THE EFFICACY OF A TOPICAL APPLICATION COMPRISING *CALENDULA OFFICINALIS Ø* AND *OLEA EUROPAEA* IN THE MANAGEMENT OF SEBORRHEIC DERMATITIS OF THE SCALP (DANDRUFF)

BY

SILINDELO MINENHLE ZONDI

Mini-dissertation submitted in partial compliance with the requirements of the Master's Degree in Technology: Homoeopathy

In the Faculty of Health Sciences

Durban University of Technology

Durban

SUPERVISOR: DR. J. C. NGOBESE-NGUBANE

CO-SUPERVISOR: DR. M. MAHARAJ

DECLARATION

This is to certify that the work is entirely my own and not of any other person, unless explicitly acknowledged (including citation of published and unpublished sources). The work has not previously been submitted in any form to the Durban University of Technology or to any other institution for assessment or for any other purpose.

The research described in this dissertation was supervised by:

DR. J. C. NGOBESE-NGUBANE – Lecturer, Department of Homoeopathy, Faculty of Health Sciences, Durban University of Technology, Durban, South Africa.

Co-supervised by:

DR. M. MAHARAJ – Senior lecturer, Department of Homoeopathy, Faculty of Health Sciences, Durban University of Technology, Durban, South Africa.

_____ _____

Silindelo M. Zondi (20604337) Date

Approved for final submission:

_____ _____

Dr. J. C Ngobese (M. Tech. Hom) Date

_____ _____

Dr. M. Maharaj (M. Tech. Hom.) Date

DEDICATION

I dedicate this dissertation:

To my late grandmother Emily maMalinga Zondi, whose love and support I will always treasure – you may have left before I commence this journey but I have no doubt you would have supported me endlessly and I will always carry you in my heart.

To my aunt Jerusa Nonhlanhla Zondi – without your tireless support and love, I would not have completed this journey. You have been in every prospect I have ever seen since – on the river, on the sails of the ship, in the clouds, in the light, in the darkness, in the wind, against all odds. You believed in me when no one else did, you believed in me when I didn't even believe in myself. There were moments where I felt like I was drowning but you saved me. All that I am or hope to be, I owe to you Nondaba, Gagashi, Nhlab'shile, Mancinza, Luqa! Uyihambe nami le ndlela. Ngiyabonga.

To my Mother Nokuthula Jelta Zondi, your constant advice, support, courage and love has kept me humble, focused and not giving up during this journey. I remember our long phones calls where I would cry and laugh simultaneously about my worries but you would turn them into a joke so I can feel better – that has made us become best friends over the years. Thank you.

Lastly to my late father, Mzikayifani Lucas Duma. I know how hurt you were in your last days in this world about leaving me so soon. You left when I was at the beginning of this journey. I am sad you did not get to see this achievement, but I will always carry you in my spirit.

ACKNOWLEDGEMENTS

My journey has a long history, but without the grace of the Almighty Lord, it would not have been completed. *"For I know the plans I have for you", says the Lord. "They are plans for good and not for disaster, to give you a future and a hope":* ***Jeremiah 29:11.***

I am deeply grateful to my supervisor, Dr. J. C. Ngobese-Ngubane who collaborated with me in the creation of this study, providing invaluable assistance in editing and revising the first parts of this dissertation. I thank her for her amazing support.

I offer my sincerest gratitude to my co-supervisor, Dr. M. Maharaj, who has tirelessly supported and guided me throughout my dissertation with her patience and knowledge while allowing me the room to work in my own way. I wish to thank her for providing help when I most needed it. I attribute the level of my Master's degree to her encouragement and effort and without her this dissertation, too, would not have been completed or written. One simply could not wish for a better or welcoming co-supervisor.

Special thanks go to Myalo Sabela, I am in awe of his amazing assistance, he came into my life in the middle of this study. I recall those long hours when he assisted me in understanding the statistical results, helped me interpret them and for the editorial and technical support. I thank him for his time, for always giving the right advice and making things look easier.

To Dr. R. Steele, thank you for your patience while editing my dissertation.

To Ntokozo 'Starring' Zulu, thank you for translating English appendices to IsiZulu.

To my friend Emmanuel Adewumi, we may be having an on-again, off-again friendship but I will always be grateful for your kindness, support and assistance towards me. I thank you for all the editorial and technical support both for this dissertation and other work not related to it.

I have also benefited from the advice of my friend Mbokodo Mbatha, "If you want to be somebody one day, accept to be nobody". These words have encouraged me not to give up throughout this journey.

To my younger brothers, Celimpilo Zondi and Ngcebo Mncwabe, we are all in this together, thank you for the love and support.

To Nondumiso ‘Soso’ Ndlovu, thank you for sharing all my good and bad times with me, I depend on you in any season of my life; you are more like a sister. I love you so much, thank you for your support.

My deepest thanks go to my friend Sbusisile Nunu Dube, thank you for being so understanding and caring. If I had to say how much it means to me, it means more than a lot.

My friend, Themba Goodhope Shandu – I may have bothered you so much but you never stop assisting me. Thank you for your continuous support and assistance.

To my late friend mam’ Tinka Mbatha, thank you for the laughter and sweet memories.

I would like to extend my sincerest thanks and appreciation to Eric Kosgey and Peter Cherop who played a role in this dissertation.

To the staff at DUT Homoeopathic Day Clinic:

The clinicians – thank you for the help with the VAS assessments.

Dr S. Brijnath – thank you for assisting me in the preparation of the research medication and dispensing the medicine.

Gugu Mkhwanazi – I thank you for all your kindness, advice and assistance.

To all the patients who participated in this study – thank you for your support, patience and helping to make this study possible.

ABSTRACT

Background

Seborrheic dermatitis (SD) also known as pityriasis capitis is a common skin condition that affects mainly the scalp, causing scaly patches, red skin and stubborn dandruff (Preedy 2012). It has been reported that dandruff occurs in at least 50% of the world's adult population and approximately 15% to 20% of the world's total population (Mia 2016). Recent studies suggest that a scalp specific yeast called *Malasseiza globosa* appears to be responsible for SD (Zhang, Ran, Xie and Zhang 2013). Seborrheic dermatitis does not affect overall health but it can be uncomfortable and may cause embarrassment and low self-esteem (Del Rosso 2011; Preedy 2012).

Anecdotal evidence at Ukuba Nesibindi Homoeopathic Community Clinic (UNHCC) indicated that patients with SD responded positively to *Calendula officinalis Ø* in combination with *Olea europaea* (olive oil). Notwithstanding this, there is a dearth of clinical data available to validate the aforesaid patient's positive response. Hence this study aims to provide clinical evidence to prove or disprove patient's response to *Calendula officinalis Ø* in combination with *Olea europaea* (olive oil).

Objective

The aim of this double blind randomized controlled study was to determine the efficacy of a topical application comprising *Calendula officinalis Ø* with *Olea europaea* in the management of SD of the scalp (dandruff).

Materials and Methods

The sample was selected by means of non-probability convenience sampling and consisted of 64 consenting participants between the ages of 18 to 50 years who had read the information letter and met the inclusion criteria. Participants were evenly distributed between the treatment and control groups according to the randomization list (32 participants in each group). The treatment group received *Calendula officinalis Ø* with *Olea europaea* and the control group received *Olea europaea* only. Three participants withdrew from the study resulting in only 61 completing the study, 30 from the control group and 31 from the treatment group. The study was conducted at the

Durban University of Technology Homoeopathic Day Clinic (DUTHDC) under the supervision of a qualified and registered homoeopathic clinician.

The duration of the study was six weeks with three consultations in total. Consultations took place on day 1, day 22 and day 43. At each consultation the participants were assessed by three individuals – the participant themselves, the researcher, and an independent party (the homoeopathic clinician on duty that day). The assessment tools included the Visual Analogue Scale (VAS) for the researcher and clinician consisting of the following categories: irritation, flaking, greasiness, percentage of the scalp involved and overall impression; and the Patient Perception Questionnaire (PPQ) for the patient consisting of the following categories: irritation, flaking, greasiness, itching and overall impression. This was accompanied by a detailed case history and physical examination performed by the researcher.

Results

Both the control and treatment groups displayed overall improvement in terms of Patient Perception Questionnaire and Visual Analogue Scale which means that a combination of *Olea europeae* with *Calendula officinalis Ø* (treatment group) and *Olea europeae* only (control group) were effective in the management of SD. There was no statistically significant difference between the effect of a combination of *Olea europaea* with *Calendula officinalis Ø* and *Olea europaea* only.

In terms of the VAS and PPQ categories, there was a statistical significance between the groups, with the exception of irritation. Significant differences found were as follows:

- Flaking (clinician and patient rated $p = 0.019$) on visit 3 for the control group.
- Greasiness (clinician and patient rated $p = 0.027$) on visit 3 for the control group.
- Greasiness (researcher and patient rated $p = 0.012$) on visit 2 for the treatment group.
- Percentage of the scalp involved (researcher and clinician rated $p = 0.013$) on visit 2 for the treatment group.
- Overall impression (researcher and patient rated $p = 0.026$) on visit 2 for the control group.
- Overall impression (researcher and clinician rated $p = 0.026$) on visit 3 for the treatment group.

Conclusion

Both the combination of *Olea europaea* with *Calendula officinalis Ø* and *Olea europaea* only improve SD. Therefore, a topical application comprising *Calendula officinalis Ø* and *Olea europaea* is effective in the management of SD of the scalp (dandruff) and therefore permits further investigation.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

DEFINITIONS OF TERMS

Alopecia

Alopecia is a condition that involves the hair follicles causing hair loss of the scalp resulting in baldness (França, Rodrigues, Ledon, Savas and Chacon 2013).

Androgens

Androgens are defined as male sex hormones that comprise several steroids with testosterone being the leading circulating androgen in the human body. Other types of steroids include dehydro sterone, androstenedione, androstenediol, androsterone and dihydrotestosterone (Chuu *et al.* 2011).

Dandruff

Dandruff is a common scalp condition presenting with flakes, pruritus and occasionally mild erythema (Kerr *et al.* 2011).

Desquamation

A regular process where the cornified layer of the epidermis is sloughed into fine scales (Jackson, *et al* 1993*).*

Desmosomes

Desmosomes are specialized and extremely well-organized membrane domains that arbitrate cell-cell contact and strong adhesion (Kowalczyk and Green 2013).

Erythema

Erythema is a usual dermatological lesion that appears as redness of the skin (Walker and Colledge 2013).

Hair follicle

Hair follicle is the structure of the skin composed of epithelium surrounding the root of a hair from which hair develops (Moore, Dalley and Agur 2013).

Keratin

Keratins are filaments that form proteins with exact physicochemical properties and are extracted from the cornified layer of the epidermis (Bragulla and Homberger 2009).

Macrophage

Macrophages are phagocytic cells that help eliminate pathogens (Liu, Zou, Chai and Yao 2014).

Macules

Macules are circumscribed changes in skin colour. The skin surface is neither elevated nor depressed in connection to the surrounding skin. Macules may vary in size or colour (Walker and Colledge 2013).

Mast cells

Mast cells are significant immune system cells; they play a powerful role as contributors to allergic reaction. They also play an important role in autoimmune diseases such as rheumatoid arthritis and multiple sclerosis (Xu and Chen 2015).

Papule

Papule is an elevated skin area with an even top, scale is commonly present e. g. psoriasis (Walker and Colledge 2013).

Pharmacopoeia

A pharmacopoeia is a legally binding collection of standards and quality specifications for medicines and drugs used in a country or regions (Allen and Ansel 2013).

Pruritis

Pruritis is a frequent dermatological complaint regarded as the symptom of itching (Tivoli and Rubenstein 2009).

Sebocytes

Sebocytes are greatly specialized, sebum-generating epithelial cells normally found in the skin in connection with hair follicles. They release their content as a result of rupture of the cell membrane and cellular degradation (Schneider and Paus 2010).

Striae gravidarum

Striae gravidarum is a physiological skin change that is experienced by the majority of women throughout pregnancy. This is commonly characterized by a reddish purple colour and lose of pigmentation. Striae become thin and atrophic in the long term after pregnancy (Yamaguchi, Suganuma and Ohashi 2012).

T-lympocyte

T-Lymphocytes are white blood cells with unvarying appearance. They are responsible for antibody production, direct cell-mediated killing of virus-infected, tumor cell, and regulation of the immune response (LaRosa and Orange 2008).

CHAPTER 1: INTRODUCTION

1.1 Problem statement

According to Del Rosso (2011) and Preedy (2012) seborrheic dermatitis (SD) is one of the most common ailments affecting the scalp. It is a benign, chronic and frequent disease that is characterized by recurrent inflammatory skin condition, causing flaky white or yellow scales. Del Rosso (2011) also states that factors that may trigger SD are hormonal imbalance, poor health, poor hygiene and improper nutrition, use of electric hair curlers or blow dryers, allergic hypersensitivity, lack of rest, emotional stress, anxiety, excessive consumption of sugar, fat, starch, hereditary predisposition, cold weather and dry indoor heating. Sometimes sensitivities to certain hair care products or hair dyes can cause a red, itchy, scaling scalp (Del Rosso 2011).

In homoeopathy, dermatologic conditions are considered to be manifestations of internal processes so treatment for these diseases is largely systemic. While no large-scale trials have been performed, a number of case reports and smaller studies have described positive results. Stibbe (1999) was the first to list dermatologic conditions for which homoeopathic remedies had been reported anecdotally to be useful, including for SD, acne, actinic keratoses, herpes, warts, and chicken pox. Studies conducted by Teleman (2005) and Kent (2005) on the effectiveness of topical homoeopathic preparation of *Selenium sulphide* 8x shampoos in the management of SD showed that there was no significant difference in the total average score of dandruff criteria symptoms between the treatment group and the control group.

In light of the current literature with all these contrasting results it is evident that there is not enough research that has been conducted in this area, thus more research is needed. This study aimed to determine in a controlled clinical trial whether the report from Ukuba Nesibindi Homoeopathic Community Clinic with regard to the efficacy of a homoeopathic topical application of *Calendula officinalis Ø* and *Olea europaea* in the management of SD of the scalp can be validated or not. *Calendula officinalis Ø* forms the basis for the homeopathic remedy *Calendula officinalis*, thus there is a need

to test the efficacy of homoeopathy in dermatological conditions especially considering that the conventional approach to treating SD is still not effective despite the progress that has been achieved. The challenge of treating dandruff lies in the successful control of its relapse. It is not easy to cure dandruff but it can be prevented (Preedy 2012). There are many over the counter dandruff treatment such as shampoos, lotions, and creams which treat the flaking and dryness (Van Wyk 2015). Severe cases may require short term treatment with oral steroids though this suppresses the immune system and may cause unwanted side effects (Dessinioti and Katsambas 2013).

1.2 Aim

The aim of the study was to determine the efficacy of a topical application comprising *Calendula officinalis Ø* with *Olea europaea* in the management of SD of the scalp (dandruff).

1.3 Objectives

- To determine the efficacy of a topical preparation in the management of SD of the scalp in terms of assessing the degree of scaling, itchiness, greasiness, irritation and percentage of scalp affected by means of a Visual Analogue Scale (VAS) (Kent 2005; Teleman 2005).
- To determine the efficacy of a topical preparation in the management of SD of the scalp in terms of assessing the degree of scaling, itchiness, greasiness, irritation and percentage of scalp affected by means of the Patient Perception Questionnaire (PPQ).
- To determine the efficacy of *Calendula officinalis Ø* with *Olea europaea* compared to *Olea europaea* alone in the management of SD of the scalp by means of a VAS (Kent 2005; Teleman 2005).
- To determine the efficacy of *Calendula officinalis Ø* with *Olea europaea* compared to *Olea europaea* alone in the management of SD of the scalp by means of the PPQ.

1.4 Statement of hypotheses

1.4.1 The first hypothesis

It is hypothesized that *Calendula officinalis Ø* and with Olea *europaea* will be effective in the management of SD.

1.4.2 The second hypothesis

It is hypothesized that *Olea europeae* only will be effective in the management of SD.

1.4.3 Null hypothesis

It is hypothesized that there will be no difference in effect between a combination of *Calendula officinalis Ø* and with *Olea europaea* and *Olea europaea* only in the management of SD.

1.5 Conclusion

Del Rosso (2011) claimed that SD has no effect on the overall health condition of the patient but is a source of discomfort, embarrassment and low self-esteem. This condition has been managed using various allopathic treatments which temporarily stops the symptoms during the treatment but often resurfaces when the administration is stopped and sometimes it becomes worse. This leads to waste of money and time without any substantial improvement (Kent 2005).

Smith, Baker and Williams Jr (2002) and Mia (2016) conducted a study that showed improvement on the condition. Kent (2005) and Teleman (2005) conducted a study on SD using homoeopathically prepared *selenium sulphide* both topically and orally, however they responded ineffectively in the management of dandruff. Thus, literature on the topic does not show vast evidence of recorded clinical trials with regards to the condition and the trials that are recorded show contradictory results; hence more research is needed in this area for validation of “complementary medicine”, treatment protocols and management of the condition.

CHAPTER 2: REVIEW OF RELATED LITERATURE

2.1 Seborrheic dermatitis

2.1.1 Definition

Seborrheic dermatitis is a common, chronic, relapsing skin condition developing on areas of the body with sebaceous glands including the scalp, face, nasolabial folds, ears and eyebrows and upper part of the trunk (chest/presternal region) (Gary 2013). According to Gary (2013) SD usually present with erythema (scaly patches, red skin) and itching. Dandruff is the most common symptom of seborrhoeic dermatitis affecting mainly the scalp causing flaking, itching, irritation and greasiness (Misery, Rahhali, Duhamel and Taieb 2013). Dandruff can also develop from other skin conditions such as psoriasis and eczema (Misery *et al.* 2013). According to Teleman (2005) and Del Rosso (2011), SD doesn't affect overall health but it can be uncomfortable and affect sufferers on a psychological level causing embarrassment and low self-esteem. Teleman (2005) further states that it is a common scalp condition that occurs when dead skin is shed as loose, white flakes and may be itchy. Scratching may cause additional inflammation in the area and may cause breaks in the skin, which can lead to mild infections or bleeding. Seborrheic dermatitis can have many different causes: hormones may play a role and yeast called *Malassezia*, which is normally present on the skin, may overgrow and cause skin problems. Complications of SD are psychological distress, low self-esteem, embarrassment and secondary bacterial or fungal infections (Teleman 2005; Preedy 2012).

2.2 Skin anatomy and physiology

The skin is a major organ of the human body (Moore, Dalley and Agur 2013). It constitutes 16% of human body weight with an average of 4kg of its own weight and a surface area of 1.8 m^2 (Fenner and Clark 2016). The skin has numerous body functions which protect the body and retain body balance, including preventing loss of body fluids, aid in regulation of body temperature and protection against external physical and chemical stimuli (Kolarsick, Kolarsick and Goodwin 2011). It is consistent

with the mucous membrane of respiratory system, digestive tract and urogenital tract and produces hair, nails and sweat glands (Fenner and Clark 2016). The skin is composed of three layers: the epidermis, the dermis and subcutaneous tissue (Moore, Dalley and Agur 2013) (Figure 1).

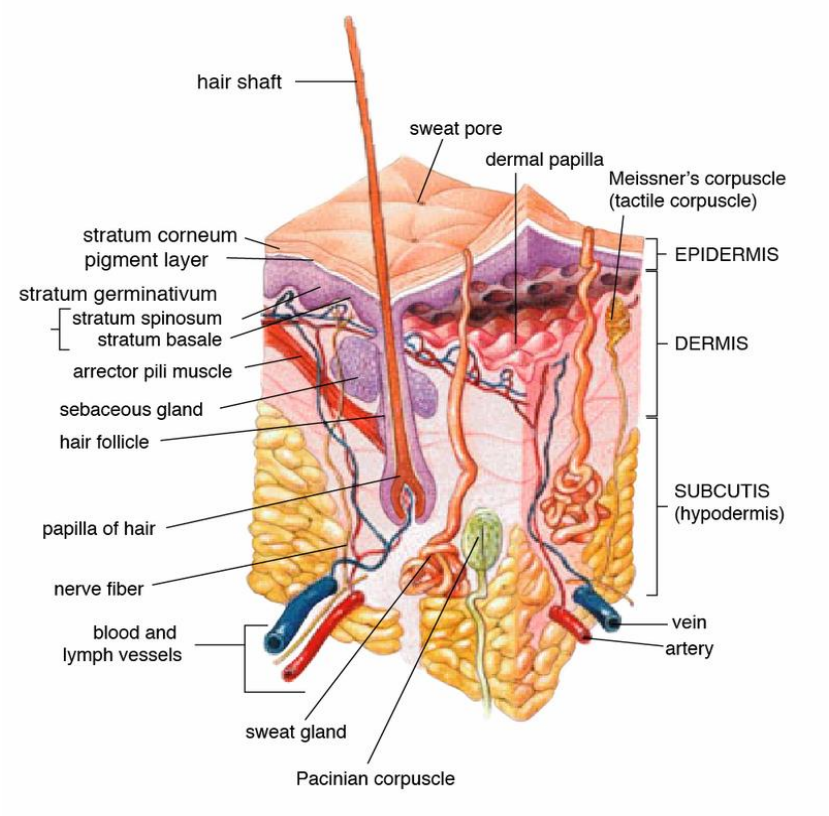


Figure 1: Skin Structure
Source: Paetow 2014

2.2.1 The epidermis

According to Rousso and Bassiri-Tehrani (2015) and Fenner and Clark (2016), the epidermis is the most superficial layer of the skin consisting of both thin and thick skin. The thick skin of the epidermis is found on the surfaces without hair, sebaceous glands and arrector pilli muscles. These surfaces include palmar of the hands and plantar of the soles and the remainder of the body surfaces consist of thin skin, with the eyelids being the thinnest with reduced cellular layers (Fenner and Clark 2016).

The epidermis is divided into five layers namely: stratum corneum, stratum lucedum, stratum granulosum, stratum spinosum and stratum basale (Jenkins and Tortora 2011) (Figure 2).

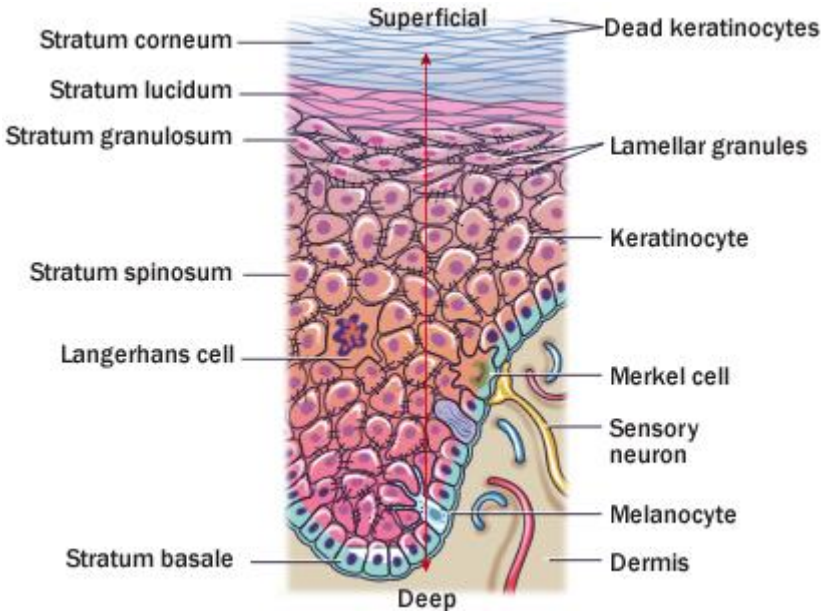


Figure 2: Layers of the epidermis
Source: Jessica 2014

2.2.1.1 Stratum corneum

The stratum corneum is the outermost, lipophilic layer of the epidermis and contains less than 20% of water. The stratum corneum consists of corneocyte cells which cover most of this layer. Corneocytes prevent invasion of any harmful substances and its lipophilic properties prevent loss of body fluids (Rousso and Bassiri-Tehrani 2015).

2.2.1.2 Stratum lucedum

The stratum lucedum is made up of dead skin cells and is found only on thick surfaces of the skin, that is, palms of the hands and soles of the feet and fingertips (Jenkins and Tortora 2011).

2.2.1.2 Stratum granulosum

The stratum granulosum is a thin layer also called the granular layer, and consists of keratohyalin granules forming keratin. This layer in conjunction with the overlying stratum corneum retains and prevents loss of water through the lipophilic structure (Rousso and Bassiri-Tehrani 2015).

2.2.1.3 Stratum spinosum

Stratum spinosum is also referred to as the spinous layer, labelled as ‘prickly’ due to the histologic appearance of their desmosomes. Both stratum spinosum and basale are labelled Malpighian layer (Rousso and Bassiri-Tehrani 2015).

2.2.1.4 Stratum basale

The stratum basale is the innermost layer of the epidermis. This layer separates the epidermis from the dermis. Cuboidal cells and melanin pigment are found in this layer (Rousso and Bassiri-Tehrani 2015).

2.2.1.4.1 Types of cells of the epidermis

The epidermis consists of four types of cells, namely: keratinocytes, melanocytes, Langerhans cells and Merkel cells (Jenkins and Tortora 2011).

- **Keratinocytes**

The keratinocytes are the primary cells of the epidermis and produces keratin and filaggrin which promote barrier function, they are initially found on the innermost basal layer of the epidermis then travel up through all epidermal layers until they reach the corneum layer forming dead superficial layers of the skin called the keratinized layer or the cornified layer (Hirobe 2014).

- **Melanocytes**

The melanocytes are dendritic cells situated in the epidermal basal layer and produces melanosomes (pigment producing granules) that are responsible for skin colour (Cichorek, Wachulska, Stasiewicz and Tyminska 2013).

- **Langerhans cells**

The Langerhans cells form a small part of epidermal cell. They are acquired from the bone marrow and are distributed amongst keratinocytes within the stratum spinosum. These cells are the foremost immunologic barrier in the skin (Jenkins and Tortora 2011).

- **Merkel cells**

The Merkel cells are slow adapting sensory receptors and are responsible for sensation. They form part of the stratum basale and are found on the palms of the hands, soles of the feet, nail bed, oral and genital mucosa (Fenner and Clark 2016).

2.2.2 The dermis

The dermis is located between the epidermis and subcutaneous tissue providing both nutrition and support to the overlying epidermis. Like the epidermis it consists of both thick and thin skin, being thinnest on the eyelids and thicker on the back. It is thicker than the epidermis (Rousso and Bassiri-Tehrani 2015; Fenner and Clark 2016). The main structure of the dermis is collagen (Type I to Type V) which is responsible for the strength of the dermis, with type I to III found in scars after wound healing (Rousso and Bassiri-Tehrani 2015). Another structures found in the dermis are mast cells, macrophages and elastic fibers. Elastic fibers provide skin recoil; the damage of this structure by aging and ultraviolet light results in wrinkles (Rousso and Bassiri-Tehrani 2015).

2.2.3 The subcutaneous layer

The subcutaneous layer also referred to as hypodermis is found underneath the dermis and above the muscles. The hypodermis mostly consists of adipocytes also known as fat cells. The hypodermis provides a cushion functions and insulation for the body against the cold. The adipocytes are also a source of energy as the fat cells can be converted to energy (Fenner and Clark 2016).

2.2.4 The skin appendages

According to Fenner and Clark (2016), the skin consists of various appendages including hair, adenexal glands and nails.

2.2.4.1 The hair

The hair is present in most areas of the skin except on the palms of the hands and soles of the feet. The hair provides essential functions; for example, the hair located at the scalp provides protection from cancer whereas the hair located in the eyelashes, eyebrows and nose provides protection from airborne particles. The beard, pubic and axillary hair appears in puberty and is darker, thicker and longer compared to the hair

on other surfaces. Melanocytes are responsible for hair colour (Fenner and Clark 2016).

2.2.4.2 The nails

The functions of fingernails include protecting fingertips, promoting sensation and assisting in holding small objects. Fingernails grow faster than toenails (Kolarsick, Kolarsick and Goodwin 2011).

2.2.4.3 The adenexal glands

The adenexal glands are divided into four major different types of glands. These glands include eccrine, apocrine and apoccrine sweat glands and sebaceous glands (Walker and Colledge 2013).

- **The eccrine sweat glands**

The eccrine sweat glands are commonly located in the palms of the hands and soles of the feet however they can also be found in other areas of the body. Their function is to control body temperature and excrete commonly odorless sweat onto the skin surface (Walker and Colledge 2013).

- **The apocrine sweat glands**

The apocrine sweat glands are commonly found in the axillary and anogenital regions and they only play a role at puberty, stimulated by hormonal changes such as androgens (Walker and Colledge 2013).

- **The apoeccrine sweat glands**

These glands are called apoeccrine because they contain both apocrine and eccrine sweat gland features. These glands are only situated on the adult axillae (Fenner and Clark 2016).

- **The sebaceous glands**

The body parts with sebaceous gland include the scalp, face, nasolabial folds, ears and eyebrows and chest (Dessinioti and Katsambas 2013). These glands are connected to the hair follicles of the dermis and secrete and produce sebum, which is an oily substance responsible for protection and lubrication of the skin, promoting

healthy hair growth. Sebaceous glands are also responsible for acne and cause oily skin when they produce more oil (Fenner and Clark 2016).

2.3 Incidence and epidemiology

Seborrheic dermatitis occurs worldwide and has an effect on all races (Okokon, Verbeek, Ruotsalainen, Ojo and Bakhoya 2015). The prevalence of SD in the global population ranges between 15 % to 25 % and is more common in men than in woman (Mia 2016). According to Farhat and Gold (2014) SD is divided into infantile and adult SD.

2.3.1 Infantile seborrheic dermatitis

Infantile SD also referred to as ‘cradle cap’, is commonly found on the scalp, (Teoh and Tay 2015) but can also be found on the face and diaper areas (Okokon *et al.* 2015). Infantile SD develops in the first three months of life and settles after one year of age. It occurs in up to 42% of children, more commonly in boys than girls, as shown in an Australian survey where SD incidence was 10% in boys and 9, 5% in girls. In generally, the level of incidence is high on the first three months of birth, however can also be observed in children between ages one to five years (Teoh and Tay 2015).

2.3.2 Adult seborrheic dermatitis

Adult SD is found on the scalp, seborrheic areas of the face, upper chest, axillae and inguinal folds (Borda and Wikramanayake 2015) and is worse during winter (Mia 2016). Adult SD occurs in 50% of healthy adults between ages 30 to 60 (Mia 2016) appearing at puberty and becoming worse by the age of 20 years (Borda and Wikramanayake 2015). It is more common in males than in females, possibly due to male hormones and because males have larger sebaceous glands that produce oil (Mohamed, Farahat, Megallaa and Elhaleem 2014).

The prevalence of SD is highest in HIV/AIDS patients (Borda and Wikramanayake 2015; Okokon *et al.* 2015). Farhat and Gold (2014) state that SD develops in 36% of patients with early HIV infection and 50% to 83% of AIDS patients.

Seborrheic dermatitis is widespread in patients with Parkinson’s disease and in mood disorder patients such as depression, anxiety and schizophrenia and can also be

found in genetic disorders such as familial amyloidosis with polyneuropathy and Down's syndrome (Farhat and Gold 2014).

2.4 Risk factors of seborrheic dermatitis

According to Dessinioti and Katsambas (2013) up to 80% of people with SD are immunosuppressed patients compared to the prevalence of normal people which ranges between 1% to 3%. Immunosuppressive diseases include HIV/AIDS, chronic alcoholic pancreatitis, organ transplant recipients, hepatitis C virus and different types of malignancies. Other risk factors which may cause SD include emotional stress, mood depression, fatigue, systemic infection, use of certain medication, exposure to damp or dry air, low exposure to sunlight and people with Parkinson's disease (Gary 2013). Gary (2013) further states that SD is more common in men than women and occurs equally in all racial and ethnic groups. There are no differences between ethnic groups (Borda and Wikramanayake 2015). Many studies conducted on SD indicate that SD can happen in any season but has proven to be worse in winter and get better when exposed to sunlight (Dessinioti and Katsambas 2013). Heredity accounts for only a very small percentage as a risk factor in causing SD (Schwartz *et al.* 2013).

2.4.1 Seborrheic dermatitis and HIV/AIDS

Seborrheic dermatitis is common in HIV/AIDS patients. Its progression is associated with a decrease in CD4 count to 200 or less and an increase in T lymphocyte cells count to 500/mm^3 or more. This demonstrates that immunological defects may be responsible for SD (Borda and Wikramanayake 2015).

2.4.2 Seborrheic dermatitis, neurogenic factors and emotional disorders

Seborrheic dermatitis is commonly found in Parkinson's disease patients and other neurologically damaging conditions such as traumatic brain and spinal cord injury, due to elevated sebum levels (Farhat and Gold 2014). Sebum level production is increased following the use of neuroleptic drugs including chlorpromazine hydrochloride and haloperidol for neuroleptic induced Parkinsonism, emotional disorders such as schizophrenia, and anxiety. L-dopa has shown improvement in decreasing levels of sebum and in managing SD (Farhat and Gold 2014).

2.4.3 Seborrheic dermatitis and genetic factors

Heredity is a recently recognized factor which plays a minor role in the contribution of SD. Some studies have been conducted on mice and detected an inherited dominant and recessive forms of SD. Induced mutation mice of autosomal recessive inherited SD produced seborrhea like symptoms, alopecia, rough coat, delay of growth and occasionally abnormal pigmentation in homozygous mutants. Enlarged sebaceous glands and abnormal structures of the epidermis and dermis were discovered on histological examination; however, no yeast growth was identified (Borda and Wikramanayake 2015).

2.4.4 Other risk factors of seborrheic dermatitis

Many studies conducted on SD indicates that SD can happen in any season but it has proven to be worse in winter and improve when exposed to sunlight (Dessinioti and Katsambas 2013; Farhat and Gold 2014). However, mountain guides developed SD due to increased exposure to ultraviolet (UV) and UV-induced immunosuppression, moreover psoralen plus UVA (PUVA) light treatment promotes SD, while narrowband UVB (NBUVB) improves SD (Farhat and Gold 2014).

Zinc deficiency conditions such as acrodermatitis enteropatica, riboflavin, pyridoxine and niacin deficiencies are other predisposing factors of SD, presenting with a rash related/similar to SD (Borda and Wikramanayake 2015). Poor hygiene also plays a role in the development of SD (Mohamed *et al.* 2014).

2.5 Etiology of seborrheic dermatitis

The cause of Seborrheic dermatitis (SD) is still not clear but yeast called *Malassezia* seems to be one of the causes of SD. This is normally present on the skin, but may overgrow and cause skin problems (Zhang *et al.* 2013). Isaiah and Karthikeyan (2015) and Belekar and Raut (2015) state that the cause of SD lies in three factors including *Malassezia*, sebum and individual susceptibility. According to Zareei, Mohammadi, Borjian Borujeni and Hashemi (2016) *Malassezia* has 14 species namely: *M. furfur, M. obtusa, M. globosa, M. slooffiae, M. sympodialis, M. pachydermatis, M. restricta, M. dermatis, M. equina, M. japonica, M. nana, M. yamatoensis, M. caprae and M. cunicoli* with *M. globosa* being the main cause of SD. However, in a study conducted by Zhang

et al. (2013) indicated that both *M. globosa* and *M. restrica* are the main cause of SD with *M. globosa* leading.

Malassezia is commonly found in areas rich in sebum/areas with sebaceous glands such as the face, scalp, trunk and back (Gary 2013). This yeast is present in almost 90% humans depending on individual sensitivity and exposed risk factors. This yeast is lipophilic, and targets areas with sebaceous glands causing them to produce more fat to use as their source of energy, causing SD (Zareei *et al.* 2016).

2.5.1 Sebaceous gland activity

Sebaceous glands on skin surfaces are found all over the body except the palms and soles, but are predominant on the scalp, face and trunk (Dessinioti and Katsambas 2013). The function of the sebaceous glands is to secrete and produce sebum which is under hormonal control; their action is initially stimulated at birth by maternal androgens through androgen receptors in sebocytes and they are stimulated again at puberty by circulating androgens leading to increased levels of sebum secretion in adolescence. Sebum secretion is constant between ages of 20 and 30 years then decreases. Sebum secretion is more elevated in males than females beginning at the age of 30 years and is long lasting until the age of 60 years and decreases after menopause in females (Borda and Wikramanayake 2015).

Borda and Wikramanayake (2015) state that not every individual with increased sebum production develops SD and not all individuals with SD have increased sebum production therefore increased sebum production on its own is not a conclusive cause. Furthermore, increased levels of sebum in SD patients may disrupt the synthesis of lipids, decreasing the levels of triglycerides and squalene and increasing the levels of free fatty acids and cholesterol in SD patients, which may result in *Malassezia* growth causing inflammation of the skin (Jourdain *et al.* 2016).

2.5.2 Other causes

According to (Van Wyk 2015) other causes of SD include:

- Dry skin which causes flaking and itch.
- Unhygienic conditions, not washing hair consistently.
- Eczema (skin disorder), when present on scalp can cause dandruff.
- Psoriasis (skin disorder) which present with thick, silvery scales also affect the scalp.
- Sensitivity of the scalp to shampoos and other hair care products, that is contact dermatitis.
- Insufficient intake of natural fat or other certain fat types in diet.
- Deficiency of B vitamins and Zinc.

While (Mohamed *et al.* 2014) states that SD causes have non-microbial and microbial factors, non-microbial factors include:

- Extreme exposure to sunlight.
- Exposure to dust and dirt.
- Irritation of the scalp due to sensitivity of shampoos or not rinsing hair efficiently.
- Inappropriate diet with excessive consumption of junk food and excessive consumption of fat, starch and sugar.
- Tight fitting hats and scarves.
- Combing hair repeatedly.

Microbial factors include *Malassezia* yeast.

2.6 Pathophysiology of seborrheic dermatitis

According to Borda and Wikramanayake (2015) and Clark, Pope and Jaboori (2015), the pathophysiology of SD is still not clear but *Malassezia* yeast appears to be responsible. These authors further state that other factors which contribute to pathophysiology include sebaceous gland activity and individual susceptibility. As stated in Section 2.4, *Malassezia* is commonly found in more than 90% of human skin and forms part of the skin flora; its abnormal proliferation is due to individual susceptibility factors which eventually cause SD and is present in more than 50% of the human population (Zareei *et al.* 2016).

Malassezia yeast is lipophilic and survives in rich sebum areas. Once stimulated by predisposing factors they overgrow and penetrate the stratum corneum layer of the skin producing unsaturated fatty acids such as oleic and arachidonic acid, using these as their source of energy causing abnormal keratinocytes. This leads to inflammatory response, inflammation (redness, itching and scaling), abnormality and damage to the barrier function of stratum corneum, causing loss of water through the cells (Clark, Pope and Jaboori 2015). Borda and Wikramanayake (2015) state that *Malassez*ia is not the only aetiology of SD but rather *Malassezia* together with individual susceptibility and host interactions have an effect on the pathophysiology of SD. This was evident in a study conducted by them in which subjects with and without SD topical applied oleic acid. Non-SD subjects did not display any changes compared to SD subjects who showed changes causing flaking in previously unaffected scalp areas.

2.7 Clinical presentation of seborrheic dermatitis

Seborrheic dermatitis generally presents with flaking, itching, irritation, dryness and greasiness, mainly affecting the scalp as mentioned in 2.1 (Misery *et al.* 2013). Clinical features of infant SD disappear after three months whereas adult SD relapses (Jackson-Richards and Pandya 2014).

2.7.1 Clinical presentation of infant seborrheic dermatitis

The scalp presents with non-itchy, red-yellow thick greasy scales commonly known as ‘cradle cap’ and is a common clinical occurrence (Teoh and Tay 2015). The affected areas of the face (forehead, eyebrows, eyelids and nasolabial folds) and body flexures (neck, axillae and inguinal areas) present with erythema, scales with plaques. Irritation symptoms may be absent (Jackson-Richards and Pandya 2014) (Figures 3 and 4). The trunk is the next most affected area spreading to the lower abdomen with flaking and sharply dermacated plaques of erythema (Borda and Wikramanayake 2015).

The general signs and symptoms include Leiners disease which is associated with immunosuppression and pruritis (although pruritus may be absent). Diarrhoea and failure to thrive which disappear within weeks to a few months can also occur in the presence of the above mentioned clinical features (Borda and Wikramanayake 2015).

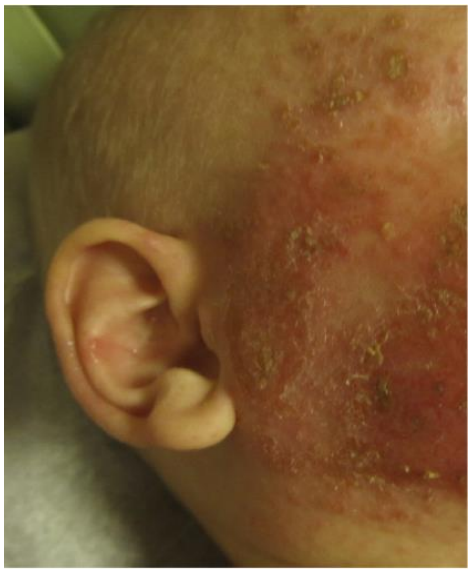


Figure 3: Erythematous, weeping plaques on the scalp and face in an infant with seborrheic dermatitis
Source: Thambyayah and Amuthan 2015

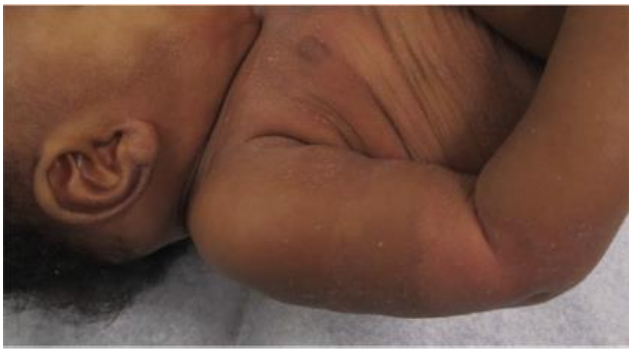


Figure 4: Cradle cap (white type) showing white dusty and dried scales
Source: Thambyayah and Amuthan 2015

2.7.2 Clinical presentation of adult seborrheic dermatitis

Seborrheic dermatitis in the adult affects the scalp, anterior hair line, eyebrows, glabella region of the forehead, nasal alar creases, melolabial folds, ears (external canal, anterior region and retro-auricular region), central chest (sternum area) and genital region (Del Rosso 2011) (Figures 5 and 6).

The scalp presents with honey coloured crusts in the hair leading to alopecia. Pruritis can be present but it is unusual (Borda and Wikramanayake 2015). The face presents with erythema, white or yellow coloured flakes between the eye lashes, erythema on the forehead, eyebrows and nasolabial folds, and may extend to the malar regions and cheeks (Okokon *et al.* 2015). The retro-auricular region presents with crusting, exuding and cracks which may extend to the external canal with itching (Borda and

Wikramanayake 2015; Okokon *et al.* 2015). Erythema is also visible in men with beards or moustaches which often disappear after removing these (Okokon *et al.* 2015).

The upper chest can either present with reddish follicular, small greasy flakes with macules and patches which are oval-shaped (worse in people with *Pityriasis rosea*). The body folds such as axillae, umbilicus, breast fold, genital and inguinal area present with moist erythema, which may advance into cracks and secondary infection (Borda and Wikramanayake 2015).

Generally, SD can be very severe in immunodeficiency patients in both children and adults with HIV, more often with CD4 counts less than 200 and is stubborn to treatment spreading to uncommon sites of SD such as extremities. Other skin conditions associated with seborrheic dermatitia include rosacea, psoriasis and acne (Borda and Wikramanayake 2015).

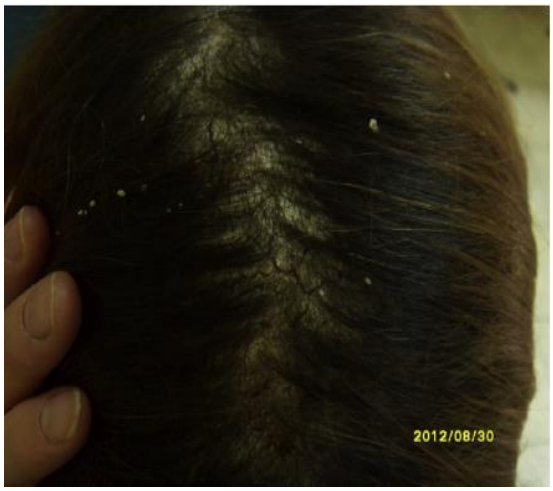


Figure 5: Erythema and extensive scaling of the scalp
Source: Dessinioti and Katsambas 2013

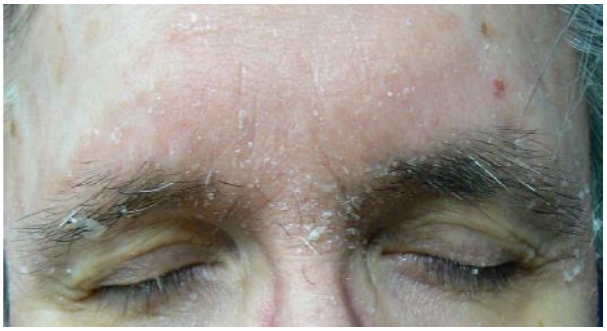


Figure 6: Seborrheic dermatitis of eyebrows
Source: Clark, Pope and Jaboori 2015

2.8 Complications of seborrheic dermatitis

Complications of SD include psychological distress (low self-esteem, embarrassment, anxiety) and secondary bacterial or fungal infection (Teleman 2005).

2.8.1 Secondary infection

Other physical conditions or diseases are unlikely to develop due to SD. Rarely, SD can cause secondary infection if the micro-organisms invade and destroy the skin (Patient.info 2016).

2.8.2 Psychological distress

The quality of life of a patient can be negatively affected by SD as it impacts on one's emotions by causing stigma, discomfort, loss of self-confidence and withdrawal from social activities (Araya, Kulthanan and Jiamton 2015).

2.9 Diagnosis of seborrheic dermatitis

According to Borda and Wikramanayake (2015) the diagnosis of SD can be acquired through a case history and physical examination of the patient. Clark, Pope and Jaboori (2015) state that the diagnosis of SD is established through the appearance and location of the skin lesions, developing in areas rich in sebaceous glands. In infants SD appear as a non-itchy rash with red-yellow thick greasy scales of the scalp and nappy rash while in adolescents and adults it is commonly distributed on the scalp presenting with irritation, itching, yellow flakes and greasiness. Other areas include face, upper chest, body folds and nasolabial folds presenting with rash with red or white scaly patches (Okokon *et al.* 2015). There is usually no need for blood, urine or allergy tests. However, if the condition is not responding to treatment a skin biopsy may be performed to rule out other causes (Clark, Pope and Jaboori 2015).

2.10 Differential diagnosis of seborrheic dermatitis

The differential diagnosis of SD includes atopic dermatitis, contact dermatitis, candidiasis, erythrasma, impetigo, lichen simplex chronicus, pityriasis rosea, psoriasis, secondary syphilis, systemic lupus eythematosus, and tinea capitis corpus (Borda and Wikramanayake 2015; Clark, Pope and Jaboori 2015).

2.10.1 Atopic dermatitis

Atopic dermatitis is associated with a family history of eczema, hayfever and asthma. It involves both infants and adults and is first noticeable after the first 3 months of life in infants and is self-limited by the age of 12 presenting with pruritis and restlessness developing on the scalp, cheeks and extensor areas and involves flexures in adults with lichenification (Borda and Wikramanayake 2015; Clark, Pope and Jaboori 2015).

2.10.2 Contact dermatitis

Contact dermatitis can be due to irritation or allergic reaction. Irritation from poisonous substances can cause swelling, blisters, ulcerations, fissures due to dry and tense skin. Allergic contact dermatitis can be from perfumes, skin care products, and poison ivy and presents with dry, red, flaky skin, hives, blisters, extreme itching and swelling most commonly on the eyes, face and groin areas (Clark, Pope and Jaboori 2015).

2.10.3 Candidiasis

Candidiasis is a fungal skin condition commonly caused by *Candida albicans*. It is common in HIV patients with CD4 count less than 200 and it affects the inside lining of the mouth and cheeks causing white patches resulting in a red raw surface after scratching (Walker and Colledge 2013).

2.10.4 Erythrasma

Erythrasma presents with asymptomatic or less itchy brown-red skin lesions with some flakes located on toe webs and in the flexures (Walker and Colledge 2013).

2.10.5 Impetigo

Impetigo is a bacterial, contagious, superficial skin infection more common in late summer caused by *Streptococci* and/or *Staphylococci*; affecting both children and adults but more commonly in young children presenting with blisters that rupture and form golden crusts (Walker and Colledge 2013).

2.10.6 Lichen simplex chronicus

Lichen simplex chronicus presents with eczema like eruptions due to constant scratching of the area, which becomes a habit. Areas involved include neck, lower

legs and anogenital areas. It is more common in adults but can also be seen in children (Walker and Colledge 2013; Clark, Pope and Jaboori 2015).

2.10.7 Pityriasis rosea

Pityriasis is a viral skin condition with acute onset, presenting with herald patch distributed in a Christmas or fir tree pattern with erythematous papules over the neck trunk, flexures and proximal extremities. It can last up to three months (Walker and Colledge 2013; Borda and Wikramanayake 2015; Clark, Pope and Jaboori 2015).

2.10.8 Psoriasis

Psoriasis is a chronic infammatory skin disease presenting with erythema plaques with thick silvery-white scales commonly located on the scalp, nails, flexus and palms. It is a non-infectious disease, is unusual in children, and can be linked to family history (Walker and Colledge 2013; Borda and Wikramanayake 2015).

2.10.9 Secondary syphilis

Secondary syphilis skin features include maculopapular rash with scales located on the trunk, palms and soles of the limbs and flu like symptoms (lymphadenopathy, fever, malaise and headache) (Walker and Colledge 2013; Clark, Pope and Jaboori 2015).

2.10.10 Systemic lupus erythematosus

Systemic lupus erythematosus is a multisystem connective tissue disease, with a skin presentation which includes malar rash due to photosensitivity which is distributed in a butterfly shape situated on nasolabial folds (Walker and Colledge 2013; Borda and Wikramanayake 2015; Clark, Pope and Jaboori 2015).

2.10.11 Tinea capitis

Tinea capitis is an extremely contagious fungal infection frequently seen in children affecting the scalp presenting with hair loss patches with some scaling and “black dot” (broken hair). Diagnosis is confirmed by microbiological culture of a sample from the area and microscopy of the hair affected (Walker and Colledge 2013; Borda and Wikramanayake 2015).

2.11 Management of seborrheic dermatitis

The treatment of SD is still not effective regardless of the progress that has been accomplished. The challenge of treating SD lies in the successful control of its relapse. It is not easy to cure SD but it can be prevented (Preedy 2012). The treatment of SD is aimed at eliminating visible signs and improves the symptoms such as pruritis since there is no permanent cure for it (Del Rosso 2011). Topical anti-fungal and anti-inflammatory treatments are the foremost treatment used due to local irritation and inflammation caused by *Malassezia* fungi (Borda and Wikramanayake 2015). Other treatement of SD include zincpyrithione, metronidazole, coal tar shampoos, selenium sulphide, benzoyl, azalaic acid, phototherapy (Stefanaki and Katsambas 2010). Frequently used over-the-counter preparations include the following shampoos: coal tar, selenium sulphide, tea tree oil and zinc pyrithione (Clark, Pope and Jaboori 2015; Van Wyk 2015).

Infantile SD can be treated with mineral or olive oil and petroleum jelly; these aid to loosen the scales, subsequently eliminating them gently with a cloth or hair brush. The U. S. Food and Drug Administration has not approved any shampoos to be used by children under two years old (Clark, Pope and Jaboori 2015).

2.11.1 Allopathic treatment

2.11.1.1 Anti-fungal agents

Topical anti-fungal agents are responsible for control and inhibition of the growth of fungi. They are applied externally in all affected skin areas including thin, sensitive and infantile skin. They are often used in conjunction with other anti-seborrheic treatments such as topical corticosteroids to promote an anti-fungal and anti-inflammatory activity (Dessinioti and Katsambas 2013).

- **Ketoconazole**

Ketoconazole is the foremost treatment for mild to severe SD, and is commonly used when other SD treatment are not effective. This treatment inhibits the growth of *Malassezia.* Ketoconazole 2% shampoo is used twice a week for two to four weeks, then once a week when necessary (Van Wyk 2015).

- **Bifonazole**

Bifonazole 1% cream is also effective when applied once a day and has shown improvement in scalp SD when diluted with 40% of urea. A randomized, double-blind study was conducted on 44 patients and bifonazole shampoo which was applied 3 times a week showed more improvement compared to the placebo group (Stefanaki and Katsambas 2010).

- **Miconazole**

Miconazole cream can be applied once or twice daily (Borda and Wikramanayake 2015), applied on its own or diluted with hydrocortisone (Stefanaki and Katsambas 2010).

- **Ciclopirox**

Ciclopirox consists of both anti-fungal and anti-inflammatory properties; with 1% ciclopirox cream being effective for facial SD compared to placebo. The effectiveness relies on the dosage with more improvement on 1% compared to 0.1% and 0.3%. Ciclopirox 1.5% shampoo is effective when diluted with 3% of salicyclic acid or 1% of zinc pyrithione (Stefanaki and Katsambas 2010).

- **Zinc Pyrithione**

Zinc Pyrithione prevents *Malassezia* proliferation which is responsible for elevated cellular levels of copper causing impairment in sulphur proteins that are responsible for fungal metabolism (Dessinioti and Katsambas 2013). Zinc pyrithione (1%) is effective when used as a shampoo 2 to 3 times a week (Borda and Wikramanayake 2015). The adverse effects of zinc pyrithione are irritation (Clark, Pope and Jaboori 2015).

- **Selenium sulphide**

Selenium sulphide can be used as a shampoo, lotion, cream, foam and suspension, and is effective in treating SD due to its fungicidal activity to *P ovale* and its keratolytic effects (Dessinioti and Katsambas 2013). Selenium sulphide shampoo (1%) is commonly used and causes an orange-brown discoloration side effect on the scalp in children which is reversible and easily eliminated with an isopropyl alcohol swab. This discoloration process is considered normal and as part of the treatment process and should not be confused with Langerhans histiocytosis (Dessinioti and Katsambas

2013). Other side effects of selenium sulphide shampoo include alopecia and irritation (Clark, Pope and Jaboori 2015).

- **Anti-fungal adverse effects**

The common adverse effects of anti-fungals are contact and allergic dermatitis, irritation, photosensitivity, pruritis and xeroderma (Clark, Pope and Jaboori 2015).

2.11.1.2 Corticosteroids

Low to medium potency of corticosteroids are normally used for intense or extreme SD, diluted with an anti-fungal agent or on its own, to minimize inflammation. Corticosteroid treatment should not be frequently used due to its adverse effects which include skin atrophy, telangiectasis, hypertrichosis and perioral dermatitis (Stefanaki and Katsambas 2010). Corticosteroid medication used for scalp, facial and body SD include betamethasone 0.12% foam and 1% cream or lotion, fluocinolone 0.01% shampoo, cream, oil and solution, clobetasol shampoo 0.05% alternating with 2% ketoconazole shampoo, 0.05% desonide foam, cream, gel, lotion, and ointment, and hydrocortisone 1% cream or ointment (Clark, Pope and Jaboori 2015).

- **Corticosteroids adverse effects**

Common adverse effects of corticosteroids are hypopigmentation, pruritis, erythema, folliculitis, stinging, burning and dryness of the skin, upper respiratory tract infection, cough, fever and rhinorrhea (Clark, Pope and Jaboori 2015).

2.11.1.3 Immuno-modulators

Immuno-modulators are agents that control the immune reaction of the skin (Sujay, Sharma and Sumanth 2004) preventing production of cytokine by T lymphocyte. Tacrolimus 0.1% ointment is one of the immune-modulators used in the management of SD, and is used on the skin 1 to 2 times daily for four weeks then twice a week for maintenance. Frequent use can cause lymphoma and skin malignancy (Borda and Wikramanayake 2015).

2.11.2 Other allopathic treatments

2.11.2.1 Coal tar

Coal tar shampoo 4% is used to treat SD because of its anti-inflammatory, anti-fungal, anti-proliferative properties and its inhibition of sebum production (Stefanaki and Katsambas 2010; Borda and Wikramanayake 2015). Coal tar shampoo's adverse effects include photosensitivity, folliculitis and contact dermatitis (Clark, Pope and Jaboori 2015)

2.11.2.2 Lithium

Lithium succinate and gluconate 8% ointment has shown improvement in treating SD because of its anti-inflammatory properties. It is used twice a day for 8 weeks (Stefanaki and Katsambas 2010; Borda and Wikramanayake 2015). Stefanaki and Katsambas (2010) further state that both lithium succinate and gluconate are effective in treating SD patients with HIV.

2.11.2.3 Metranidazole

Metronidazole 0.75% gel is used twice daily for four weeks (Stefanaki and Katsambas 2010; Borda and Wikramanayake 2015). It acts as an anti-inflammatory agent preventing free radical species. Frequent use of metronidazole can cause rare contact sensitization (Borda and Wikramanayake 2015).

2.11.3 Allopathic systemic treatment of seborrheic dermatitis

Systemic treatment and oral anti-fungals are commonly considered in extreme cases of SD and if SD does not respond to topical treatment. The use of oral ketoconazole 200mg daily for four weeks has shown improvement in SD of the scalp and body, and the daily use of itraconazole 200 mg for seven days has also shown improvement (Dessinioti and Katsambas 2013). The use of oral ketoconazole and itraconazole can cause liver toxicity adverse effect, and itraconazole is preferred over ketoconazole because it has less risk of developing liver toxicity (Dessinioti and Katsambas 2013; Borda and Wikramanayake 2015). Another systemic therapy called terbinafine is effective in SD, 250mg taken once a day for four to six times a week or for twelve days a month for three months (Borda and Wikramanayake 2015).

2.11.4 Phototherapy

2.11.4.1 Ultraviolet B (UVB)

Exposure to sun or summer improves SD, UVB act as an immune-modulator and prevents cell proliferation. A dose of 9.8J/cm^2 is essential three times a week for eight weeks or until signs and symptoms disappear (Stefanaki and Katsambas 2010; Borda and Wikramanayake 2015). Ultraviolet B adverse effects include burning, itching sensation during and after therapy, and frequent use results in genital tumor development (Borda and Wikramanayake 2015).

2.11.5 Nutritional supplements

2.11.5.1 Biotin

Biotin forms part of vitamin B and has several therapeutic effects in the body and is one of the main anti-seborrheic compounds. A dose of 6mg per day is suggested for prevention and treatment of SD (Potluri, Harish and Kumar 2013).

2.11.6 Phytotherapy

Phytotherapy is the alternative and complementary medical practice that uses plant materials in various mediums to manage diseases and promote well-being. Phytotherapy has been used by various cultures to manage diseases across the ages, from ancient times to the present (Ameh, Obodozie, Inyang, Abubakar, and Garba 2010). The preparation of medicinal substances comprises complex dilutions of more than one plant for the treatment of various diseases (Calixto 2000). According to Heinrich, Barnes Gibbons and Williamson (2012) many races, religions and cultures practice plant medicine to maintain their diseases. Two types of phytotherapy are recognized, the first one being herbal medicine which is performed by a medicinal herbalist based on traditional information yet understood and applied in a modern setting. The second type is rational phytotherapy, where the medicinal plants for the management of diseases are experimented with and therapeutic benefit is established through the scientific method. The preparations of rational phytotherapy must be consistent and their effectiveness must be proven through experiments and clinical trials (Karanović and Jokić 2009).

2.11.6.1 Phytotherapeutic agents used to treat seborrheic dermatis

- ***Cinnamomum camphora***

Cinnamomum camphora is used for pruritis, can be diluted with other lotions and creams, and is toxic if applied in large doses (Shenefelt 2011).

- ***Malaleuca***

Malaleuca oil shampoo is recognized for its antiseptic activity (Chhavi, Sushma and Mahammad 2011), and can be applied daily. Side effects include allergic reaction, contact dermatitis and irritation (Clark, Pope and Jaboori 2015).

- **Licorice root**

Licorice root (*Glycyrrhiza glabra*) has anti-viral and anti-inflammatory properties (Graf 2000). Licorice root is effective in controlling oil secretion and production on the scalp and has salicyclic acid ingredients (Chhavi, Sushma and Mahammad 2011).

2.11.7 Non-pharmacological treatment

2.11.7.1 Apple cider vinegar

Apple cider vinegar is commonly used as a conventional treatment for SD (Kent 2005; Chhavi, Sushma and Mahammad 2011). The common method of using it is to apply it directly to the scalp before applying shampoo (Chhavi, Sushma and Mahammad 2011).

2.11.7.2 Hygiene and diet

Mohamed *et al.* (2014) recommend a strict diet and food rich in vitamin B that will eliminate SD and provide nutrients to the scalp and skin. Other food which helps control dryness and flaking of the scalp include fish (shellfish and sardines, salmon), red meat, sunflower seeds, fresh fruit, organic food and vegetables. Food with high and animal fat, junk food, flour and sea food must be avoided (Mohamed *et al.* 2014). Hygiene and regular washing which aids in eliminating excess oil improves SD (Kent 2005).

2.11.8 Homoeopathic treatment

Homoeopathy is a system of alternative medicine discovered by Dr Samuel Hahnemann (1755-1843), and provides treatment of diseases by prescribing remedies in a minute dose. It is based on the principle "*Similia Similibus Curentur*" meaning "like cures like". Homoeopathic remedies give rise to the same symptoms of the disease when given to a healthy individual (Gulati 2004). The word 'homoeopathy' derives from the Greek words *'homoios'* which means like or similar and '*pathos*' which means suffering (Boyd 1989).

Homoeopathy aims to treat a person as a whole (mind and body). A totality of symptoms (general, physical and mental) of every individual case are taken into consideration when prescribing a homoeopathic remedy (Gulati 2004). Homoeopathic remedies are aimed at reinstating the overall balance of a living being by not eliminating or suppressing symptoms in a certain way. The entirety of symptoms and their connection to each other leads to selection of a remedy that will result in effective healing (Boyd 1989).

According to Hahnemann, the body holds its own power to cure itself and this is termed *vital force* also called life energy, this energy is in control of our systemic-body functions and defense mechanism against diseases. Its energy can be disturbed and decreased by illnesses such as stress, sedentary life, lack of a healthy diet, genetic diseases, environmental changes and some other illnesses. Symptomatic drugs may provide a temporary cure to these illnesses and constitutional remedies are beneficial at this stage where the patient is treated based on appearance and as a whole (Gulati 2004).

Hahnemann introduced the basic principles and practice of homoeopathy which include the theory of the vital force, the law of similia, the law of minimum, drug dynamization and the law of simplex. Similia means symptoms that develop in a sick individual which are not a disease but rather a response as a defense mechanism of the body and these individual symptoms give hints for a homoeopathic remedy based on "like cures like". Hence, the remedy given for that particular symptom must be capable of producing similar symptoms in a healthy individual (Chauhan and Gupta 2007).

Minimum means the lowest dose of a homoeopathic remedy that has the power to bring cure (Chauhan and Gupta 2007). According to Hahnemann and O'Reilly (1996) “The quality of action to affect any changes in nature is the least possible, the decisive amount is always minimum and infinitesimal”.

Drug dynamization or potentization is a process in which the drug is reduced of its crude, inactive and toxic substances to its healing state (Chauhan and Gupta 2007). The potentization process consists of three parts namely; dilution, trituration and succussion, which are responsible for delivering the deeper energy of vital remedies (Roberts 1993).

Simplex means all homoeopathic remedies are proved individually, producing their own individual symptoms therefore one simple remedy must be prescribed for that particular case at a time, for more than one remedy will provide confusion leading to no direction of second prescription and course of the disease. This also prevents interactions between two remedies which may cause adverse effects because some remedies antidote each other (Chauhan and Gupta 2007).

Homoeopathic mother tinctures’ standard is guaranteed by the description of their starting material; a monograph is responsible for the description of their manufacturing process and investigative features. Traditionally, the investigative features of mother tincture include appearance, odor, identity, density and dry residue (Biber, Franck-Karl, Waimer, Riegert and Wiget 2009). Mother tinctures are liquid solutions prepared with alcohol and water dilutions acquired from the extraction of a living source material prepared in accordance with homoeopathic pharmacopoeia standards (Razlog, Pellow and White 2012). Homoeopathic mother tinctures are the source of potencies (Boyd, 1989).

Homoeopathy has been utilized extensively for almost two centuries; the advantages of homoeopathy include cost-effectiveness, non-toxicity, safety and simple administration methods. Homoeopathy has earned its reputation for its positive effects in treating skin conditions, joints and emotional diseases, children diseases, allergic reactions and other illnesses of old and young patients (Chauhan and Gupta 2007).

Kent (2005) and Teleman (2005) simultaneously yet independently conducted a double blind, placebo controlled study which evaluated the effectiveness of homoeopathic *Selenium sulphide* in the management of SD. Kent (2005) determined

the effectiveness of an oral homoeopathic preparation of *Selenium sulphide* 12X in the management of SD. The duration of the study was four weeks and 38 participants between ages 18 and 50 were randomly allocated into treatment and placebo groups. Both the treatment and placebo groups displayed significant improvement after using the treatment but displayed no significant improvement when both treatment and placebo groups were compared on statistical analysis. The study concluded that *Selenium sulphide* 12X was not effective in the management of SD.

Teleman (2005) determined the effectiveness of a topical homoeopathic preparation of *Seleneum sulphide* 8X shampoo in the management of SD. The duration of the study was four weeks, with 38 participants between the ages of 18 and 50 randomly allocated into treatment and placebo groups. Both groups displayed significant improvement; however, when both these groups were compared they exhibited no significant improvement on statistical analysis. The study concluded that *Selenium sulpide* 8 x shampoo was not effective in the management of SD.

Smith, Baker and Williams Jr (2002) conducted a study on the homoeopathic treatment of SD. Their aim was to determine the effectiveness of low dose, oral homoeopathic medication of potassium bromide, sodium bromide, nickel sulfate and sodium chloride. This study was a double blind, placebo controlled study, with treatment and placebo groups. The duration of the study was 20 weeks, with 41 participants randomly allocated to the two groups. At the end of the initial 10-week study period all participants crossed over to the active medication for another 10 weeks. The results showed that the active medication was effective, showing improvement in SD compared to placebo.

2.11.8.1 Homoeopathic remedies applied in the management of seborrheic dermatitis

2.11.8.1.1 *Thuja occidentalis*

Thuja occidentalis is useful for violently burning, itching and dry SD eruptions aggravated by scratching, with the eruptions being worse after a cold bath. It is commonly used for eruptions found in covered parts of the skin. The skin of *Thuja* appears dirty even after washing and is very sensitive to touch (Vemeulen and Bakker 2001). The scalp presents with white flakes (dandruff) which covers almost the whole hair (Jouanny 1990).

2.11.8.1.2 *Natrum muriaticum*

Natrum muriaticum is useful in SD patients with greasy, oily skin commonly in hairy parts. Other significant clinical features of this remedy include eruptions on the edges of the scalp, crusty, itching and burning eruptions behind the ears and on the flexures of the limbs (Boericke 2007).

2.11.8.1.3 *Kali sulphuricum*

The main clinical features that benefit from this remedy are desquamation, seborrhoea and yellow flakes of the skin. It is also useful in moist, sticky, itching and burning erythema. The skin may form blisters which ooze on the skin surface with yellow discharge (Kent and Savage 1989; Vemeulen and Bakker 2001).

2.11.8.1.4 *Graphites*

Graphites is effective in SD patients with dry, thick and rough skin, rawness in flexures of the limbs, behind the ears, in the groin, on the scalp, on the eyelids and around the mouth. Another clinical feature of SD which benefits from this remedy is oozing with sticky exudate; this exudate dries out on the skin surface causing goldish yellowish to brownish yellow flakes. Even minor irritation causes bleeding and an increase in exudation. These lesions are worse after being washed and for exposure to heat and are better for cold exposure (Jouanny 1990; Boericke 2007).

2.11.8.1.5 *Phosphorus*

Phosphorus is useful for excessively bleeding of skin eruptions and wounds regardless of their size; these wounds heal but crack again. Other features that benefit from this remedy are burning and dryness, eruptions, numbness of the skin, red streaks from scratching, petechia and ecchymosis. These patients usually present with restlessness and frequently change position (Kent and Savage 1989; Vemeulen and Bakker 2001; Boericke 2007).

2.11.8.1.6 *Carboneum sulphuratum*

Carboneum sulphuratum is another remedy useful for anesthesia of the skin, burning and sharp sensation of the skin, and is aggravated by scratching. The skin is cold with great itching in all parts of the body. Moist erythema aggravated by scratching discharging yellowish fluid causing profuse and yellowish scabs on the skin surface.

These patients are worse at night and from warmth of bed. This is the best remedy for anxious, depressed and distracted patients after long term consumption of alcohol stimulants and they become irritable, short-tempered in such a way that they break things they are carrying in their hands (Kent and Savage 1989; Vemeulen and Bakker 2001).

2.11.8.1.7 *Sulphur*

Sulphur is a great remedy for itching and burning skin symptoms. These symptoms are worse for washing, bathing, scratching, warmth, especially warmth of bed, at night and from alcoholic stimulants. Another feature of this remedy is pruritis caused by warmth and is worse in the evening, from damp weather and relapses in spring-time (Boericke 2007).

2.11.8.1.8 *Ammonium muriaticum*

Ammonium muriatium is a remedy for eruptions located in several parts of the body. These eruptions are itchy with extreme burning and bleeding worse in the evenings, prior to bed and subsequently become better for cold. The extreme burning symptom is better for cold applications (Vemeulen and Bakker 2001).

2.11.8.1.9 *Lycopodium clavatum*

Lycopodium clavatum is useful for skin signs and symptoms such as dry skin, violent, burning and biting itching with offensive sweat which is worse when exposed to warm and from warm applications. The skin bleeds easily and has cracked eruptions which form thick yellowish crusts that stay on the skin and do not fall off (Vemeulen and Bakker 2001; Boericke 2007).

2.11.8.1.10 *Mezereum*

Mezereum is the big remedy for unbearable itching with pruritus. Desquamation of the skin all over the body, moist eruptions which ulcerate and ooze a yellow discharge causing a thick crust on the surface. The itching is aggressive with burning sensation, which is compared to the burn of a fire. These signs and symptoms are aggravated by the warmth of bed and from warm bathing, and they are temporarily relieved by consumption of coffee and wine (Vemeulen and Bakker 2001).

2.11.8.1.11 *Arsenicum album*

Arsenicum album is useful in patients with SD presenting with dry, rough scales which are worse from cold exposure and scratching. Other symptoms include itching, burning and swelling eruptions; should this patient develop ulcers their exudate is offensive. *Arsenicum album* patients demonstrate restlessness, exhaustion and debility and are worse at night (Boericke 2007).

2.11.8.12 *Baryta carbonica*

Baryta carbonica is best for itching complains of the skin with no eruptions and tightness of the skin. If there are eruptions they are moist and painful, better for not scratching or rubbing (Vemeulen and Bakker 2001).

2.11.8.1.13 *Bryonia Alba*

Bryonia Alba is useful for seborrhoea (excessively oily skin) with very greasy hair (Boericke, 2013; Vermeulen and Bakker 2001). It is also useful in itching and burning eruptions that develop all over the body; these eruptions are better for scratching and are aggravated by walking fast. Other features that benefit from this remedy include yellow discoloration of the whole body and prickling sensation in eruptions worse from touching (Vemeulen and Bakker 2001).

2.11.8.1.14 *Medorrhinum*

Medorrhinum is effective in SD patients presenting with yellow lesions, and a red burning rash commonly found in the anus area of babies. Another significant symptom is extreme and persistent itching which is worse at night and when the skin is cold but the patient does not want to be covered and is worse in the evenings. Other areas include limbs, knees, forearms and waist which present with itching leaving red spots and are worse on undressing at night (Vemeulen and Bakker 2001; Boericke 2007).

2.11.8.1.15 *Psorinum*

Psorinum has very noticeable skin symptoms. Patients who need this remedy are enormously sensitive to cold; head must be kept warm and wear warm clothes even in summer. It is useful in enlarged glands including sebaceous glands which excrete more oil causing oily skin. Other significant symptoms include unbearable itching, dirty appearance, dry, rough and dingy hair (Boericke 2007).

2.11.8.1.16 *Sepia*

Sepia is useful for itching eruptions commonly found in flexures of knees and elbows. The erythema of these patients is raw and hard and becomes moist after scratching. Other features include pink discoloration of the skin after scratching, yellowish-brown spots located on the neck that flakes off on scratching. Sepia is the best remedy for eruptions that develop during pregnancy and breast feeding (Vemeulen and Bakker 2001).

2.11.8.1.17 *Alumina*

Alumina is useful for unbearable itching aggravated by getting warm in bed. This patient scratches until the area bleeds causing pain, and presents with constipation. These skin complaints are worse in winter (Vemeulen and Bakker 2001; Boericke 2007).

2.11.8.1.18 *Oleander*

Oleander is used for sensitive skin which becomes painful and cracks with even minor scratching, occurring mostly on the neck, scrotum and between the thighs. The eruptions are violently itching and result in bleeding and exudate; the itching is terrible as if there are lice stinging. The itching symptom frequently occurs at night and is worse on undressing. The scalp present with pruritus (Vemeulen and Bakker 2001).

2.11.8.1.19 *Magnesium carbonicum*

Magnesium carbonicum is useful in patients who appear unhealthy, abnormally thin with yellowish-brown and pale complexion with a bitter smell, they have weak hair and nails and painful skin and are very sensitive to cold. Itching is all over the body (Jouanny 1990; Vemeulen and Bakker 2001).

2.12. *Calendula officinalis*

2.12.1 Introduction

The genus *Calendula officinalis* belongs to the Asteraceae family, It is a well-known species also commonly known as Zergul (Hindi), African Marigold, Calendula, Common Marigold, Garden Marigold, Marigold, Pot Marigold (English), Butterblume

(German), Chin Chan Ts'ao (Chinese), Galbinele (Romanian) and Ringblomma (Swedish) (Muley, Khadabadi and Banarase 2009).

2.12.2 Taxonomic classification of *Calendula officinalis*

The taxonomic classification of *Calendula officinalis* is presented in Table 1.

Table 1: Taxonomic classification of *Calendula officinalis*

Kingdom	Plantae
Subkingdom	Tracheobionta
Division	Magnoliophyta
Class	Magnoliopsida
Subclass	Asteridae
Order	Asterales
Family	Asteraceae
Tribe	Calenduleae
Genus	Calendula
Species	*Calendula officinalis*

Source: Muley, Khadabadi and Banarase 2009

2.12.3 General description

Calendula officinalis is an inhabitant of Europe, although today it is also found growing commonly in North America, Balkans, Eastearn Europe, Germany and India. *Calendula officinalis* is an annual self-seeding plant surviving in any kind of soil, cultivated in temperate regions around the world and grows up to to 30 cm to 60 cm in height with numerous stems. Its leaves are spatulate with narrowed bases covered with short fine hairs. The single flower heads are yellow-orange with tubular florets commonly known as petals, located on a green crown-shaped receptacle and the circular corona seeds are visible as petals fall off. The roots are long tapered with various thin and secondary roots and are about 20 cm long. The stem originates from the base and branches up, even higher, it is angular, erect and downy (Figure 7). The name 'Calendula' originates from the Latin word *calends* (first day of every month) and because of its lengthly flowering process it was linked to the astrological sign of summer, Leo, therefore was used to treat heat related conditions, and heart conditions (Khalid and Teixeira da Silva 2012).

(A) (B)

Figure 7:(A) The leaf, stem and (B) flower of *C. officinalis*
Source: Khalid and Teixeira da Silva 2012; Mullaicharam, Amaresh and Balasubramanian 2014; Kaur, Sidhu and Khan 2015

2.12.4 History and folk use

Calendula officinalis has been used for centuries for medicinal and culinary purposes, and has rich medicinal properties. It has been used by folk systems as an anti-infammatory, anti-tumour, antioxidant, anti-bacterial, anti-HIV, ant-ulcer and antiseptic (Mullaicharam, Amaresh and Balasubramanian 2014).

Chakraborthy (2010) further classifies the plant uses into internal and external uses. Internally it is used for mucous membrane inflammation, peptic and duodenal ulcers, gastro intestinal tract spasms, intestinal and duodenal mucosa and dysmenorrhoea commonly in anemic and nervous women, splenic and hepatic inflammtions and for mouth wash after tooth extraction. External uses of *Calendula officinalis* include treatment of skin inflammation, open wounds, laceration wounds with bleeding, and minor conditons such as razor burns and wind burns (Chakraborthy 2010).

Traditionally the plant was used as an anti-inflammatory, analgesic, antiseptic, as diaphoretic and for cuts, burns, wounds and for jaundice treatment (Kaur, Sidhu and Khan 2015).

Calendula officinalis flowers are more potent therapeutically and are used to make extracts, tinctures, balms and salves, ointments and creams. Its culinary uses from its fresh flowers includes being chopped into salads, dried petals used like saffron, for teas, as a spice, to colour cheese and butters and to flavor cakes, cookies, and puddings (Khalid and Teixeira da Silva 2012; Kaur, Sidhu and Khan 2015).

According to Vermeulen and Bakker (2001) and Boericke (2013) *Calendula officinalis* has been proven homoeopathically to have a significantly healing effect when applied externally; it is used for treating ulcers and wounds by stimulating a healthy granulation which speeds up the healing potential and promotes wound healing. Internally, *Calendula officinalis* is said to have beneficial effects on: deafness, neuroma, catarrhal conditions, erysipelas, for excessive pain from injury, exposure to cold, damp weather, paralysis after apoplexy, in cancer as an intercurrent remedy. *Calendula officinalis* is generally known to have an effect on the mind, head, eyes, ears nose, stomach, respiratory system. It is effective in extremely nervous and easily fearful patients, open wounds on the scalp, neck pain worse on the right side and tender lymphadenopathy of sub-maxillary glands, wounds with suppuration on the eye after surgery, myxorrhoea of lachrymal sac, deafness better for distant hearing and sneezing, green discharges, runny and blocked one nostril of the nose. *Calendula officinalis* use in the digestive system includes heartburn with nausea felt in the chest, vomiting, feeling hungry immediately after eating, bulimia and abdominal distension (Vermeulen and Bakker 2001; Boericke, 2013).

2.12.5 Phytochemistry of *Calendula officinalis*

The *Calendula officinalis* plant consists of various classes of phytochemical compounds; amongst these compounds is the presence of terpenoids, flavonoids, coumarines, quinones, volatile oil, carotenoids and amino acids which are recognized as the main compounds. The structures of terpenoids comprise triterpenoids which are responsible for anti-inflammatory, anti-oedematous and anti-tumour activities. The structures of flavonoids include isorhamnetin3-O-neohesperidoside, which plays a major role in wound healing and in antioxidant activity. Another structure of flavonoids includes quercetin which is responsible for antioxidant activity (Muley, Khadabadi and Banarase 2009).

2.12.6 Anti-inflammatory activity

Calendula officinalis is well recognized for its topical anti-inflammatory properties and has been used for many years. Many studies have been conducted on *Calendula officinalis* as an anti-inflammatory *in vitro* and animals and have been demonstrated to be effective in burns, including radiation and wound healing (Edwards, da Costa Rocha, Williamson and Heinrich 2015).

Preethi, Kuttan and Kuttan (2009) conducted a study on *Calendula officinalis* to determine its anti-inflammatory activity on male mice – carrageenam, dextran and formalin induced paw edema in mice were used. The mice were injected in their subplantar region with 1% of carrageenam or dextran in 1% carboxy methyl cellulose of 0.02 ml to stimulate inflammation and a significant improvement of 50.6% and 65.9% was noted in paw edema after oral administration of 250 mg *Calendula officinalis* extract whereas inflammation caused by dextran only improved by 41, 9% and 42, 4% after oral administration of *Calendula officinalis* extract. Formalin 2% of 0.02 ml was used to produce chronic inflammation and oral administration of 250 mg and 500 mg of *Calendula officinalis* extract was improved by 32, 9% and 62.3% when compared to placebo (Preethi, Kuttan and Kuttan 2009).

In a study conducted on mice using 12-otetradecanoyl phorbol-13-acetate (TPA)-induced inflammation in 0.05 mg to 0.20 mg per ear of the mice, showed improvement by 84% after topical application solution of ethanol extract of *Calendula officinalis* in 0.001 mg per ear (Muley, Khadabadi and Banarase 2009). Ethanol aqueous extract 1.2 mg of *Calendula officinalis* also showed improvement by 20% in mice with ear edema induced by croton oil (Muley, Khadabadi and Banarase 2009; Parente, Lino Júnior, Tresvenzol, Vinaud, de Paula and Paulo, 2012).

2.12.7 Anti-fungal activity

A study conducted by (Mullaicharam, Amaresh and Balasubramanian 2014) indicates that the oil of *Calendula officinalis* flowers was effective in inhibiting yeast growth compared to Nystatin, an anti-fungal for mucocutaneous candidiasis. These fungal micro-organisms, some of which were obtained from humans, included *Candida albicans, Candida dubllniensis, Candida parapsilosis, Candida glabrata, Candida parapsilosis, Candida tropicalis, Candida guilliermondii, Candida krusei and Rhodutorulla* and were cultured at 25 ºC for 48 hours in sabouraud dextrose agar. The effectiveness of *Calendula officinalis* oil was measured by the disc diffusion technique; it decreased the yeast growth at the rate of 15 ul per disc compared to nystatin which decrease the yeast growth by 20 ug per disc (Gazim Rezende, Fraga, Svidzinski and Cortez 2008; Muley, Khadabadi and Banarase 2009; Mullaicharam, Amaresh and Balasubramanian 2014).

2.12.8 Anti-bacterial activity

In a study demonstrating the anti-bacterial activity of *Calendula officinalis*, the methanol extract and 10% of *Calendula officinalis* flower were measured against the pathogenic bacterial isolate of both anaerobic and aerobic bacteria for their anti-bacterial activity, including against *Porphyyromonos gingivalis, Prevotella spp., Furobacterium nucleatum, Caphocytophaga gingavalis, Veilonella parvulla, Eikenella corrodens,Peptostreptococcus micros and Actinomyces odontolyticus*.They exhibited a decrease in bacterial growth by ≥ 2048 mg/L (Muley, Khadabadi and Banarase 2009).

In a study conducted by Ghaima, Rasheed and Ahmed (2013) the researchers determined the effectiveness of a water extract of *Calendula officinalis* flowers on enteropathogenic bacteria (*Salmonella, Shigella dysenteriae, Shigella flexneri, Shigella sonnei and E. coli*). The cultures of these bacteria were conveyed into 5 ml brain heart infusion broth at 7.6 pH level and stored at 37 ºC for 24 hours and measured by means of the agar diffusion assay method. These showed a decrease in bacterial growth, with *Shigella sonnei* being the most sensitive leading to highest decrease compared to the control of cefotan antibiotic.

2.12.9 Ant-viral and anti-HIV activity

Al-Snafi (2015) conducted a study to determine the effectiveness of *Calendula officinalis* extracts of dried flowers to prevent the duplication of human immunodeficiency virus type 1 (HIV-1). Both organic and aqueous extracts of *Calendula officinalis* flowers were used on tetrazolium-based cell proliferation to determine their anti-HIV activity. The organic extract showed dominant anti-HIV activity whereas the aqueous extract was effective in preventing duplication of the encephalitis virus as a result of intraperitoneal administration in mice. Additionally, duplication of other viruses such as *Herpes simplex*, influenza A2 and influenza APR-8 was suppressed by a tincture of *Calendula officinalis* (Al-Snafi 2015).

2.12.10 Toxicology

Calendula officinalis has reported to have few toxic effects when used both internally and externally, rarely causing allergic reactions when applied externally on the skin.

There is no data evidence to support its safety during pregnancy and breast feeding (Edwards *et al.* 2015).

Silva *et al.* (2007) conducted a study to determine the acute toxic effects of *Calendula officinalis*. A dose of 5.0 g hydroalcohol extract (HAE) of *Calendula officinalis* was administered orally to rats and mice and no death resulted and produced non-toxic effects although the subjects displayed renal and liver overload.

2.13 *Olea europaea*

2.13.1 Description of *Olea europaea* oil

Olea europeae oil*,* commonly known as olive oil, is obtained from the fruit of *Olea europae* L. which belongs to the Oleaceae family (Tripoli, Giammanco, Tabacchi, Di Majo, Giammanco and La Guardia 2005). Olives have been cultivated since biblical times and has been a major farming practice in the Mediterranean which continues to be the case in the present. Olive trees develop in spring in Europe creating a tiny ovoidal bud which grows into an advanced drupe between October and January. Various changes occur during the growth of the fruit creating mainly phenolic compounds at about 6 months of maturation (Owen, Giacosa, Hull, Haubner, Würtele, Spiegelhalder and Bartsch 2000). The composition of *Olea europeae* oil includes about 90% to 99% of glycerol fraction and 0.4% to 5% of non-glycerol fraction, 70% to 80% of the fatty acids and 18:1n-9 of oleic acid, a monounsaturated fatty acids. *Olea europaea* is manufactured by a process of mechanical extraction (Tripoli *et al.* 2005).

Figure 8: *Olea europaea* fruit
Source: Landscape Artchitects Pages 2011

2.13.2 History and uses of *Olea europaea*

Olea europaea has been the main source of fats in the Mediterranean diet, accompanied by less prevalence of cadiovascular diseases and cancer in the Mediterranean area compared to other areas. Recent studies have shown that *Olea europaea* has been effective as an antioxidant, anti-inflammatory and anti-microbial in both *in vitro* and *in vivo* studies, providing the potent beneficial health effects of the Mediterranean diet (Visioli, Poli and Gall 2002; Tripoli *et al.* 2005). *Olea europaea* has been recognized for its positive effects in cholesterol, breast and colon cancer, diabetes with hypertriacylglycerolaemia, and in autoimmune diseases including rheumatoid arthritis (Tripoli *et al.* 2005). Polyphenols of *Olea europaea* have been effective in treating skin damage by applying *Olea europaea* externally and for other skin pathologies such as contact dermatitis (diaper rash), atopic dermatitis, xerosis, eczema, rosacea, seborrhea, psoriasis, thermal and radiation burns, skin inflammation from other causes, and skin aging (Perricone 2002).

2.13.3 Phytochemistry of *Olea europaea*

According to Cicerale, Lucas and Keast (2012) *Olea europaea* consists of various types of phenolic compounds, some of which include hydroxytrosol, oleuropein, oleocanthal, oleupeimein aglycone. These phenolic compounds within the *Olea europaea* have demonstrated to be potent antioxidant, anti-inflammatory and anti-microbial compounds.

2.13.4 Anti-microbial activity

The phenolic compounds of *Olea europaea* found in extra virgin olive oil (EVOO) manifest anti-microbial properties that prevent the growth of bacteria, viruses and fungi and they provide therapeutic effects against these micro-organisms. These phenolic compounds have demonstrated powerful activity against various bacterial strains that causes intestinal and respiratory infections when tested *in vitro*. They have also demonstrated their ability to kill useful bacteria such as *Lactobacillus acidophilus* and *Bifidobacterium bifidum*; interference with these useful bacteria causes harm in a healthy being, thus more research should be conducted in this field. Other benefits of *Olea europaea* phenol compounds include prevention of stomach bacteria called *Helicobacter pylori* which causes peptic ulcers and gastric cancer. A study was conducted on *Olea europaea* phenolic compounds to determine their anti-microbial

activities on different types of foodborne pathogenic bacteria, including *Salmonella enteritidis, Escheridia coli O157:H7* and *Listeria monocytogenes*. These demonstrated increased anti-microbial ability as a result of collaboration between the numerous phenolic compounds of *Olea europaea* compared to single compounds. It was further recommended to use foods with EVOO to avoid foodborne disease (Cicerale, Lucas and Keast 2012).

The *Olea europaea* compounds can also inhibit the composition of amino acids responsible for the action of a virus as it inhibits the dispersion, growth and invasion on the cell membranes, and can prevent the replication of retroviruses. Although *Olea europaea* has demonstrated significant effect on a vast range of bacteria, unfortunately there has been no experimentation with *Olea europaea* oil's effect on yeasts though it has some influence on inhibition of the development and formation of spores of *Aspergillus parasiticus* hence can reduce the manufacture of aflatoxin. In conclusion *Olea europaea* promotes phagocytosis as an immune response against bacterium, fungi and viruses (Tripoli *et al.* 2005).

2.13.5 Anti-inflammatory activity

It is well recognized that pathophysiology of frequent diseases is associated with chronic inflammation. These diseases include cancer, heart diseases, autoimmiune diseases such as arthritis and neurodegenerative diseases. Recent studies conducted on phenolic compounds acquired from EVOO both *in vivo* and *in vitro* have demonstrated remarkable anti-inflammatory ability; it is further recommended to consume a diet with EVOO with greater concentrations of phenolic compounds because they act as anti-inflammatories and decrease the risk of developing chronic inflammatory diseases (Cicerale, Lucas and Keast 2012).

The phenolic compound called oleupeinein aglycone has recently demonstrated the prevention of tumour necrosis factor alpha (TNFa) (Cicerale, Lucas and Keast 2012). Another phenolic compound of extra virgin olive (newly pressed), oleocanthal, acts as a natural anti-inflammatory similar to ibuprofen. Both demonstrate similar effectiveness as an anti-inflammatory by inhibiting COX-1 and COX-2 enzymes (Beauchamp *et al.* 2005; Cicerale, Lucas and Keast 2012). Oleocanthal contains anti-inflammatory properties beneficial in the management of diseases such as chronic arthritis and Alzheimer disease and as an anti-proliferative in breast and prostate cancer (Cicerale, Lucas and Keast 2012).

A placebo controlled, crossover randomized study was conducted by Fitó *et al.* (2008) to evaluate the effectiveness of two similar oils with different phenolic compounds as an anti-inflammatory in 28 established coronary heart disease patients. Participants in this randomized placebo controlled crossover trial received 50 ml of a raw daily dose of EVOO or refined olive oil (ROO). The trial was conducted over a period of three weeks preceded by a washout period of two weeks using ROO. The results demonstrated a reduction of C-reactive protein $p = 0.024$ and Interleukin-6 $p < 0.002$, which are normally increased in the presence of inflammation, in the EVOO group. Therefore, it was concluded that EVOO could be beneficial in treating stable coronary heart disease when consumed in addition to other pharmacological treatment.

2.13.6 Topical application of Olea *europaea*

A study was conducted by Kiechl-Kohlendorfer, Berger and Inzinger (2008) with infants to determine the effectiveness of cutaneous water-in-oil emollient cream (Bepanthen) and olive oil cream 70% lanoline and 30% olive oil. The study was conducted between October 2004 and November 2006 on a sample size of 173 neonatal infants in a neonatal intensive care unit between 25 and 36 weeks of gestation who were evenly distributed between water-in-oil emollient cream, olive oil cream and the control group. The treatments were applied over a period of four weeks. Results showed superior results in dermatitis for infants that used olive oil cream compared to infants that used emollient cream, however both emollient cream and olive oil cream were effective in managing dermatitis compared to the placebo group. It was further concluded that external application treatment decreases the risk of dermatitis.

Taavoni, Soltanipour, Haghani, Ansarian and Kheirkhah (2011) conducted a study to evaluate the effectiveness of olive oil in preventing development of striae gravidarum (SG) present in pregnant women in the second trimester. The treatment group applied olive oil twice daily on their abdomen and the control group did not receive any treatment. Forty percent of pregnant women using olive oil developed striae and 50% of the control group exhibited visible striae. It was therefore concluded that olive oil has no effect in decreasing SG during second trimester pregnancy.

CHAPTER 3: METHODOLOGY

3.1 The research design

This was a double blind control study which evaluated the effectiveness of topical preparation of *Calendula Officinalis Ø* and *Olea europaea* in the management of SD. The effectiveness was measured by the participant, the researcher and an independent third party (a qualified homoeopathic clinician) using a Visual Analogue Scale (VAS).

3.2 The data

Data was collected using primary and secondary sources. The primary data was acquired through the use of the VAS from the perspectives of the participant, researcher and independent third party (a qualified homoeopathic clinician). The third perspective was included in this study due to the subjective nature of the assessment, a third clinical observation gives more validity to the readings obtained. The participant completed a questionnaire at each consultation and the researcher and independent person completed the single item of VAS at each consultation to confirm the severity of SD. The average of the three measurements i. e. participant, researcher and clinician was used to calculate a score which, in turn, was used for statistical analysis. All the variables were averaged with the exception of itching (only the participant's perception) and percentage of the scalp involved (only the perception of the researcher and the independent third party).

The secondary data is the information that was acquired from the available literature review on SD, as well as information sourced from internet.

3.3. The research methodology

3.3.1 The participants

The participants were between the ages of 18 and 50. This age range was chosen to minimize dermatological conditions due to other age related factors that might mimic SD such as peri-menopause which may cause dryness of the skin and change in

texture of the skin. The participants recruited in the study were all from the Durban area and were screened against the inclusion and exclusion criteria.

3.3.2 Sample and randomisation

A sample size of 64 consenting participants was evenly distributed between the active and control groups according to the randomisation list (32 participants in each group). The active group received Calendula *Officinalis* with *Olea europaea* oil and the control group received *Olea europaea* oil only. The reason for recruiting 64 as opposed to 60 was to enhance established viability of the study. The randomisation was conducted by an independent qualified and registered homoeopathic clinician within the Department of Homoeopathy nominated by the Department of Homoeopathy Research Committee (DRC). After the randomization list was formulated random numbers from 1-64 were assigned to each participants to distinguish participants that received *Calendula officinalis* and *Olea europaea* oil (active group) from participants that received *Olea europaea* oil only (control group). The randomisation list was stored securely at the Durban University of Technology Homoeopathic Day Clinic (DUTHDC) where the research student did not have access to the randomisation list until the study was completed. After the completion of the study the un-blinding process was performed where the randomisation list was revealed to the researcher.

3.3.3 Inclusion criteria:

Participants were considered for the study if they met the following criteria:

- Between the ages 18-50 years.
- Participants with noticeable flaking of the scalp, irritation, itchiness and greasiness of the scalp.
- Residing in Durban, KwaZulu-Natal.
- Participants willing to follow study requirements.
- Participants who were maintaining their normal lifestyle during the study. (Kent 2005; Teleman 2005.)

3.3.4 Exclusion criteria

- Participants who did not meet the inclusion criteria as stated above.
- Participants who were on any recreational drugs.
- Participants who were currently using antibiotics or antimycotics.

- Participants who had an allergy or sensitivity to shampoo or soap.
- Participants who had open cuts / abrasions on the scalp and or hands.
- Participants who were on any treatment for dandruff.
- Participants were having other dermatological disorders.
- Participants who were pregnant or intending to conceive during the period of the study.
- Participants who had surgery on the head and or were recovering from surgery in the past six weeks.

These criteria ensured the exclusion of individuals who could have contributed inexplicable factors which may have had an impact on the study.

3.4 Recruitment

Prior to the recruitment of participants, the research proposal was evaluated and approved by the Institutional Research Ethics Committee (IREC) providing permission to the researcher to commence the research study. Permission letters were then sent to individual gate keepers requesting permission to commence the research study (Appendix E(a), E(b), E(c)). Participants were recruited through advertisements (Appendix G) that were placed on noticeboards at DUT, other tertiary institutions, health shops, shopping malls, around local public clinics, hospitals, libraries and churches. Prior to placing the adverts, permission letters (Appendix H) were handed or emailed to individuals in control or in charge of the desired location to place advertisements about the research study. Participation in the study was voluntary and there was no coercion to participate.

3.5 Duration of the study

The duration of the study was six weeks; there were three consultations in which the measurement tools were applied. Teleman (2005) and Kent (2005) recommended an increase of duration of the study from four weeks to enhance the possible effect of the treatment. Both Kent (2005) and Teleman (2005) had three consultations. Participant retention is critically important in the conduct of a successful clinical trial; this is dependent on the completion of follow-up for every patient randomized. The longer the duration, the harder it is to retain participants.

3.6 Treatment preparation

The treatment used in this study comprised *Calendula officinalis Ø* mixed with *Olea europaea* (olive oil).

3.6.1 *Calendula officinalis*

Calendula officinalis Ø was prepared by Comed (A homoeopathic laboratory in Johannesburg, South Africa). Batch number 13RD33 *Calendula officinalis Ø* was manufactured using the French Homoeopathic Pharmacopoeia (FHP) method. The *Calendula Officinalis* tincture strength was 1:10, where *Calendula officinalis Ø* is one part into nine parts of 20 % alcohol.

3.6.2 *Olea europaea*

The type of olive oil used in this study was extra virgin cold pressed olive oil. Olive oil from Vesuvio Olive Estates was used in this study. Vesuvio Olive Estates is one of South Africa's largest olive oil producers with more than 100 000 olive trees located in the Paarl region of the Western Cape. It manufactures 100% Cold Extracted EVOO, both Kosher and Halaal types, using hazard analysis critical control points (HACCP) and is fully automated and processed with no human contact from tree to consumer (Vesuvio Olive Estate 2016). Batch numbers: C212, C217, C230, C233, C236, G105, G106 and G109.

3.6.2.1 Manufacturing of *Olea europaea* according to *Vesuvio Olive Estates*

Their manufacturing process consists of five stages which are as follows:

- **Leaf extraction and washing process**

The olives are transported by belt to the washer. Before they enter the washer they pass through a free fall area where the branches and leaves are extracted by a powerful reverse vacuum. When the olives touch the water they are propelled forward by means of a recycling torrent of clean water.

- **Crushing process**

The washed olives are then crushed and sliced to a pulp by the crusher which consists of a hammer mechanism.

- **Malaxing process**

This process releases oil from the flesh of the pulp, occurring at temperatures under 30 ºC and is crucial to the extraction of high quality EVOO.

- **Decanting process**

The decanting process is the advanced part of the process when it comes to preparation of superior quality of EVOO. The paste is put through a centrifuge and the oil is then separated and decanted from solids and water and the oil never comes in contact with water again. This process ensures that the oil retains all the polyphenols of the fruit.

- **Separation process**

This process removes any suspended vegetable water from the oil, which contains sugar that could ferment, decreasing quality of the oil (Vesuvio Olive Estate 2016).

3.7 Preparation of medication

The medication used for the study was prepared at the DUTHDC dispensary by the researcher. The researcher used the laminar flow room to prepare the medication under the supervision of the specialist laboratory technician. Size 125 ml spray bottles were filled with 100 ml of medication to allow for space to shake the mixture. Thirty-two spray bottles were filled with 20 ml *Calendula officinalis* Ø and 80 ml *Olea europaea* and 32 spray bottles filled with100 ml of *Olea europaea* oil only. Pretesting for colour and viscosity of the research medication was perfomed, there was no difference in colour or viscosity between the active and control medication. The spray bottles were also non-transparent hence participants and researcher could not detect which treatment was dispensed to each participant. Labels were only attached to the bottles when the participant was given the randomized medication by the laboratory technician since this was a double blind controlled study.

3.7.1 Preparation of *Calendula officinalis Ø* and *Olea europaea* oil

The experimental medication was prepared by the researcher in the manner laid out below.

Aim:

- To combine 20 ml of Calendula *officinalis Ø* and 80 ml of *Olea europaea* oil into 32 x 125 ml empty spray bottles.

Apparatus:

- *Calendula officinalis Ø*.
- *Olea europaea* oil.
- 32 x 125 ml empty spray bottles.
- Funnel.
- 100 ml measuring cylinder.
- 20 ml measuring cylinder.
- Aqua distilled water and paper towel.
- 96% S. V. R.

Procedure:

a) Condition the room.
b) Ensure that all equipment is clean.
c) Place the funnel on top of each empty spray bottle.
d) Add 80 ml of *Olea europaea* oil into each of the 32 spray bottles using a 100 ml measuring cylinder.
e) Add 20 ml of *Calendula officinalis Ø* into (d) using a 20ml measuring cylinder.
f) Cap the bottle.
g) Gently shake the bottle for 10 seconds and store away from light.

3.7.2 Preparation of *Olea europaea* oil only

Aim:

- To add *Olea europaea* oil into 32x125 ml empty spray bottles.

Apparatus:

- *Olea europaea* oil.
- 32x120ml empty spray bottles.
- Funnel.
- 100ml measuring cylinder.
- Aqua distilled water and paper towel.
- 96% S. V. R.

Procedure:

- Condition the room.
- Ensure that all equipment is clean.
- Put the funnel on top of each empty spray bottle.
- Add 100 ml of *Olea europaea* oil into each of the 32 spray bottles using a 100 ml measuring cylinder.
- Cap the bottle.
- Gently shake the bottle for 10 seconds and store away from light.

3.8 Outcome measurements tools

The outcome measurements tools used in this study were VAS and PPQ.

3.8.1 Visual Analogue Scale

The VAS which was used to assess participants is an instrument commonly used to measure dermatological change within the human skin (Crichton 2001; Kent 2005; Teleman 2005) (Appendix C). This assessment was based on the following categories:

- Irritation (visual confirmation of irritation, i. e. redness, dermatitis and any scratch marks).
- Flaking (the extent of flaking of the scalp).
- Greasiness (oiliness of the scalp and hair).
- Percentage of the scalp involved (how much of the scalp was involved).

- Overall impression (overall impression about severity of the dermatological condition of their scalp).

3.8.2 Patient Perception Questionnaire

The components on this questionnaire investigate the perception of the individual's regarding their condition of SD (Appendix D). These components together make up the patient's perception of their illness. This assessment was based on the following categories:

- Irritation (the extent of which dandruff disturbed their day).
- Flaking (the extent of flaking of the scalp).
- Greasiness (oiliness of the scalp and hair).
- Itchiness (how much they felt compelled to scratch their scalp).
- Overall impression (overall impression about severity of the dermatological condition of their scalp).

The participant, researcher and an independent person (clinician/qualified homoeopath) completed the single item VAS (Crichton 2001; Kent 2005; Teleman 2005) (Appendix C), at each consultation to confirm the severity of SD. The average of the three measurements i. e. participants, researcher and clinician, were used to calculate a score which in turn, was used for statistical analysis. All the variables were averaged with the exception of itching (only the participant's perception) and percentage of scalp involved (only the perception of the researcher and the independent person).

3.9 The study protocol

The duration of the study was six weeks. There were three consultations in which the respective scales and the perception questionnaire were applied by the researcher, a qualified homoeopath and the participant. Initial consultation was regarded as baseline, thereafter the participant was seen for the first follow-up after 21 days of treatment. The participant was given treatment according to the randomization list. The participant came for the final consultation 21 days after their first follow-up consultation.

3.9.1 Consultation procedure

Consultation one:

- **Step 1**: The participant was fully informed about the study. The participant was given an information letter (Appendix A), the participant had an opportunity to ask question about the study.
- **Step 2**: The participant then signed the consent form (Appendix B) on agreeing to participate on the study. On both the information letter and consent form there was information about participants not being forced to participate in the study and that there was no remuneration for taking part in the study. Participants were informed that they may withdraw at any time during the study without any prejudice.
- **Step 3**: The participant, researcher and an independent person (clinician/qualified homoeopath) completed the single item VAS (Crichton 2001; Kent 2005; Teleman 2005) (Appendix C), and the patient completed the PPQ (Appendix D) at each consultation to confirm the severity of SD.
- **Step 4**: A detailed case history was taken (Appendix K).
- **Step 5**: Full physical examination was performed and a SOAPE note was completed by the researcher (Appendix L).
- **Step 6**: Treatment was dispensed according to the randomisation list.
- **Step 7**: The participant then proceeded to the Clinic reception area where the dispenser on duty dispensed a labelled bottle of the allocated treatment and detailed instructions on when and how to apply the treatment (Appendix M).

The researcher called the participants at the end of each week to check if they were complying with the study criteria and the researcher also called the participants after 21 days of their initial consultation to remind them of their next follow-up consultation.

Consultation two: First follow-up

This was carried out 21 days after the initial consultation:

- **Step 8:** The participant, researcher and an independent person (clinician/qualified homoeopath) completed the single item VAS (Crichton 2001; Kent 2005; Teleman 2005) (Appendix C), and the patient completed the PPQ (Appendix D).
- **Step 9**: A detailed follow-up case history was taken (Appendix N).

- **Step 10**: A full physical examination was performed and a SOAPE note was completed by the researcher (Appendix L).
- **Step 11**: Treatment was dispensed according to the randomisation list.
- **Step 12:** The participant then proceeded to the Clinic reception area where the dispenser on duty dispensed a labelled bottle of the allocated treatment with instructions on when and how to apply the treatment (Appendix M).

Consultation three: Final follow-up

This was carried out after 42 days of the initial consultation:

- **Step 11**: The participant, researcher and an independent person (clinician/qualified homoeopath) completed the single item VAS (Crichton 2001; Kent 2005; Teleman 2005) (Appendix C), and the patient completed the PPQ (Appendix D).
- **Step 12**: A detailed follow-up case history was taken (Appendix N).
- **Step 13:** A full physical examination was performed and a SOAPE note was completed by the researcher (Appendix L).

There was no treatment prescribed on this final follow-up.

- **Step 14**: The participants were thanked for their participation in the study and were informed that they were welcome for further treatment at the HDC should they need to and they were reminded that all participants in the control group would receive free treatment at the Homoeopathic Day Clinic (HDC) of the treatment product of the study once the un-blinding of the randomisation list was done.

SUMMARY OF PROCEDURE: Participants were randomly and evenly distributed between the treatment (topical application comprising *Calendula officinalis Ø* and *Olea europaea)* and control (comprising *Olea europaea*) groups. There was no placebo control in the study as *Olea europaea* has therapeutic properties (Table 2).

Table 2: Summary of procedure

TREATMENT GROUP: *Calendula officinalis* and *Olea europaea*	**CONTROL GROUP:** *Olea europaea* only
Consultation one – day 1: • Consent form, Information letter, VAS, PPQ, Case history, Physical examination, treatment protocol and instruction and 100 ml of treatment spray.	**Consultation one – day 1**: • Consent, Information letter, VAS, PPQ, Case history, Physical examination, treatment protocol and instruction and 100 ml of control spray.
• Phone calls on day 7, 14 and 21	• Phone calls on day 7, 14 and 21
Consultation two - day 22: • VAS, PPQ, Follow-up case history, physical examination, treatment protocol and instruction and 100 ml of treatment spray.	**Consultation two - day 22**: • VAS, PPQ, Follow-up case history, physical examination, treatment protocol and instruction) 100 ml of control spray.
• Phone calls on day 28, 35 and 41	• Phone calls on day 28, 35 and 41
Consultation three – day 42: • VAS, PPQ, Follow-up case history & physical examination. No treatment. Final consultation and thanking of participants.	**Consultation three – day 42**: • VAS, PPQ, Follow-up case history & physical examination. No treatment. Final consultation and thanking of participants.

3.9.2 Posology and dosage

Each participant received a copy of the instructions (Appendix M) on how to apply the treatment. Participants were required to:

1. Apply the treatment on the scalp twice a week for a minimum period of 6 weeks.
2. Shake the treatment bottle well before applying.
3. Use a pin-tail comb or fine-toothed comb to part hair as the treatment was applied to the scalp.
4. Before using the hair spray, make sure that the spray nozzle was not glued up. Otherwise, the hair spray would not leave the bottle as a fine mist but rather in sticky spurts.
5. Hold the spray nozzle at least 10 cm away from the hair root and keep the spray can in constant motion as they were spraying.
6. From a shorter distance, apply a little hair spray underneath the strands. The total squirts for the entire scalp should be not more than 20 squirts.
7. Massage the treatment well into the scalp using circular motion until it was fully absorbed by the scalp.
8. Apply the treatment only at night before going to bed twice a week on every third day.
9. Wrap the provided head cap on the head to avoid staining the linen.

10. Wash the hair as normal the following morning to wash off the treatment oil. When washing the hair participants were instructed not to rub the scalp too hard with their nails as this could cause dandruff. Participants had to completely rinse the hair until the water ran out with no bubbles. Not rinsing it out enough would leave a greasy film. If the participants were towel drying the hair they were not supposed to rub the hair with the towel as it is damaging to the hair; instead lightly squeeze and pat the hair.
11. Not apply any other anti-dandruff cream/lotion/ointment/shampoo or conditioner on their hair as this would affect the validity of the results.
12. Not use any other treatment for dandruff during the research study period.
13. Store the treatment away from heat, light and electromagnetic radiation (e.g. T. V., computers and cellphones).
14. Always apply the treatment as instructed/directed on the bottle.

3.10 Ethical considerations

The study was carried out according to the approved Research Committee and the IREC protocol and standards (REC 134/15) (Appendix F). The participants were informed of all the known possible risks involved and DUT IREC adverse effect protocol to be followed should a participant develop adverse reaction to the treatment, which included the option of being referred to the DUTHDC. The study was always under constant supervision by the supervisors and the clinicians on duty at the DUTHDC. Prior to commencing the study, full permission was attained from the participant by signing the consent form (Appendix B) after reading the information letter (Appendix A) which addressed the aspects outlined below.

3.10.1Confidentiality

All data collected from participants was handled with strictest confidence. Only the supervisors, the clinicians, the researcher and the clinic receptionist had access to the participant's file. The participant's particulars not relevant to the study were not mentioned in public. The researcher replaced participants' names with numbers. The data collected was kept in a safe research storeroom within the department of homoeopathy and will be destroyed appropriately after 5 years as per DUT regulations. All data captured were coded and password protected.

3.10.2 Voluntarily participation

The participants were participating in the study voluntarily and there was no coercion to be part on the study by the researcher or the supervisors of the study nor DUT.

3.10.3 Freedom of withdrawal

The participants were informed that they could withdraw at any time from the study without bias and prejudice.

3.11 Data analysis

All data captured were analysed using SPSS version 24.0. Reliability and validity of the results were measured using Cronbach's Alpha. The results were presented in the form of graphs, cross tabulations and other figures for the quantitative data that was collected. Inferential techniques comprised the use of correlations and chi square test values which were interpreted using p values. The ratings comparisons and correlation between the researcher, clinician and patient were done using Cohen's kappa test.

CHAPTER 4: RESULTS

4.1 Introduction

The aim of this research study was to determine the efficacy of a topical application comprising *Calendula officinalis Ø* with *Olea europaea* in the management of SD of the scalp (dandruff).

The sample size of the study comprised 64 participants between the ages 18 to 50 years. Participants had to have noticeable dandruff prior to the study and had to meet the inclusion and the exclusion criteria in order to qualify for this study. All participants were instructed not to apply any other hair care or anti-dandruff products during the course of the study.

This was a double blind controlled study which took place over a period of six weeks with three consultations; participants were distributed into the control and the treatment groups with each group consisting of 32 participants. The control group received *Olea europaea* only and the treatment group received *Calendula officinalis Ø* with *Olea europaea.* They were instructed to apply the medication gently on their scalp twice a week (every third day) before bedtime and keep it overnight and rinse it the following day in the morning.

Participants were required to record the severity of signs and symptoms of their scalp according to the severity of sensation they experienced using the PPQ scale and with the researcher and the clinician measure the severity using a VAS. The measurements occurred on all three consultations, the first measurements were conducted prior to applying the medication and the second measurements were conducted after 21 days and the last measurements after 41 days.

The results and findings were obtained from the two questionnaires as they were the only primary tools used to collect data in this study and were distributed to patients and clinicians who contributed more than two thirds of the data while the rest was from the researcher.

The data collected from the responses was analyzed with SPSS version 24.0. Reliability and validity of the results were determined using Cronbach's Alpha. The descriptive statistics are presented in the form of graphs, cross tabulations and other figures from the quantitative data that was collected. Inferential techniques include the use of correlations and chi square test values which are interpreted using p values. The ratings comparisons and correlation between the researcher (R) and clinician (C) and patient (P) were done using kappa statistics.

4.2 Study compliance

The study aimed at successfully recruited 64 participants, however only 61 completed the trial which gave a 95% response rate. Thirty were from the control group whilst the remaining 31 were from the treatment group. Three participants were unable to complete the study due to problems such as availability and patient compliance. Participants were allowed to withdraw at any time from the study without explanation, bias and prejudice.

4.3 The research instrument

The VAS research instrument consisted of five components (irritation, flaking, greasiness, percentage of the scalp involved and overall impression), with a level of measurement at an ordinal level. The PPQ also had five components (irritation, flaking, greasiness, itching and overall impression) based on ordinal data.

4.4 Reliability statistics

The two most important aspects of precision are reliability and validity. Reliability is computed by taking several measurements on the same subjects. A reliability coefficient of 0.70 or higher is considered as "acceptable". Table 3 reflects the Cronbach's alpha score for all the items that constituted the questionnaire.

Table 3: Reliability coefficients of results based on Cronbach's Alpha

	Reliability Statistics	
	Cronbach's Alpha	**N of Items**
VAS	0.951	45
PPQ	0.928	45

The reliability scores for all sections exceed the recommended Cronbach's alpha value. This indicates a degree of acceptable, consistent scoring for these sections of the research as it exceeds 0.9.

4.5 Biographical data

4.5.1 Race

This section summarizes the biographical characteristics of the participants. There were similar numbers of respondents per race group in each of the two groups (Figure 9). The sample consisted mainly of 96.7% and 93.5% African patients in each group respectively. There were no Indian patients in the control group while there were 3.2% in the treatment group. The treatment and control groups comprised 3.2% and 3.3% White patients respectively.

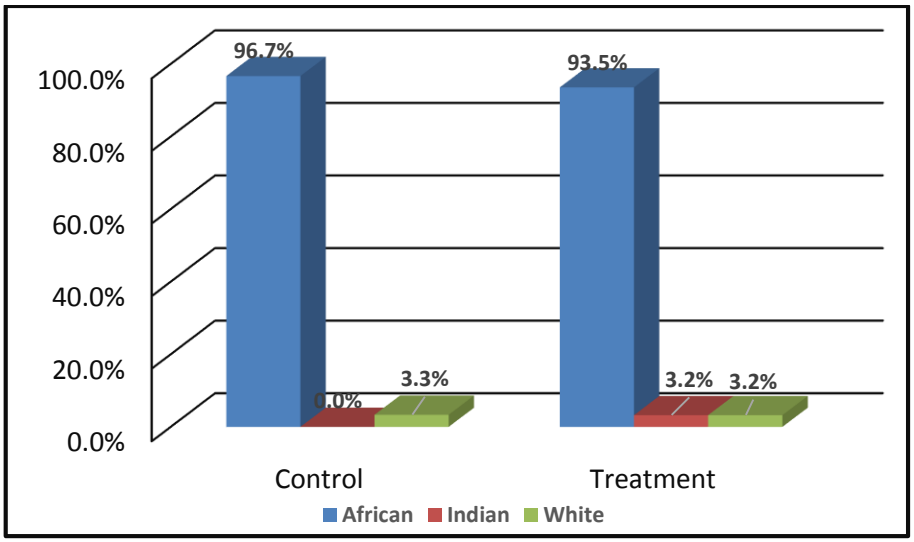


Figure 9: Race distribution of participants (%)

4.5.2 Gender

Overall, the ratio of males to females was approximately 2:3 (39.3%:60.7%)(Figure 10).

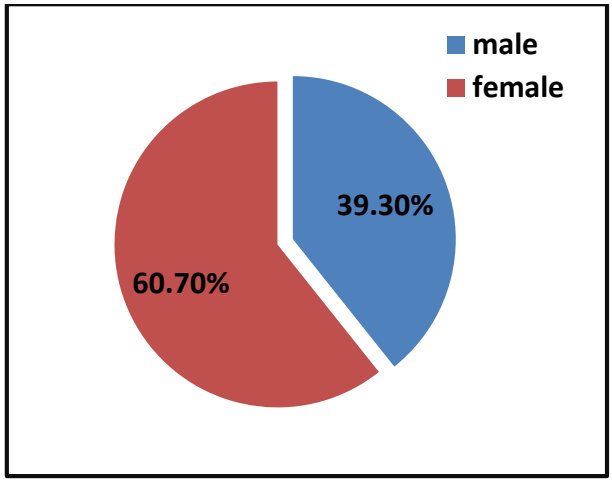


Figure 10: Gender distribution of participants (%)

4.5.3 Age

The study inclusion criteria was 18-50 years of age, but the participants were 19-49 years of age. Of the 61 participants there were 2 participants (3.30%) between the ages of 18 and 19 years, 38 participants (65.5%) between the ages of 20 and 29 years, 13 participants (21.3%) between the ages 30 and 39 years and 6 participants (9.80%) between the ages 40 and 49 years. Table 4 shows the overall age and gender distribution, and Figure 11 shows the age distribution.

Table 4: Age distribution of participants (%

Group	Age	Male	Female
Control	10 - 19	0%	0%
	20 - 29	42.9%	57.1%
	30 - 39	28.6%	71.4%
	40 - 49	0.0%	100.0%
	Total	36.7%	63.3%
Treatment	10 - 19	50.0%	50.0%
	20 - 29	42.1%	57.9%
	30 - 39	33.3%	66.7%
	40 - 49	50.0%	50.0%
	Total	41.9%	58.1%
Total	10 - 19	50.0%	50.0%
	20 - 29	42.5%	57.5%
	30 - 39	30.8%	69.2%
	40 - 49	33.3%	66.7%
	Total	39.3%	60.7%

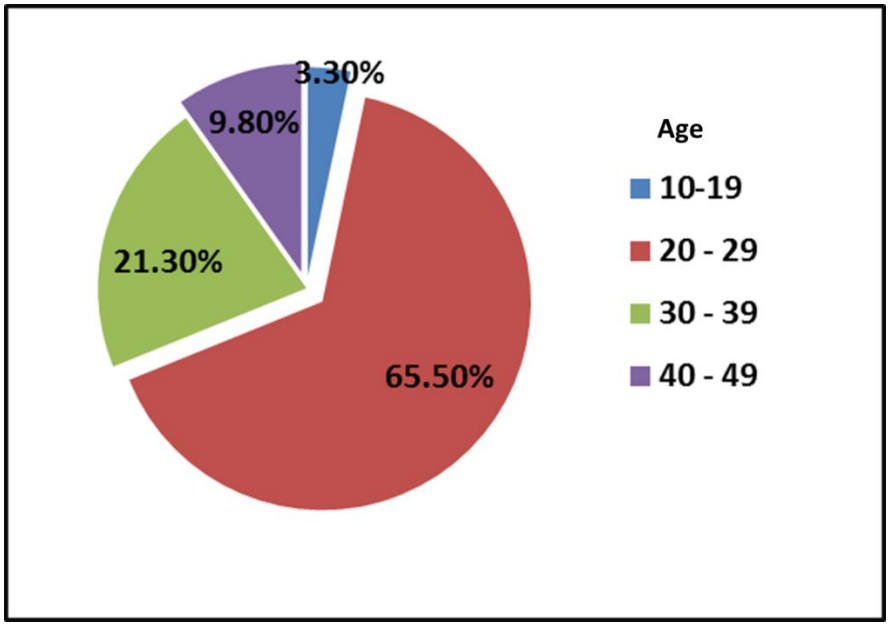


Figure 11: Age distribution of participants (%)

4.6 Statistical analysis

The sections that follows analyses the scoring patterns of the participants per visit per variable per rater. The mean values and frequency ratings across visits were used for comparative purposes.

4.6.1 Irritation

This section measures the observed irritation due to SD on the patient's scalp as reported by the researcher, clinician and patient. Figure 12 shows the mean scores per rater over time.

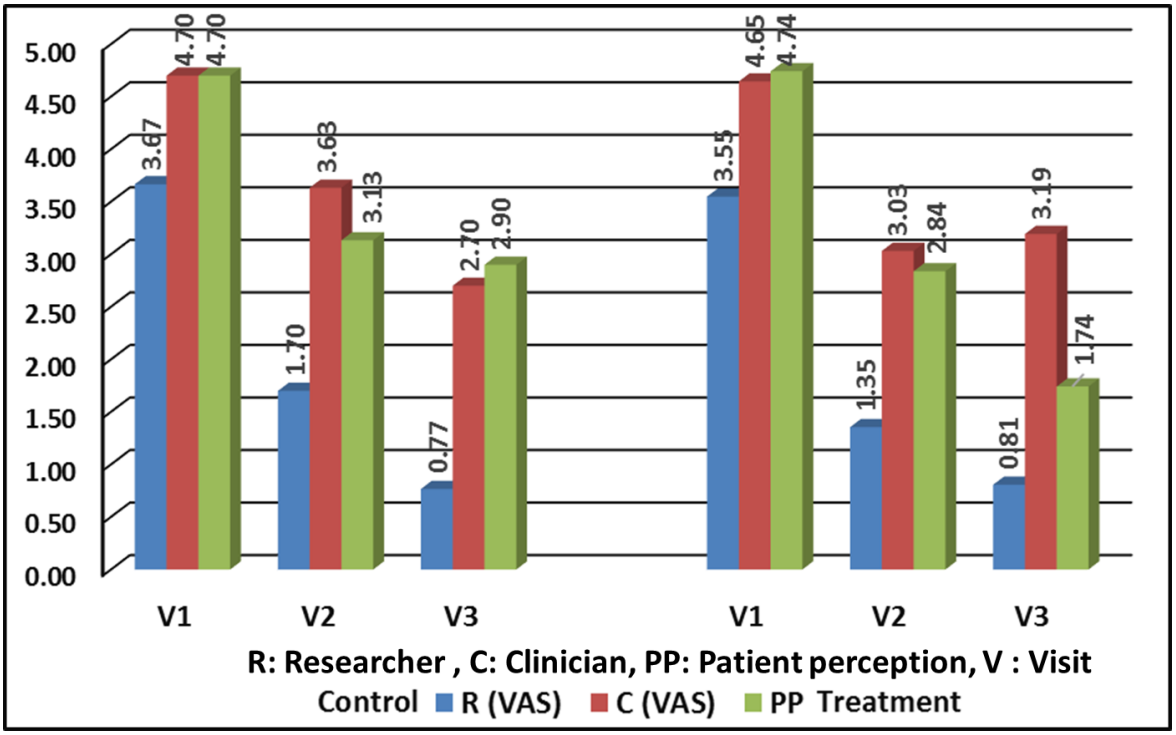


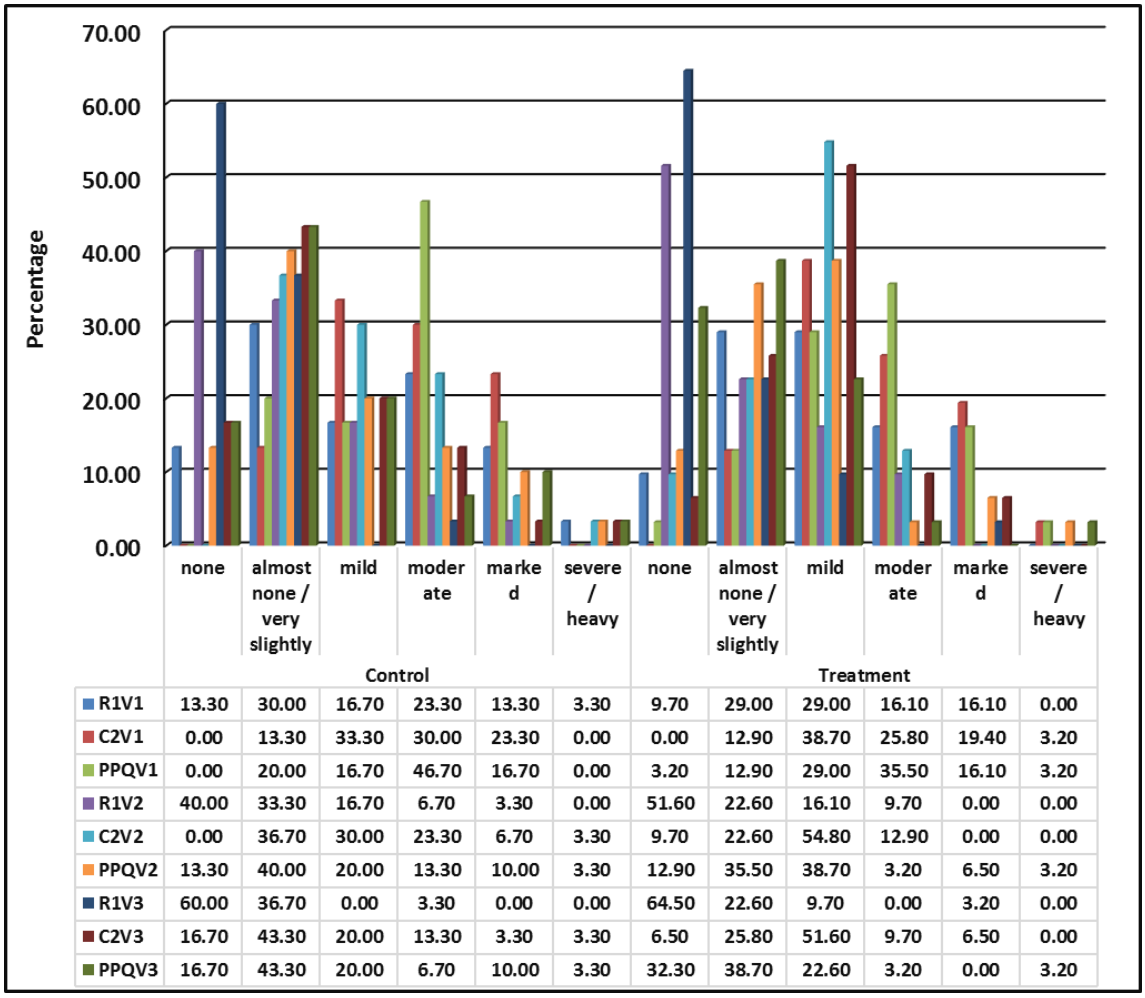
Figure 12: Mean scores for control and treatment groups on irritation

The following patterns were observed.

Generally, the ratings (mean score) by the researcher, the clinician and patient showed improvement on decreasing the level of irritation over time for both groups (control and treatment), however the researcher scored consistently lower than the clinician and the patients. With regards to the control group the researcher scored 3.67 for visit 1 which improved to 1.70 on visit 2 and 0.77 by visit 3. The clinician scored 4.70 on visit 1 which improved to 3.63 for visit 2 and was 2.70 on visit 3 whilst the patients scored 4.70 on the first visit which improved to 3.13 in visit 2 and was 2.90 by visit 3.

With regards to the treatment group the researcher scored 3.55 for visit 1 which improved to 1.35 and 0.81 for visit 2 and 3 respectively. The clinician scored 4.65 for visit 1, which improved to 3.03 for visit 2 and indicated 3.19 on visit 3 whilst the patients' ratings were 4.74 for visit 1 and which decreased to 2.84 and 1.74 for visit 2 and visit 3 respectively.

Figure 13 indicates the frequency of scores made by raters on the severity of the irritation.



	Control						Treatment					
	none	almost none / very slightly	mild	moderate	marked	severe / heavy	none	almost none / very slightly	mild	moderate	marked	severe / heavy
R1V1	13.30	30.00	16.70	23.30	13.30	3.30	9.70	29.00	29.00	16.10	16.10	0.00
C2V1	0.00	13.30	33.30	30.00	23.30	0.00	0.00	12.90	38.70	25.80	19.40	3.20
PPQV1	0.00	20.00	16.70	46.70	16.70	0.00	3.20	12.90	29.00	35.50	16.10	3.20
R1V2	40.00	33.30	16.70	6.70	3.30	0.00	51.60	22.60	16.10	9.70	0.00	0.00
C2V2	0.00	36.70	30.00	23.30	6.70	3.30	9.70	22.60	54.80	12.90	0.00	0.00
PPQV2	13.30	40.00	20.00	13.30	10.00	3.30	12.90	35.50	38.70	3.20	6.50	3.20
R1V3	60.00	36.70	0.00	3.30	0.00	0.00	64.50	22.60	9.70	0.00	3.20	0.00
C2V3	16.70	43.30	20.00	13.30	3.30	3.30	6.50	25.80	51.60	9.70	6.50	0.00
PPQV3	16.70	43.30	20.00	6.70	10.00	3.30	32.30	38.70	22.60	3.20	0.00	3.20

Figure 13: Percentage mean score of control and treatment group on irritation

All the raters moved from reporting high levels of severity to lower incidences of severity over time for both the control and the treatment group. With regard to the control group, the sum of m*oderate* and *marked* severities decreased over time by the researcher, the clinician and the patients. The researcher indicated a total of 36.6% which was lowered to 10% for visit 2 and 3.3% by visit 3. The clinician ratings were 53% in visit 1 and decreased to 30% during visit 2 and 16% by visit 3 whilst the patients scored 62% on visit 1 which decreased to 23.3% and 16% for visit 2 and 3 respectively.

Even in the treatment group, the sum of *moderate* and *marked* severities indicated a decreased in percentage mean scores, for instance the researcher's ratings were 45.1% in visit 1 and improved to 25.8% & 9.7% during visit 2 and 3 respectively. The clinician scored 64.5% on visit 1 and indicated 67.7% on visit 2 and which later decreased to 61.3% on visit 3 whereas the patients indicated a total of 64.5% on visit 1 which decreased to 41.9% and 25% during visit 2 and 3 respectively.

4.6.2 Flaking

This section measures the observed flaking due to SD on the patient's scalp as reported by the researcher, clinician and patients.

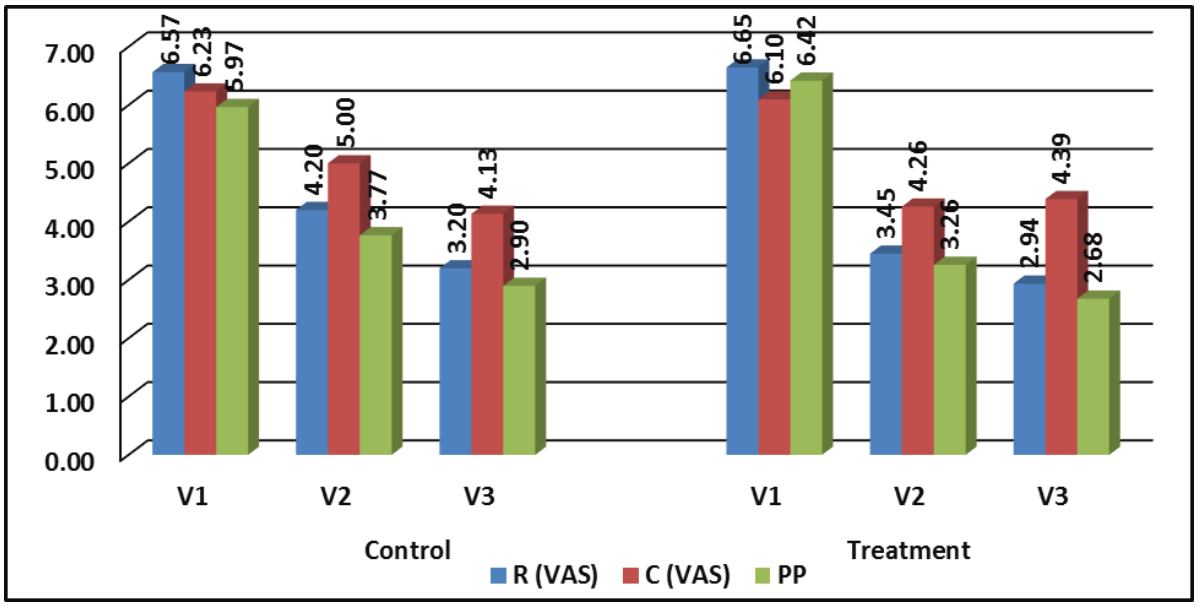
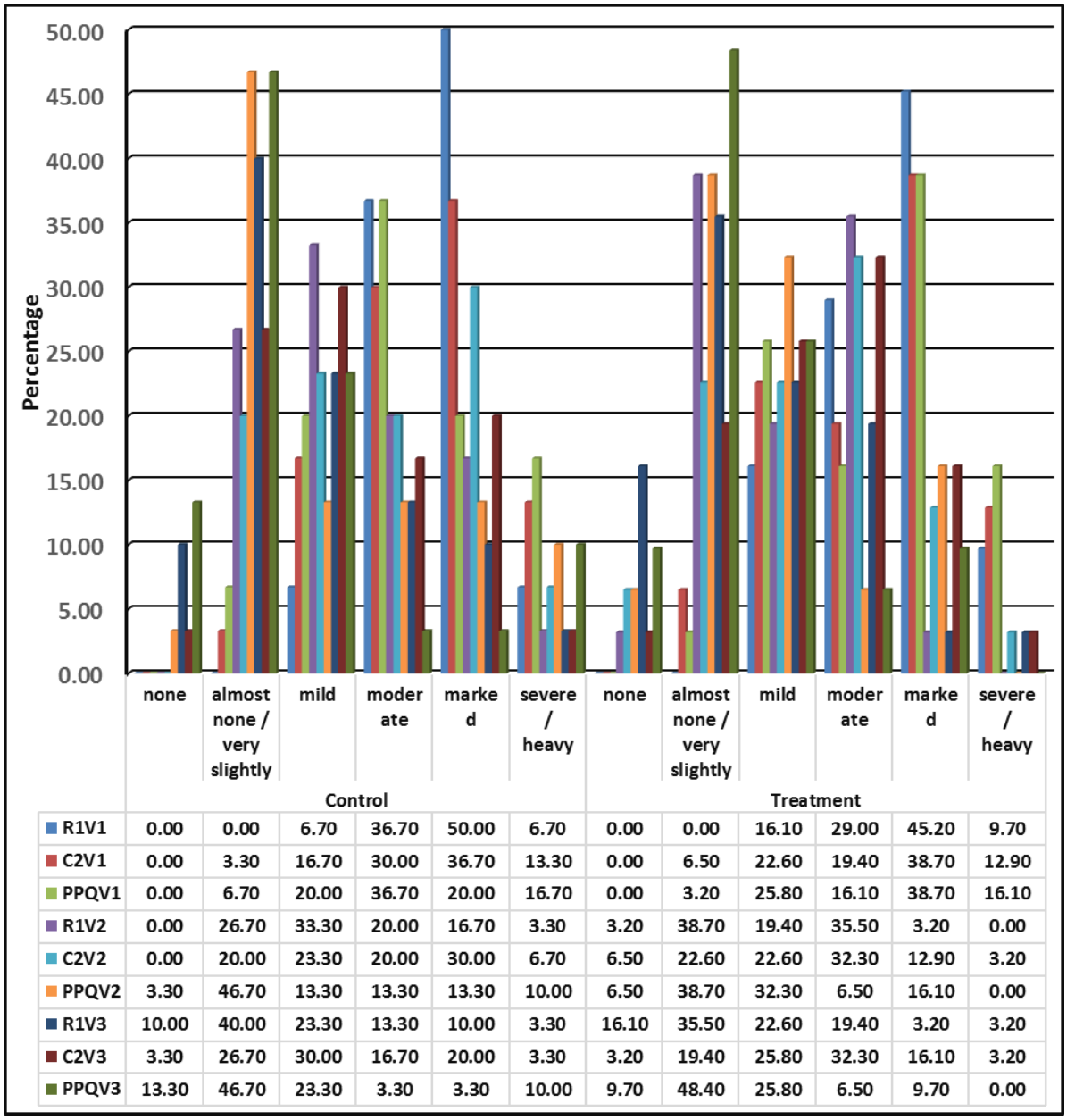


Figure 14: Mean scores for control and groups on flaking treatment

The following patterns were observed with reference to Figure 14. Overall, the ratings (mean score) per rater improved over time for both groups (control and treatment). The researcher, clinician and patients scored differently but almost at the same levels over time. The differences in these ratings for significance are tested later. With regards to control group the mean score by the researcher indicated 6.57 for visit 1 which decreased to 4.20 for visit 2 and 3.20 on visit 3. The clinician ratings were 6.23 for visit 1 and lowered to 5.00 and 4.13 in visit 2 and 3 respectively whereas the patients scored 5.97 for visit 1 and indicated improvement by 3.77 for visit 2 and 2.90 by visit 3.

In terms of the treatment group, the researcher displayed improvement with their ratings indicating 6.65 for visit 1 which decreased to 3.45 and 2.94 during visit 2 and 3 respectively. The clinician scored 6.10 for visit 1 which decreased to 4.26 in visit 2 and 4.39 for visit 3 whereas the patients scored 6.42 on visit 1 which decreased to 3.26 on visit 2 and 2.68 on visit 3.

The frequency of scores made by raters on the severity of the flaking is reflected in Figure 15.



	Control						Treatment					
	none	almost none / very slightly	mild	moderate	marked	severe / heavy	none	almost none / very slightly	mild	moderate	marked	severe / heavy
R1V1	0.00	0.00	6.70	36.70	50.00	6.70	0.00	0.00	16.10	29.00	45.20	9.70
C2V1	0.00	3.30	16.70	30.00	36.70	13.30	0.00	6.50	22.60	19.40	38.70	12.90
PPQV1	0.00	6.70	20.00	36.70	20.00	16.70	0.00	3.20	25.80	16.10	38.70	16.10
R1V2	0.00	26.70	33.30	20.00	16.70	3.30	3.20	38.70	19.40	35.50	3.20	0.00
C2V2	0.00	20.00	23.30	20.00	30.00	6.70	6.50	22.60	22.60	32.30	12.90	3.20
PPQV2	3.30	46.70	13.30	13.30	13.30	10.00	6.50	38.70	32.30	6.50	16.10	0.00
R1V3	10.00	40.00	23.30	13.30	10.00	3.30	16.10	35.50	22.60	19.40	3.20	3.20
C2V3	3.30	26.70	30.00	16.70	20.00	3.30	3.20	19.40	25.80	32.30	16.10	3.20
PPQV3	13.30	46.70	23.30	3.30	3.30	10.00	9.70	48.40	25.80	6.50	9.70	0.00

Figure 15: Percentage mean score of control and treatment group on flaking

All raters moved from reporting high levels of severity to lower incidences of severity over time. For instance, the sum of *moderate* and *marked* severities for both the control and the treatment groups displayed a decrease in percentage mean score from visit 1 to visit 3. With regard to the control group, the researcher indicated the ratings of 86,7% on visit 1 which reduced to 36.7% on visit 2 and 23.3% by visit 3. The clinician ratings were 66.7% on visit 1 which decreased to 50% during visit 2 and 36.7% on visit 3 whilst the patients scored 56.7% on visit 1 and which lowered to 26.6% and 6.6% on visit 2 and 3 respectively.

With regards to the treatment group, the researcher indicated the percentage mean scores of 74.2% for visit 1 which decreased to 38.7% and 22.6% for visit 2 and 3 respectively. The clinician scored 58.1% on visit 1 which decreased to 45.2% for visit 2 and indicated 48.4% on visit 3 whereas the patients' ratings were 54.8% on visit 1 which decreased to 22.6% in visit 2 and 16.2%in visit 3.

4.6.3 Greasiness

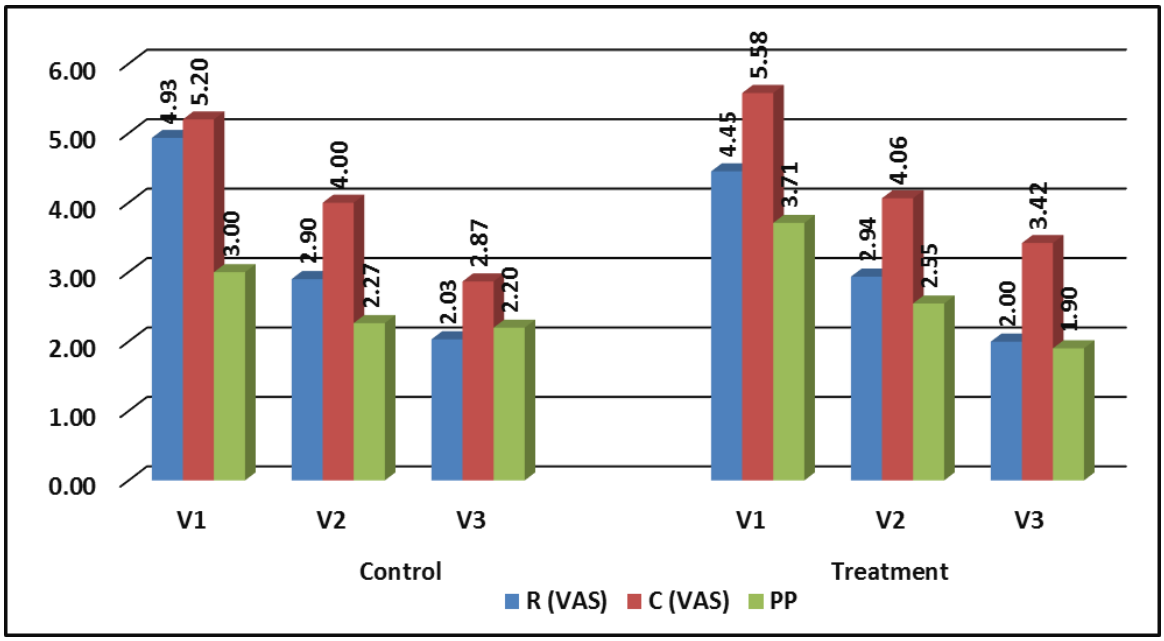


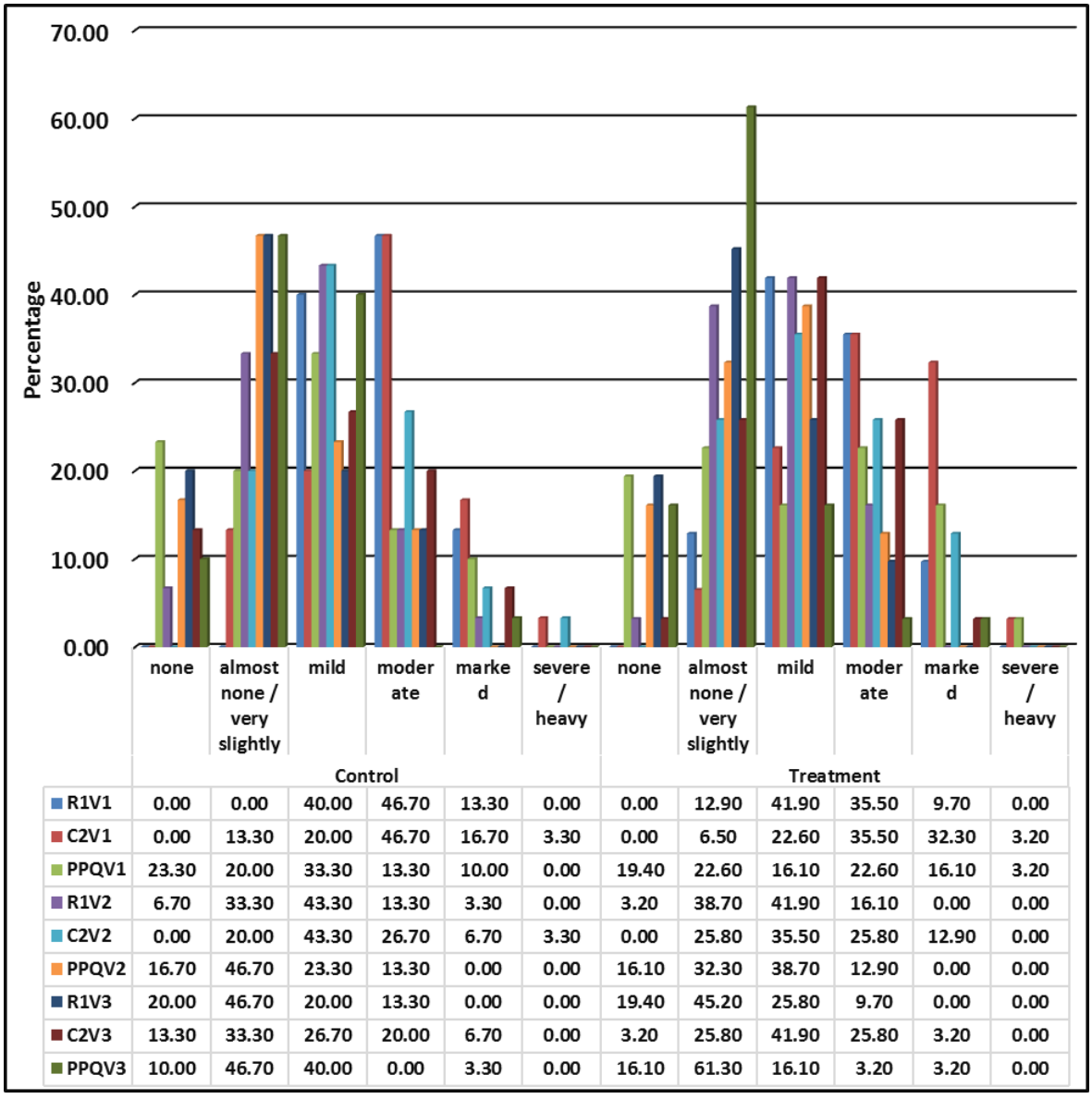
Figure 16: Mean scores for control and treatment groups on greasiness

Figure 16 shows the observed greasiness due to SD on the patient's scalp as reported by the researcher, clinician and patients. The following patterns were observed where the overall ratings (mean score) per rater improved over time for both groups (control and treatment). The researcher scored consistently lower than the clinician and the patients. The differences in these ratings for significance are tested later. The mean scores by all raters show a decrease over time for both groups. With regards to control group, the mean score by the researcher indicated 4.93 for visit 1 which decreased to 2.90 and 2.03 in visit 2 and 3 respectively, the clinician scored 5.20 on visit 1 which decreased to 4.00 and 2.87 for visit 2 and 3 respectively whilst the patients' ratings were 3.00 for visit 1 and reduced to 2.27 for visit 2 and 2.20 by visit 3.

Considering the treatment group, the researcher recorded 4.45 for visit 1 which improved to 2.94 and 2.00 for visit 2 and 3 respectively and the clinician's ratings were

5.58 for visit 1 which lowered to 4.06 in visit 2 and 2.00 by visit 3 whereas the patients indicated 3.71 for visit 1 which improved to 2.55 for visit 2 and 1.90 by visit 3.

The frequency of scores made by raters on the severity of the greasiness is depicted in Figure 17.



	Control						Treatment					
	none	almost none / very slightly	mild	moderate	marked	severe / heavy	none	almost none / very slightly	mild	moderate	marked	severe / heavy
R1V1	0.00	0.00	40.00	46.70	13.30	0.00	0.00	12.90	41.90	35.50	9.70	0.00
C2V1	0.00	13.30	20.00	46.70	16.70	3.30	0.00	6.50	22.60	35.50	32.30	3.20
PPQV1	23.30	20.00	33.30	13.30	10.00	0.00	19.40	22.60	16.10	22.60	16.10	3.20
R1V2	6.70	33.30	43.30	13.30	3.30	0.00	3.20	38.70	41.90	16.10	0.00	0.00
C2V2	0.00	20.00	43.30	26.70	6.70	3.30	0.00	25.80	35.50	25.80	12.90	0.00
PPQV2	16.70	46.70	23.30	13.30	0.00	0.00	16.10	32.30	38.70	12.90	0.00	0.00
R1V3	20.00	46.70	20.00	13.30	0.00	0.00	19.40	45.20	25.80	9.70	0.00	0.00
C2V3	13.30	33.30	26.70	20.00	6.70	0.00	3.20	25.80	41.90	25.80	3.20	0.00
PPQV3	10.00	46.70	40.00	0.00	3.30	0.00	16.10	61.30	16.10	3.20	3.20	0.00

Figure 17: Percentage mean score of control and treatment group on greasiness

The following patterns were observed: All the raters moved from reporting high levels of severity to lower incidences of severity over time for both the control and the treatment groups. For instance, the sum of *mild* and *moderate* severities for both groups indicated a decrease on all visits. With regards to the control group, the researcher scored 86.7% for visit 1 which displayed a reduction of 56.6% and 33.3% on visit 2 and 3 respectively. The clinician ratings were 66.7% for visit 1 and lowered

to 56.6% on visit 2 and 46, 7% for visit 3 whilst the patients scored 46.6% on the first visit which decreased to 36.6% but indicated 40% by the last visit.

Regarding the treatment group, the researcher scored 77.4% during visit 1 which decreased to 58.0% and 35.5% for visit 2 and 3 respectively. The clinician showed a total of 58.1% for visit 1 which reduced to 61.3% for visit 2 and increased to 67.7% for visit 3 whereas the patients scored 38.7% on visit 1 which increased to 51.6% for visit 2 and decreased to 19.3% in visit 3.

4.6.4 Percentage of the scalp involved

This section measures the observed percentage of the patient's scalp affected by SD as reported by only the researcher and clinician.

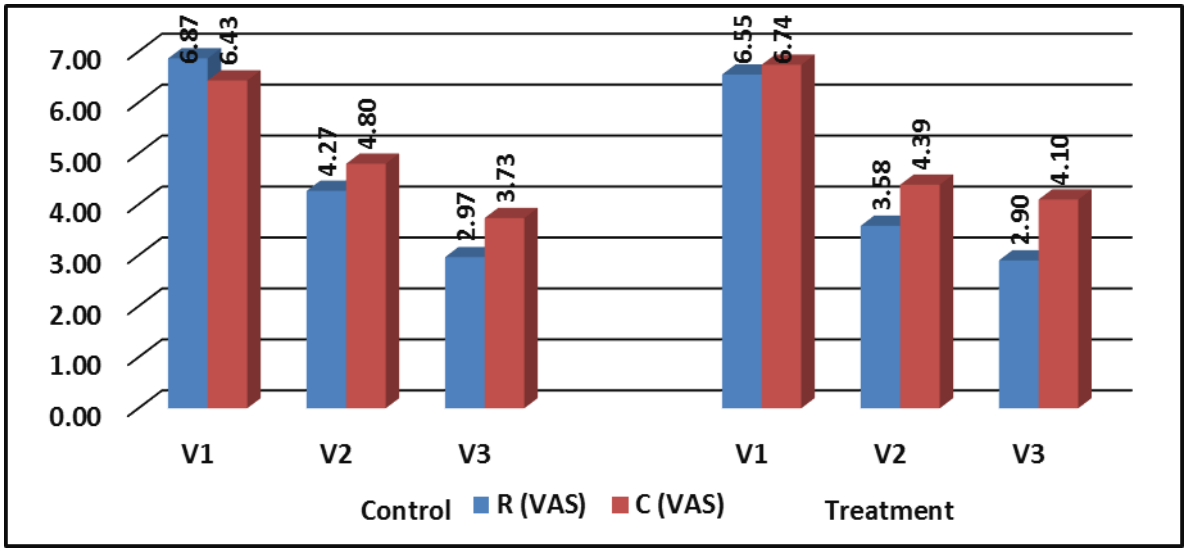
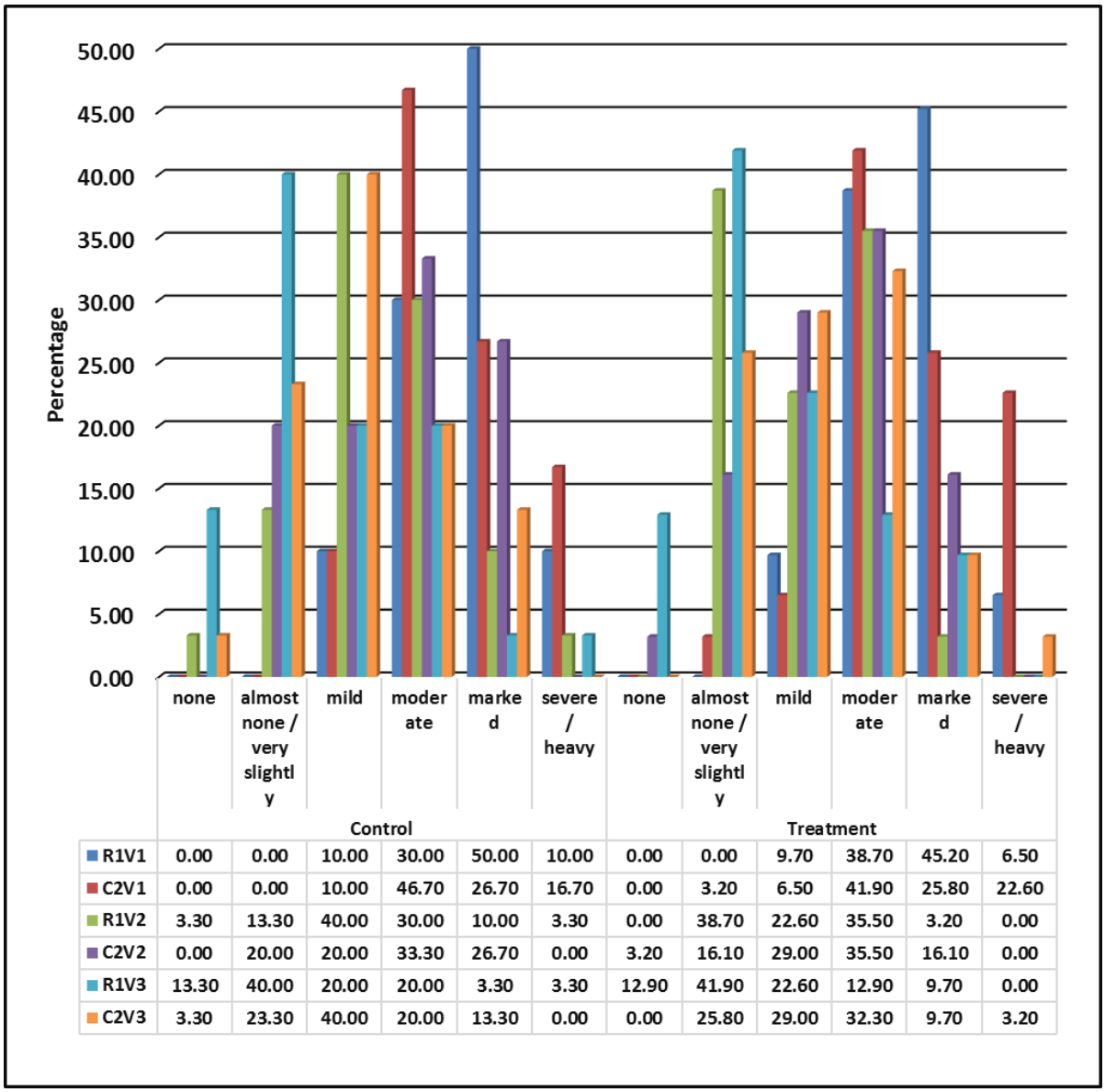


Figure 18: Mean scores for control and treatment groups on Percentage of the scalp involved

Generally, the ratings (mean score) per rater improved over time for both groups (control and treatment). The researcher scored consistently lower than the clinician. The differences in these ratings for significance is tested later. The mean scores by all raters showed a decrease over time for both groups. With regards to the control group, the mean score by the researcher was 6.87 for visit 1 which improved to 4.27 and 2.97 for visit 2 and 3 respectively. The clinician ratings were 6.43 for visit 1 which improved to 4.80 for visit 2 and 3.73 by visit 3. With regards to the treatment group, the researcher scored 6.55 for visit 1 which improved to 3.58 and 2.90 for visit 2 and 3 respectively whereas the clinician mean scores were 6.74 for visit 1 which improved to 4.39 on visit 2 and 4.10 by visit 3.

Figure 19 indicates the frequency of scores made by the clinician and researcher on the percentage of the scalp affected by the SD.



	Control						Treatment					
	none	almost none / very slightly	mild	moderate	marked	severe / heavy	none	almost none / very slightly	mild	moderate	marked	severe / heavy
R1V1	0.00	0.00	10.00	30.00	50.00	10.00	0.00	0.00	9.70	38.70	45.20	6.50
C2V1	0.00	0.00	10.00	46.70	26.70	16.70	0.00	3.20	6.50	41.90	25.80	22.60
R1V2	3.30	13.30	40.00	30.00	10.00	3.30	0.00	38.70	22.60	35.50	3.20	0.00
C2V2	0.00	20.00	20.00	33.30	26.70	0.00	3.20	16.10	29.00	35.50	16.10	0.00
R1V3	13.30	40.00	20.00	20.00	3.30	3.30	12.90	41.90	22.60	12.90	9.70	0.00
C2V3	3.30	23.30	40.00	20.00	13.30	0.00	0.00	25.80	29.00	32.30	9.70	3.20

Figure 19: Percentage mean score of control and treatment group on percentage of the scalp involved

The following patterns were observed. All the raters moved from reporting high levels of severity to lower incidences of severity over time. For instance, if one considers the sum of *moderate* and *marked* severities for both groups they indicated a decrease in percentage mean score from visit 1 to visit 3. With regards to the control group the researcher indicated a total rating of 80% for visit 1 which decreased to 40% and 23.3% for visit 2 and 3 respectively. The clinician scored 73.4% on visit 1 and 60% for visit 2 and 33.3% for visit 3.

In the treatment group, the researcher's ratings were 83.95% for visit 1 which decreased to 38.7% for visit 2 and 22.6% for visit 3. The researcher scored 67.7% on visit 1 which lowered to 51.6% and 42% for visit 2 and 3 respectively.

4.6.5 Itching

This section measures the itching observed due to SD on the patient's scalp as reported by the patients.

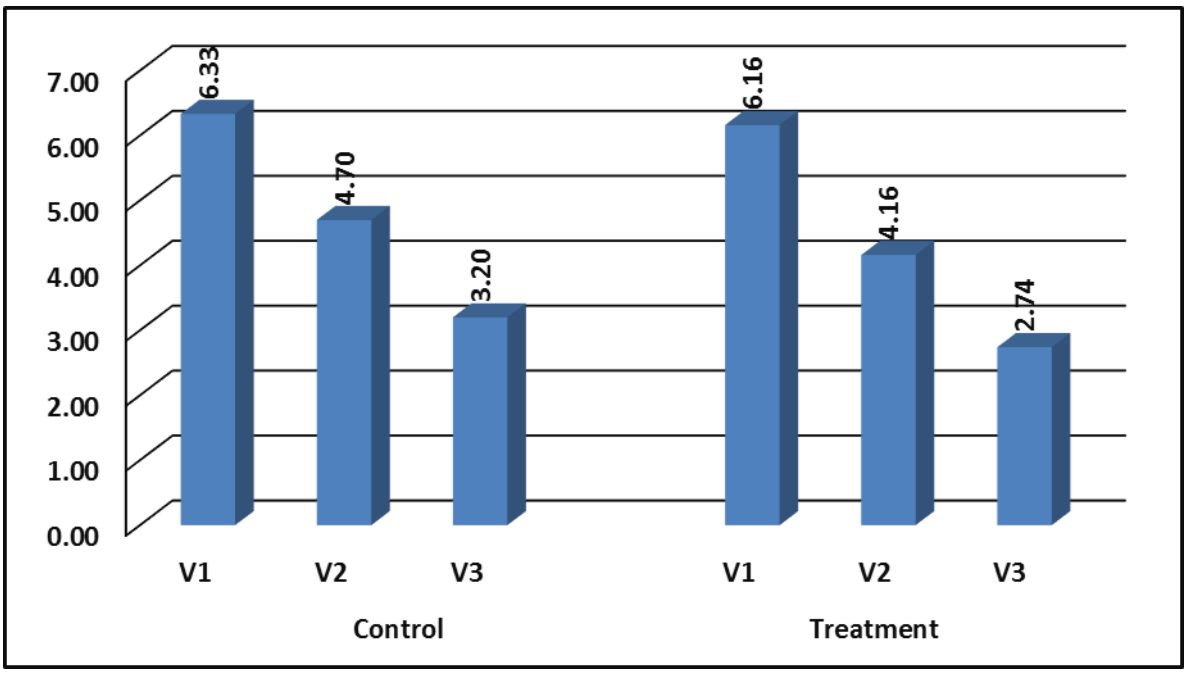


Figure 20: mean scores for control and treatment groups on itching

In general, the ratings (mean score) displayed improvement over time for both groups (control and treatment). With regards to the control group, the mean score by the patients indicated 6.33 on the first visit which improved to 4.70 and 3.20 for visit 2&3 respectively.

With regards to the treatment group, patients scored 6.16 for visit 1 which decreased to 4.16 for visit 2 and to 2.74 by visit 3.

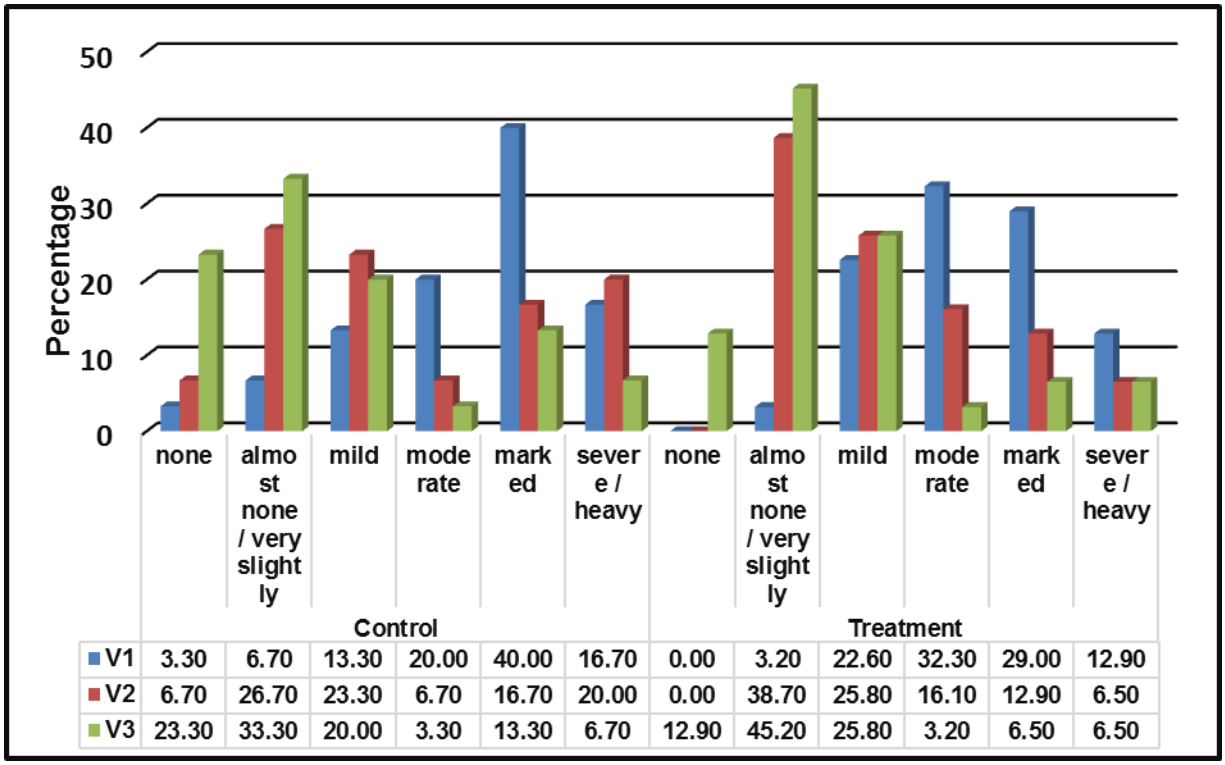


Figure 21: percentage mean score of control and treatment group for Itching

The following patterns were observed. The rating moved from reporting high levels of severity to lower incidences of severity over time for both the control and the treatment groups. With regards to the control group for *marked* severity, the patients reported 40% in the first visit which decreased to 16.7% and 13.3% for visit 2 and visit 3 respectively whilst in the treatment group they indicated 29% for visit 1 which lowered to 12.9% for visit 2 and 6.5% for visit 3.

With regards to *heavy* severity for the control group, it was observed that patients scored 16.7% for visit 1 which abnormally increased to 20% in visit 2 but later decreased to 6.70% by visit 3. In the treatment group the *heavy* severity indicated 12.9% for visit 1 and decreased to 6.5% for both visit 2 and visit 3.

4.6.7 Overall impression

This section depicts the measurement of the observed overall impression on the effects of SD on the patients as reported by the researcher, clinician and patients.

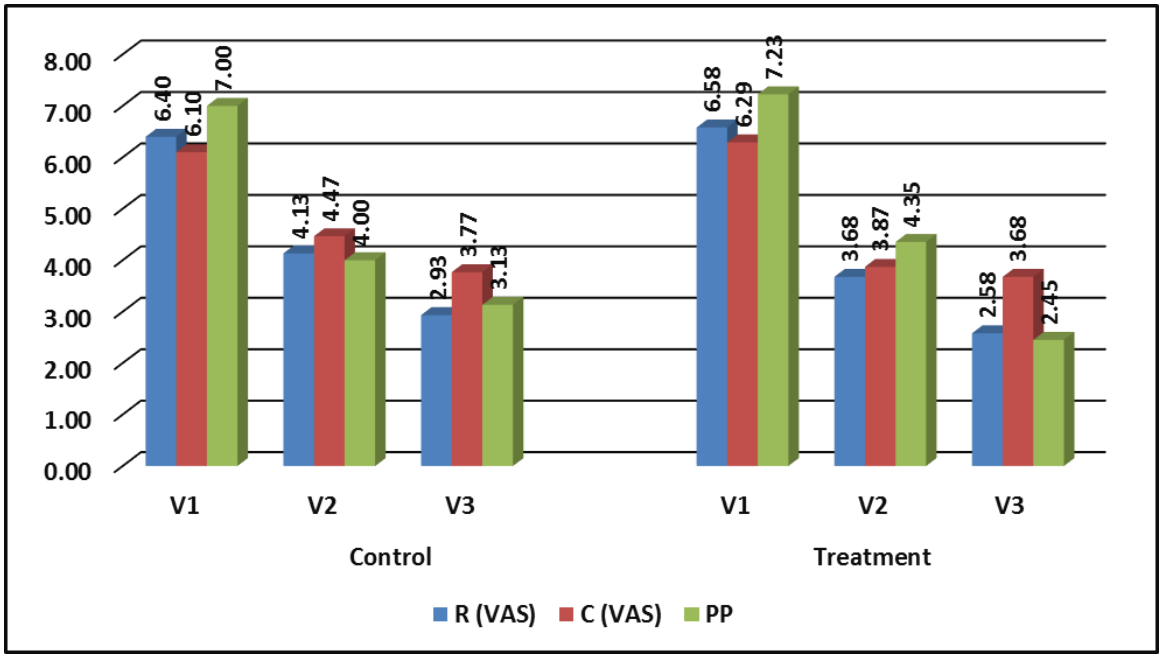
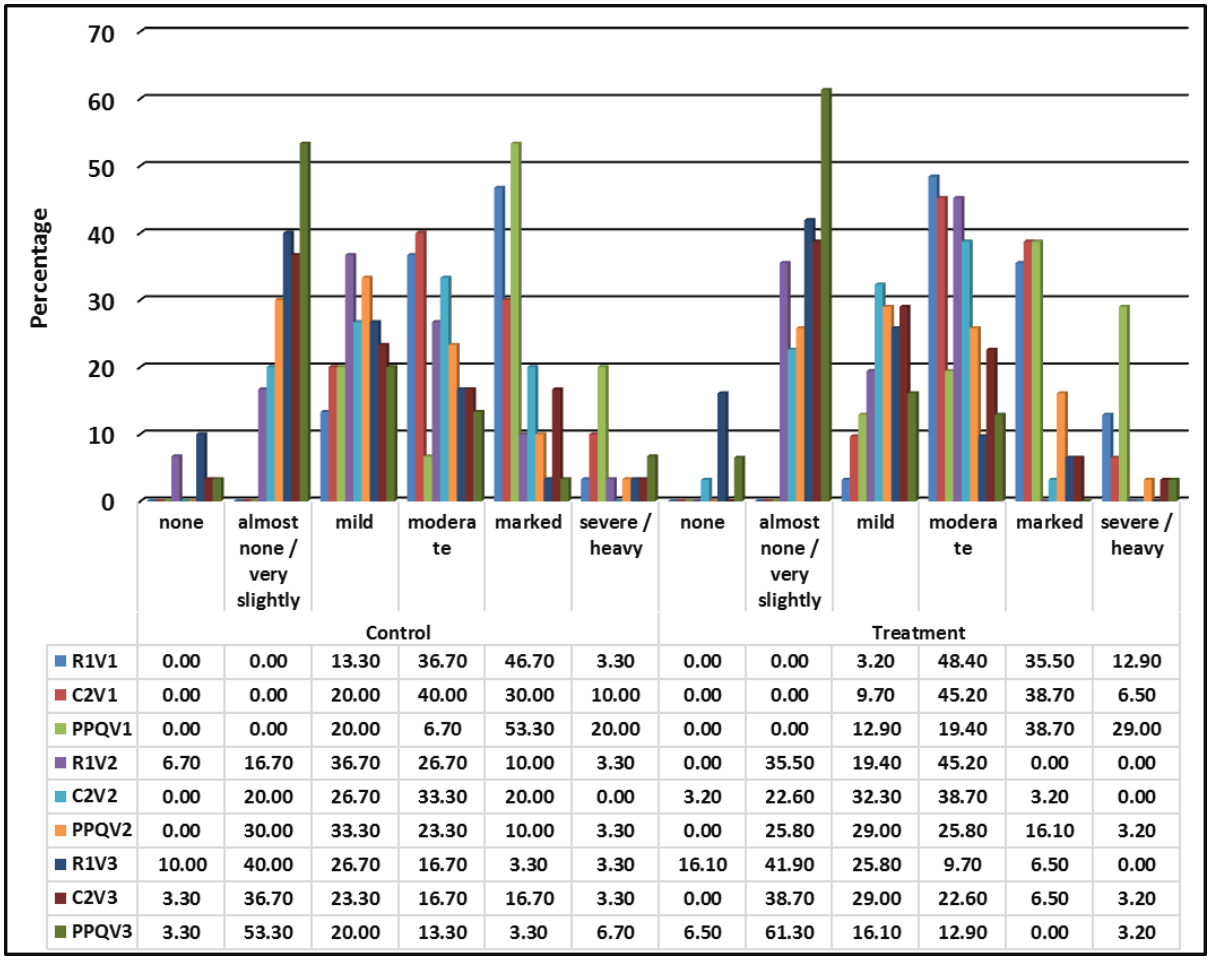


Figure 22: mean scores for control and treatment groups on overall impression

Overall, the ratings (mean score) per rater improved over time for both of the groups (control and treatment) (Figure 22). The differences in these ratings for significance are tested later. With regards to the control group, the mean score by the researcher decreased to 4.13 and 2.93 in visit 2 and 3 respectively from that of visit 1 which was 6.40, the clinician mean score was 6.10 for visit 1 which improved to 4.47 on visit 2 and 3.77 on visit 3 whereas the patients scored 7.00 on the first visit and improved to 4.00 for visit 2 and 3.13 by visit 3.

The treatment group indicate that the researcher ratings were 6.58 for visit 1 which lowered to 3.68 and 2.58 for visit 2 and 3 respectively, the clinician mean score was 6.29 in visit 1 and decreased to 3.87 for visit 2 and 3.68 on visit 3 whereas the patients scored 7.23 on the first visit which reduced to 4.35 and 2.45 for visit 2 and visit 3 respectively.

Figure 23 indicates the frequency of scores made by raters on the severity of the overall impression SD had on patients.



	Control						Treatment					
	none	almost none / very slightly	mild	moderate	marked	severe / heavy	none	almost none / very slightly	mild	moderate	marked	severe / heavy
R1V1	0.00	0.00	13.30	36.70	46.70	3.30	0.00	0.00	3.20	48.40	35.50	12.90
C2V1	0.00	0.00	20.00	40.00	30.00	10.00	0.00	0.00	9.70	45.20	38.70	6.50
PPQV1	0.00	0.00	20.00	6.70	53.30	20.00	0.00	0.00	12.90	19.40	38.70	29.00
R1V2	6.70	16.70	36.70	26.70	10.00	3.30	0.00	35.50	19.40	45.20	0.00	0.00
C2V2	0.00	20.00	26.70	33.30	20.00	0.00	3.20	22.60	32.30	38.70	3.20	0.00
PPQV2	0.00	30.00	33.30	23.30	10.00	3.30	0.00	25.80	29.00	25.80	16.10	3.20
R1V3	10.00	40.00	26.70	16.70	3.30	3.30	16.10	41.90	25.80	9.70	6.50	0.00
C2V3	3.30	36.70	23.30	16.70	16.70	3.30	0.00	38.70	29.00	22.60	6.50	3.20
PPQV3	3.30	53.30	20.00	13.30	3.30	6.70	6.50	61.30	16.10	12.90	0.00	3.20

Figure 23: Percentage mean score of control and treatment group on overall impression

The following patterns were observed. All the raters moved from reporting high levels of severity to lower incidences of severity over time. For instance, the researcher, the clinician and the patients indicated a decrease in ratings for the sum of *moderate* and *marked* severities for both groups from visit 1 to visit 3. Considering the control group, the researcher scored 83.4% on visit 1 which lowered to 36.7% for visit 2 and 20% by visit 3. The clinician ratings was 70% in visit 1 and reduced to 53.3% on visit 2 and 33.4% on visit 3 whereas the patients scored 60% for visit 1 which decreased to 33.4% for visit 2 and 16.6% for visit 3.

With regards to the treatment group, the researcher scored 83.9% for visit 1 which decreased to 45.2% on visit 2 and 16.2% on visit 3. The clinician also scored 83.9% for visit 1 which improved to 41.9% for visit 2 and 29.1% on visit 3 whilst the patients' ratings were 58.1% on visit 1 and lowered to 41.9% and 12% for visit 2 and visit 3 respectively.

4.7 Comparisons of scores

The results that follow compare the researcher rating (R1) to the clinician rating (C2) to the patient rating (PPQ), by group.

Cohen's kappa (κ) is a measure of inter-rater agreement for categorical scales when there are two raters (where κ is the lower-case Greek letter 'kappa').

The ***K*** value can be interpreted as follows (Altman 1991):

Value of *K*	**Strength of agreement**
< 0.20	Poor
0.21 - 0.40	Fair
0.41 - 0.60	Moderate
0.61 - 0.80	Good
0.81 - 1.00	Very good

Table 5: Correlation between the ratings by the researcher and the clinician on irritation (Visit 1). R1V1 Irritation * C2V1 Irritation * Group Cross-tabulation

Group		**Value**	**Approximate Significance**
Control	Measure of Agreement	-0.034	0.555
Treatment	Measure of Agreement	0.102	0.077
Total	Measure of Agreement	0.032	0.451

Table 5 shows that the kappa values are in the region < 0.2. This implies a poor correlation between the raters (R1 and C2) for visit 1 (VI) for irritation. For the control group the kappa value was -0.034, and for the treatment group the kappa value was 0.102. That is, the rating between the researcher and clinician were different in each of the groups. An inspection of the means also indicates this. For the control group, the means were 3.67 and 4.70 for the researcher and clinician respectively.

Furthermore, since p > 0.05, the kappa (κ) coefficients are statistically not significantly different from zero.

Table 6: Correlation between the ratings by the researcher and the patients on irritation (Visit 1). R1V1 Irritation * PPQ1 Irritation * Group Cross-tabulation

Group		Value	Approximate Significance
Control	Measure of Agreement	0.065	0.290
Treatment	Measure of Agreement	0.033	0.558
Total	Measure of Agreement	0.045	0.300
a. Not assuming the null hypothesis. b. Using the asymptotic standard error assuming the null hypothesis.			

Table 6 shows that the kappa values are in the region < 0.2. This implies a poor correlation between the raters (R1 and PPQ1) for visit 1 (VI) for irritation. For the control group the kappa value was 0.065, and for the treatment group the kappa value was 0.033. That is, the rating between the researcher and patients were different in each of the groups. An inspection of the means also indicates this. For the control group, the means were 3.67 and 4.70 for the researcher and patients respectively. Furthermore, since $p > 0.05$, the kappa (κ) coefficients are statistically not significantly different from zero.

Table 7: Correlation between the ratings by the clinician and the patients on irritation (Visit 1). C2V1 Irritation * PPQ1 Irritation * Group Cross-tabulation

Group		Value	Approximate Significance
Control	Measure of Agreement	0.197	0.003
Treatment	Measure of Agreement	0.025	0.720
Total	Measure of Agreement	0.11	0.016
a. Not assuming the null hypothesis. b. Using the asymptotic standard error assuming the null hypothesis.			

Table 7 shows that the kappa values are in the region < 0.2. This implies a poor correlation between the raters (C2 and PPQ1) for visit 1 (VI) for irritation. For the control group the kappa value was 0.197, and for the treatment group the kappa value was 0.025. That is, the rating between the clinician and patients were different in each of the groups. An inspection of the means also indicates this. For the control group, the means were 3.63 and 3.13 for the clinician and patients respectively.

Furthermore, since $p < 0.05$ on the control group, the kappa (κ) coefficients are statistically significant.

Table 8: Correlation between the ratings by the researcher and the clinician on flaking (Visit 1). R1V1 Flaking * C2V1 Flaking * Group Cross-tabulation

Group		Value	Approximate Significance
Control	Measure of Agreement	0.046	0.545
Treatment	Measure of Agreement	0.197	0.007
Total	Measure of Agreement	0.132	0.011

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.

Table 8 shows that the kappa values are in the region < 0.2. This implies a poor correlation between the raters (R1 and C2) for visit 1 (VI) for flaking. For the control group the kappa value was 0.046, and for the treatment group the kappa value was 0.197. That is, the rating between the researcher and clinician were different in each of the groups. An inspection of the means also indicates this. For the control group, the means were 6.57 and 6.23 for the researcher and clinician respectively.

Furthermore, since p <0.05 on the treatment group, the kappa (κ) coefficients are statistically significant.

Table 9: Correlation between the ratings by the researcher and the patients on flaking (Visit 1). R1V1 Flaking * PPQ1 Flaking * Group Cross-tabulation

Group		Value	Approximate Significance
Control	Measure of Agreement	0.083	0.212
Treatment	Measure of Agreement	0.085	0.227
Total	Measure of Agreement	0.086	0.082

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.

Table 9 shows that the kappa values are in the region < 0.2. This implies a poor correlation between the raters (R1 and PPQ1) for visit 1 (V1) for flaking. For the control group the kappa value was 0.083, and for the treatment group the kappa value was 0.085. That is, the rating between the researcher and patients were different in each of the groups. An inspection of the means also indicates this. For the control group, the means were 6.57 and 5.97 for the researcher and patients respectively.

Furthermore, since p > 0.05, the kappa (κ) coefficients are statistically not significantly different from zero.

Table 10: Correlation between the ratings by the clinician and the patients on flaking (Visit 1). C2V1 Flaking * PPQ1 Flaking * Group Cross-tabulation

Group		Value	Approximate Significance
Control	Measure of Agreement	-0.057	0.380
Treatment	Measure of Agreement	0.046	0.453
Total	Measure of Agreement	-0.007	0.879

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.

Table 10 shows that the kappa values are in the region < 0.2. This implies a poor correlation between the raters (C2 and PPQ) for visit 1 (V1) for flaking. For the control group the kappa value was -0.057, and for the treatment group the kappa value was 0.046. That is, the rating between the clinician and patients were different in each of the groups. An inspection of the means also indicates this. For the control group, the means were 6.23 and 5.97 for the clinician and patients respectively.

Furthermore, since p > 0.05, the kappa (κ) coefficients are statistically not significantly different from zero.

Table 11: Correlation between the ratings by the researcher and the clinician on greasiness (V1). R1V1 Greasiness * C2V1 Greasiness * Group Cross-tabulation

Group		Value	Approximate Significance
Control	Measure of Agreement	-0.015	0.799
Treatment	Measure of Agreement	0.241	0.000
Total	Measure of Agreement	0.122	0.003

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.

Table 11 shows that the kappa value for the control is in the region < 0.2 whilst for the treatment group it is > 0.2. This implies a poor correlation between the raters (R1 and C2) for visit 1 (V1) for greasiness in the control group whilst the treatment group reflects a good correlation between them. For the control group the kappa value is -0.015, and for the treatment group the kappa value was 0.241. That is, the rating between the researcher and clinician were different in the control group and similar in the treatment group. An inspection of the means also indicates this. For the control group, the means were 4.93 and 5.20 for the researcher and clinician respectively.

Furthermore, since p <0.05 on the treatment group, the kappa (κ) coefficients are statistically significant.

Table 12: Correlation between the ratings by the clinician and the patients on greasiness (Visit 1). C2V1 Greasiness * PPQ1 Greasiness * Group Cross-tabulation

Group		Value	Approximate Significance
Control	Measure of Agreement	-0.065	0.229
Treatment	Measure of Agreement	0.048	0.360
Total	Measure of Agreement	-0.009	0.812

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.

Table 12 shows that the kappa values are in the region < 0.2. This implies a poor correlation between the raters (C2 and PPQ) for visit 1 (VI) for greasiness. For the control group the kappa value was -0.065, and for the treatment group the kappa value was 0.048. That is, the rating between the clinician and patients were different in each of the groups. An inspection of the means also indicates this. For the control group, the means were 5.20 and 3.00 for the clinician and patients respectively.

Furthermore, since p > 0.05, the kappa (κ) coefficients are statistically not significantly different from zero.

Table 13: Correlation between the ratings by the researcher and the clinician on percentage of the scalp involved (Visit 1). R1V1 Percentage * C2V1 Percentage * Group Cross-tabulation

Group		Value	Approximate Significance
Control	Measure of Agreement	0.016	0.829
Treatment	Measure of Agreement	0.090	0.199
Total	Measure of Agreement	0.052	0.311

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.

Table 5 shows that the kappa values are in the region < 0.2. This implies a poor correlation between the raters (R1 and C2) for visit 1 (V1) for percentage affected. For the control group the kappa value was 0.016 and for the treatment group the kappa value was 0.090. That is, the rating between the researcher and clinician were different in each of the groups. An inspection of the means also indicates this. For the control group, the means were 6.87 and 6.43 for the researcher and clinician respectively.

Furthermore, since p > 0.05, the kappa (κ) coefficients are statistically not significantly different from zero.

Table 14 shows the correlation ratings by the patient on itching.

Table 14: Correlation ratings by the patients on itching. PPQ1 Itching * Group Cross-tabulation

Symmetric Measures		
		Asymptotic Standard Error[a]
Measure of Agreement	Kappa	0.014
a. Not assuming the null hypothesis b Using the asymptotic standard error assuming the null hypothesis.		

Table 15: Correlation between the ratings by the researcher and the clinician on overall impression (Visit 1). R1V1 overall * C2V1 Overall * Group Cross-tabulation

Group		Value	Approximate Significance
Control	Measure of Agreement	0.294	0.000
Treatment	Measure of Agreement	0.125	0.137
Total	Measure of Agreement	0.209	0.000
a. Not assuming the null hypothesis. b. Using the asymptotic standard error assuming the null hypothesis.			

Table 15 shows that the kappa values are in the region < 0.2. This implies a poor correlation between the raters (R1 and C2) for visit 1 (VI) for overall perception. For the control group the kappa value was 0.294, and for the treatment group the kappa value was 0.125. That is, the rating between the researcher and clinician were different in each of the groups. An inspection of the means also indicates this. For the control group, the means were 6.40 and 6.10 for the researcher and clinician respectively.

Furthermore, since $p < 0.05$ on the control group, the kappa (κ) coefficients are statistically significant.

Table 16: Correlation between the ratings by the Researcher and the Patient on overall impression (Visit 1). R1V1 overall * PPQ1 Overall * Group Cross-tabulation

Group		Value	Approximate Significance
Control	Measure of Agreement	0.026	0.698
Treatment	Measure of Agreement	-0.004	0.957
Total	Measure of Agreement	0.009	0.847
a. Not assuming the null hypothesis. b. Using the asymptotic standard error assuming the null hypothesis.			

Table 16 shows that the kappa values are in the region < 0.2. This implies a poor correlation between the raters (R1 and C2) for visit 1 (VI) for overall perception for the control group the kappa value was 0.026, and for the treatment group the kappa value was-0.004. That is, the rating between the researcher and patients were different in

each of the groups. An inspection of the means also indicates this. For the control group, the means were 6.40 and 7.00 for the researcher and patients respectively. Furthermore, since p > 0.05, the kappa (κ) coefficients are statistically not significantly different from zero.

Table 17: Correlation between the ratings by the clinician and the patients on overall impression (Visit 1). C2V1 Overall * PPQ1 Overall * Group Cross-tabulation

Group		Value	Approximate Significance
Control	Measure of Agreement	0.065	0.342
Treatment	Measure of Agreement	0.070	0.298
Total	Measure of Agreement	0.075	0.115
a. Not assuming the null hypothesis. b. Using the asymptotic standard error assuming the null hypothesis.			

Table 17 shows that the kappa values are in the region < 0.2. This implies a poor correlation between the raters (R1 and C2) for visit 1 (VI) for irritation. For the control group the kappa value was 0.065, and for the treatment group the kappa value was 0.070. That is, the rating between the clinician and patients were different in each of the groups.

An inspection of the means also indicates this. For the control group, the means were 6.10 and 7.00 for the clinician and patients respectively.

Furthermore, since p > 0.05, the kappa (κ) coefficients are statistically not significantly different from zero.

Table 18: Correlation between the ratings by the researcher and the clinician on irritation (Visit 2). R1V2 Irritation * C2V2 Irritation * Group Cross-tabulation

Group		Value	Approximate Significance
Control	Measure of Agreement	0.032	0.571
Treatment	Measure of Agreement	0.043	0.475
Total	Measure of Agreement	0.041	0.326
a. Not assuming the null hypothesis. b. Using the asymptotic standard error assuming the null hypothesis.			

Table 18 shows that the kappa values are in the region < 0.2. This implies a poor correlation between the raters (R1 and C2) for visit 2 (V2) for irritation. For the control group the kappa value was 0.032, and for the treatment group the kappa value was 0.043. That is, the rating between the researcher and clinician were different in each

of the groups. An inspection of the means also indicates this. For the control group, the means were 1.7 and 3.63 for the researcher and clinician respectively.

Furthermore, since $p > 0.05$, the kappa (κ) coefficients are statistically not significantly different from zero.

Table 19: Correlation between the ratings by the researcher and the patients on irritation (Visit 2). R1V2 Irritation * PPQ2 Irritation * Group Cross-tabulation

Group		Value	Approximate Significance
Control	Measure of Agreement	0.180	0.009
Treatment	Measure of Agreement	0.023	0.724
Total	Measure of Agreement	0.102	0.033

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.

Table 19 shows that the kappa values are in the region < 0.2. This implies a poor correlation between the raters (R1 and PPQ) for visit 2 (V2) for irritation. For the control group the kappa value was 0.180, and for the treatment group the kappa value was 0. 023.That is, the rating between the researcher and patients were different in each of the groups. An inspection of the means also indicates this. For the control group, the means were 1.7 and 3.13 for the researcher and patients respectively.

Furthermore, since $p < 0.05$ on the control group, the kappa (κ) coefficients are statistically significant.

Table 20: Correlation between the ratings by the clinician and the patients on irritation (Visit 2). C2V2 Irritation * PPQ2 Irritation * Group Cross-tabulation

Group		Value	Approximate Significance
Control	Measure of Agreement	0.102	0.141
Treatment	Measure of Agreement	0.035	0.642
Total	Measure of Agreement	0.077	0.124

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.

Table 20 shows that the kappa values are in the region < 0.2. This implies a poor correlation between the raters (C2 and PPQ) for visit 2 (V2) for irritation. For the control group the kappa value was 0.102, and for the treatment group the kappa value was 0.035. That is, the rating between the clinician and patients were different in each of

the groups. An inspection of the means also indicates this. For the control group, the means were 3.63 and 3.13 for the clinician and patients respectively.

Furthermore, since p > 0.05, the kappa (κ) coefficients are statistically not significantly different from zero.

Table 21: Correlation between the ratings by the researcher and the clinician on flaking (Visit 2). R1V2 Flaking * C2V2 Flaking * Group Cross-tabulation

Group		Value	Approximate Significance
Control	Measure of Agreement	0.107	0.079
Treatment	Measure of Agreement	0.105	0.123
Total	Measure of Agreement	0.113	0.011
a. Not assuming the null hypothesis. b. Using the asymptotic standard error assuming the null hypothesis.			

Table 21 shows that the kappa values are in the region < 0.2. This implies a poor correlation between the raters (R1 and C2) for visit 2 (V2) for flaking. For the control group the kappa value was 0.107, and for the treatment group the kappa value was 0.105. That is, the rating between the researcher and clinician were different in each of the groups. An inspection of the means also indicates this. For the control group, the means were 4.20 and 5.00 for the researcher and clinician respectively.

Furthermore, since p > 0.05, the kappa (κ) coefficients are statistically not significantly different from zero.

Table 22: Correlation between the ratings by the researcher and the patients on flaking (Visit 2). R1V2 Flaking * PPQ2 Flaking * Group Cross-tabulation

Group		Value	Approximate Significance
Control	Measure of Agreement	0.094	0.135
Treatment	Measure of Agreement	0.112	0.075
Total	Measure of Agreement	0.104	0.023
a. Not assuming the null hypothesis. b. Using the asymptotic standard error assuming the null hypothesis.			

Table 22 shows that the kappa values are in the region < 0.2. This implies a poor correlation between the raters (R1 and PPQ) for visit 2 (V2) for flaking. For the control group the kappa value was 0.094, and for the treatment group the kappa value was 0.112. That is, the rating between the researcher and clinician were different in each

of the groups. An inspection of the means also indicates this. For the control group, the means were 4.20 and 3.77 for the researcher and clinician respectively.

Furthermore, since p > 0.05, the kappa (κ) coefficients are statistically not significantly different from zero.

Table 23: Correlation between the ratings by the clinician and the patient on flaking (Visit 2). C2V2 Flaking * PPQ2 Flaking * Group Cross-tabulation

Group		Value	Approximate Significance
Control	Measure of Agreement	0.081	0.148
Treatment	Measure of Agreement	-0.021	0.727
Total	Measure of Agreement	0.025	0.561

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.

Table 23 shows that the kappa values are in the region < 0.2. This implies a poor correlation between the raters (C2 and PPQ) for visit 2 (V2) for flaking. For the control group the kappa value was 0.081, and for the treatment group the kappa value was -0.021. That is, the rating between the clinician and patients were different in each of the groups. An inspection of the means also indicates this. For the control group, the means were 5.00 and 3.77 for the clinician and patients respectively.

Furthermore, since p > 0.05, the kappa (κ) coefficients are statistically not significantly different from zero.

Table 24: Correlation between the ratings by the researcher and the clinician on greasiness (Visit 2). R1V2 Greasiness * C2V2 Greasiness * Group Cross-tabulation

Group		Value	Approximate Significance
Control	Measure of Agreement	0.080	0.293
Treatment	Measure of Agreement	0.080	0.281
Total	Measure of Agreement	0.081	0.129

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.

Table 24 shows that the kappa values are in the region < 0.2. This implies a poor correlation between the raters (R1 and C2) for visit 2 (V2) for greasiness. For the control group the kappa value was 0.080 and for the treatment group the kappa value was 0.080. That is, the rating between the researcher and clinician were different in

each of the groups. An inspection of the means also indicates this. For the control group, the means were 2.90 and 4.00 for the researcher and clinician respectively.

Furthermore, since $p > 0.05$, the kappa (κ) coefficients are statistically not significantly different from zero.

Table 25: Correlation between the ratings by the researcher and the patients on greasiness (Visit 2). R1V2 Greasiness * PPQ2 Greasiness * Group Cross-tabulation

Group		Value	Approximate Significance
Control	Measure of Agreement	0.064	0.377
Treatment	Measure of Agreement	0.191	0.012
Total	Measure of Agreement	0.125	0.020

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.

Table 25 shows that the kappa values are in the region < 0.2. This implies a poor correlation between the raters (R1 and PPQ) for visit 2 (V2) for greasiness. For the control group the kappa value was 0.064 and for the treatment group the kappa value was 0.191. That is, the rating between the researcher and patients were different in each of the groups. An inspection of the means also indicates this. For the control group, the means were 2.90 and 2.27 for the researcher and patients respectively.

Furthermore, since $p < 0.05$ on the treatment group, the kappa (κ) coefficients are statistically significant.

Table 26: Correlation between the ratings by the clinician and the patients on greasiness (Visit 2). C2V2 Greasiness * PPQ2 Greasiness * Group Cross-tabulation

Group		Value	Approximate Significance
Control	Measure of Agreement	-0.053	0.389
Treatment	Measure of Agreement	-0.004	0.957
Total	Measure of Agreement	-0.032	0.488

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.

Table 26 shows that the kappa values are in the region < 0.2. This implies a poor correlation between the raters (C2 and PPQ) for visit 2 (V2) for greasiness. For the control group the kappa value was -0.054 and for the treatment group the kappa value was -0.004. That is, the rating between the clinician and patient were different in each

of the groups. An inspection of the means also indicates this. For the control group, the means were 4.00 and 2.27 for the clinician and patient respectively.

Furthermore, since p > 0.05, the kappa (κ) coefficients are statistically not significantly different from zero.

Table 27: Correlation between the ratings by the researcher and the clinician on percentage of the scalp involved (Visit 2). R1V2 Percentage * C2V2 Percentage * Group Cross-tabulation

Group		Value	Approximate Significance
Control	Measure of Agreement	0.097	0.119
Treatment	Measure of Agreement	0.185	0.013
Total	Measure of Agreement	0.140	0.004

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.

Table 27 shows that the kappa values are in the region < 0.2. This implies a poor correlation between the raters (R1 and C2) for visit 2 (V2) for percentage affected. For the control group the kappa value was 0.097 and for the treatment group the kappa value was 0.185. That is, the rating between the researcher and clinician were different in each of the groups. An inspection of the means also indicates this. For the control group, the means were 4.27 and 4.80 for the researcher and clinician respectively.

Furthermore, since p <0.05 on the treatment group, the kappa (κ) coefficients are statistically significant.

Table 28 shows the correlations ratings by the patient on itching

Table 28: Correlation ratings by the patients on itching. PPQ2 Itching * Group Cross-tabulation

Symmetric Measures		
		Asymptotic Standard Error[a]
Measure of Agreement	Kappa	0.043

b. Not assuming the null hypothesis
b Using the asymptotic standard error assuming the null hypothesis.

Table 29: Correlation between the ratings by the researcher and the clinician on overall impression (Visit 2). R1V2 overall * C2V2 Overall * Group Cross-tabulation

Group		Value	Approximate Significance
Control	Measure of Agreement	0.091	0.160
Treatment	Measure of Agreement	0.023	0.773
Total	Measure of Agreement	0.059	0.245
a. Not assuming the null hypothesis. b. Using the asymptotic standard error assuming the null hypothesis.			

Table 29 shows that the kappa values are in the region < 0.2. This implies a poor correlation between the raters (R1 and C2) for visit 2 (V2) for overall perception. For the control group the kappa value was 0.091 and for the treatment group the kappa value was 0.023. That is, the rating between the researcher and clinician were different in each of the groups. An inspection of the means also indicates this. For the control group, the means were 4.13 and 4.47 for the researcher and clinician respectively.

Furthermore, since $p > 0.05$, the kappa (κ) coefficients are statistically not significantly different from zero.

Table 30: Correlation between the ratings by the researcher and the patients on overall impression (Visit 2). R1V2 overall * PPQ2 Overall * Group Cross-tabulation

Group		Value	Approximate Significance
Control	Measure of Agreement	0.154	0.026
Treatment	Measure of Agreement	0.094	0.180
Total	Measure of Agreement	0.126	0.011
a. Not assuming the null hypothesis. b. Using the asymptotic standard error assuming the null hypothesis.			

Table 30 shows that the kappa values are in the region < 0.2. This implies a poor correlation between the raters (R1 and C2) for visit 2 (V2) for overall perception. For the control group the kappa value is 0.154 and for the treatment group the kappa value was 0.094. That is, the rating between the researcher and patients were different in each of the groups. An inspection of the means also indicates this. For the control group, the means were 4.13 and 4.00 for the researcher and patients respectively.

*Furthermore, since $p < 0.05$ on the control group, the kappa (κ) coefficients are statistically significant.

Table 31 shows that the kappa values are in the region < 0.2. This implies a poor correlation between the raters (R1 and C2) for visit 2 (V2) for overall perception. For the control group the kappa value is 0.083 and for the treatment group the kappa value was 0.053. That is, the rating between the clinician and patients were different in each of the groups.

Table 31: Correlation between the ratings by the clinician and the patients on overall impression (Visit 2). C2V2 Overall * PPQ2 Overall * Group Cross-tabulation

Group		Value	Approximate Significance
Control	Measure of Agreement	0.083	0.217
Treatment	Measure of Agreement	0.053	0.466
Total	Measure of Agreement	0.062	0.218
a. Not assuming the null hypothesis. b. Using the asymptotic standard error assuming the null hypothesis.			

An inspection of the means also indicates this. For the control group, the means were 4.47 and 4.00 for the clinician and patients respectively.

Furthermore, since p > 0.05, the kappa (κ) coefficients are statistically not significantly different from zero.

Table 32:Correlation between the ratings by the researcher and the clinician on irritation (Visit 3). R1V3 Irritation * C2V3 Irritation * Group Cross-tabulation

Group		Value	Approximate Significance
Control	Measure of Agreement	-0.029	0.696
Treatment	Measure of Agreement	0.076	0.110
Total	Measure of Agreement	0.038	0.358
a. Not assuming the null hypothesis. b. Using the asymptotic standard error assuming the null hypothesis.			

Table 32 shows that the kappa values are in the region < 0.2. This implies a poor correlation between the raters (R1 and C2) for visit 3 (V3) for irritation. For the control group the kappa value was -0.029, and for the treatment group the kappa value was 0.076. That is, the rating between the researcher and clinician were different in each of the groups. An inspection of the means also indicates this. For the control group, the means were 0.77 and 2.70 for the researcher and clinician respectively.

Furthermore, since p > 0.05, the kappa (κ) coefficients are statistically not significantly different from zero.

Table 33:Correlation between the ratings by the researcher and the patients on irritation (Visit 3). R1V3 Irritation * PPQ3 Irritation * Group Cross-tabulation

Group		Value	Approximate Significance
Control	Measure of Agreement	0.063	0.386
Treatment	Measure of Agreement	0.155	0.074
Total	Measure of Agreement	0.117	0.034
a. Not assuming the null hypothesis. b. Using the asymptotic standard error assuming the null hypothesis.			

Table 33 shows that the kappa values are in the region < 0.2. This implies a poor correlation between the raters (R1 and PPQ) for visit 3 (V3) for irritation. For the control group the kappa value was 0.063, and for the treatment group the kappa value was 0.155. That is, the rating between the researcher and patients were different in each of the groups. An inspection of the means also indicates this. For the control group, the means were 0.77 and 2.90 for the researcher and patients respectively.

Furthermore, since p > 0.05, the kappa (κ) coefficients are statistically not significantly different from zero.

Table 34: Correlation between the ratings by the clinician and the patients on irritation (Visit 3). C2V3 Irritation * PPQ3 Irritation * Group Cross-tabulation.

Group		Value	Approximate Significance
Control	Measure of Agreement	-0.021	0.771
Treatment	Measure of Agreement	-0.072	0.265
Total	Measure of Agreement	-0.047	0.340
a. Not assuming the null hypothesis. b. Using the asymptotic standard error assuming the null hypothesis.			

Table 34 shows that the kappa values are in the region < 0.2. This implies a poor correlation between the raters (C2 and PPQ) for visit 3 (V3) for irritation. For the control group the kappa value was -0.021, and for the treatment group the kappa value was -0.072. That is, the rating between the clinician and patients were different in each of the groups. An inspection of the means also indicates this. For the control group, the means were 2.70 and 2.90 for the clinician and patients respectively.

Furthermore, since p > 0.05, the kappa (κ) coefficients are statistically not significantly different from zero.

Table 35: Correlation between the ratings by the researcher and the clinician on flaking (Visit 3). R1V3 Flaking * C2V3 Flaking * Group Cross-tabulation

Group		Value	Approximate Significance
Control	Measure of Agreement	0.051	0.441
Treatment	Measure of Agreement	0.027	0.653
Total	Measure of Agreement	0.043	0.330

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.

Table 35 shows that the kappa values are in the region < 0.2. This implies a poor correlation between the raters (R1 and C2) for visit 3 (V3) for flaking. For the control group the kappa value was 0.051, and for the treatment group the kappa value was 0.027. That is, the rating between the researcher and clinician were different in each of the groups. An inspection of the means also indicates this. For the control group, the means were 3.20 and 4.13 for the researcher and clinician respectively.

Furthermore, since p > 0.05, the kappa (κ) coefficients are statistically not significantly different from zero.

Table 36: Correlation between the ratings by the clinician and the patients on flaking (Visit 3). C2V3 Flaking * PPQ3 Flaking * Group Cross-tabulation

Group		Value	Approximate Significance
Control	Measure of Agreement	0.019	0.758
Treatment	Measure of Agreement	0.136	0.019
Total	Measure of Agreement	0.078	0.068

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.

Table 36 shows that the kappa values are in the region < 0.2. This implies a poor correlation between the raters (C2 and PPQ) for visit 3 (V3) for flaking. For the control group the kappa value was 0.019, and for the treatment group the kappa value was 0.136. That is, the rating between the clinician and patients were different in each of the groups. An inspection of the means also indicates this. For the control group, the means were 4.13 and 2.90 for the clinician and patients respectively.

Furthermore, since p <0.05 on the treatment group, the kappa (κ) coefficients are statistically significant.

Table 37: Correlation between the ratings by the researcher and the clinician on greasiness (Visit 3). R1V3 Greasiness * C2V3 Greasiness * Group Cross-tabulation

Group		Value	Approximate Significance
Control	Measure of Agreement	-0.029	0.706
Treatment	Measure of Agreement	0.069	0.308
Total	Measure of Agreement	0.022	0.670
a. Not assuming the null hypothesis. b. Using the asymptotic standard error assuming the null hypothesis.			

Table 37 shows that the kappa values are in the region < 0.2. This implies a poor correlation between the raters (R1 and C2) for visit 3 (V3) for greasiness. For the control group the kappa value was -0.029, and for the treatment group the kappa value was 0.069. That is, the rating between the researcher and clinician were different in each of the groups. An inspection of the means also indicates this. For the control group, the means were 2.03 and 2.87 for the researcher and clinician respectively.

Furthermore, since p > 0.05, the kappa (κ) coefficients are statistically not significantly different from zero.

Table 38: Correlation between the ratings by the researcher and the patients on greasiness (Visit 3). R1V3 Greasiness * PPQ3 Greasiness * Group Cross-tabulation

Group		Value	Approximate Significance
Control	Measure of Agreement	0.022	0.790
Treatment	Measure of Agreement	-0.079	0.343
Total	Measure of Agreement	-0.033	0.585
a. Not assuming the null hypothesis. b. Using the asymptotic standard error assuming the null hypothesis.			

Table 38 shows that the kappa values are in the region < 0.2. This implies a poor correlation between the raters (R1 and PPQ) for visit 3 (V3) for greasiness. For the control group the kappa value was 0.022, and for the treatment group the kappa value was -0.079. That is, the rating between the researcher and patients were different in each of the groups. An inspection of the means also indicates this. For the control group, the means were 2.03 and 2.20 for the researcher and patient respectively.

Furthermore, since p > 0.05, the kappa (κ) coefficients are statistically not significantly different from zero.

Table 39: Correlation between the ratings by the clinician and the patients on greasiness (Visit 3). C2V3 Greasiness * PPQ3 Greasiness * Group Cross-tabulation

Group		Value	Approximate Significance
Control	Measure of Agreement	0.167	0.027
Treatment	Measure of Agreement	0.082	0.180
Total	Measure of Agreement	0.118	0.018

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.

Table 39 shows that the kappa values are in the region < 0.2. This implies a poor correlation between the raters (C2 and PPQ) for visit 3 (V3) for greasiness. For the control group the kappa value was 0.167, and for the treatment group the kappa value was 0.082. That is, the rating between the clinician and patients were different in each of the groups. An inspection of the means also indicates this. For the control group, the means were 2.87 and 2.20 for the clinician and patients respectively.

Furthermore, since $p < 0.05$ on the control group, the kappa (κ) coefficients are statistically significant.

Table 40: Correlation between the ratings by the researcher and the clinician on percentage of the scalp involved (Visit 3). R1V3 Percentage * C2V3 Percentage * Group Cross-tabulation

Group		Value	Approximate Significance
Control	Measure of Agreement	-0.011	0.855
Treatment	Measure of Agreement	0.000	1.000
Total	Measure of Agreement	-0.006	0.893

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.

Table 40 shows that the kappa values are in the region < 0.2. This implies a poor correlation between the raters (R1 and C2) for visit 3 (V3) for percentage affected. For the control group the kappa value was -0.011 and for the treatment group the kappa value was 0.000. That is, the rating between the researcher and clinician were different in each of the groups. An inspection of the means also indicates this. For the control group, the means were 2.97 and 3.73 for the researcher and clinician respectively.

Furthermore, since p > 0.05, the kappa (κ) coefficients are statistically not significantly different from zero.

Table 41 shows the correlation ratings by the patient on itching.

Table 41:Correlation ratings by the patients on itching (Visit 3). PPQ3 Itching * Group Cross-tabulation

Symmetric Measures		
	Asymptotic Standard Error[a]	
Measure of Agreement	Kappa	0.049
a. Not assuming the null hypothesis. b. Using the asymptotic standard error assuming the null hypothesis.		

Table 42: Correlation between the ratings by the researcher and the clinician on overall impression (Visit 3). R1V3 overall * C2V3 Overall * Group Cross-tabulation

Group		**Value**	**Approximate Significance**
Control	Measure of Agreement	-0.011	0.852
Treatment	Measure of Agreement	0.146	0.026
Total	Measure of Agreement	0.065	0.157
a. Not assuming the null hypothesis. b. Using the asymptotic standard error assuming the null hypothesis.			

Table 42 shows that the kappa values are in the region < 0.2. This implies a poor correlation between the raters (R1 and C2) for visit 3 (V3) for overall perception. For the control group the kappa value was -0.011, and for the treatment group the kappa value was -0.146. That is, the rating between the researcher and clinician were different in each of the groups. An inspection of the means also indicates this. For the control group, the means were 2.93 and 3.77 for the researcher and clinician respectively.

Furthermore, since p <0.05 on the treatment group, the kappa (κ) coefficients are statistically significant.

Table 43: Correlation between the ratings by the researcher and the patients on overall impression (Visit 3). R1V3 overall * PPQ3 Overall * Group Cross-tabulation

Group		Value	Approximate Significance
Control	Measure of Agreement	-0.045	0.509
Treatment	Measure of Agreement	0.112	0.129
Total	Measure of Agreement	0.033	0.510

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.

Table 43 shows that the kappa values are in the region < 0.2. This implies a poor correlation between the raters (R1 and PPQ) for visit 3 (V3) for overall perception. For the control group the kappa value was -0.045, and for the treatment group the kappa value was -0.112. That is, the rating between the researcher and patients were different in each of the groups. An inspection of the means also indicates this. For the control group, the means were 2.93 and 3.13 for the researcher and patients respectively.

Furthermore, since p > 0.05, the kappa (κ) coefficients are statistically not significantly different from zero.

Table 44: Correlation between the ratings by the clinician and the patients on overall impression (Visit 3). C2V3 Overall * PPQ3 Overall * Group Cross-tabulation

Group		Value	Approximate Significance
Control	Measure of Agreement	0.051	0.461
Treatment	Measure of Agreement	0.004	0.958
Total	Measure of Agreement	0.029	0.566

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.

Table 44 shows that the kappa values are in the region < 0.2. This implies a poor correlation between the raters (C2 and PPQ) for visit 3 (V3) for overall perception. For the control group the kappa value was 0.051, and for the treatment group the kappa value was -0.004. That is, the rating between the clinician and patients were different in each of the groups. An inspection of the means also indicates this. For the control group, the means were 3.77 and 3.13 for the clinician and patients respectively.

Furthermore, since p > 0.05), the kappa (κ) coefficients are statistically not significantly different from zero.

CHAPTER 5: DISCUSSION

5.1 Introduction

The purpose of this double blind randomized controlled study was to determine the efficacy of a topical application comprising *Calendula Officinalis Ø* and *Olea europaea* in the management of seborrheic dermatitis (SD) of the scalp (dandruff).

This chapter provides interpretation and discussion of the results acquired during the study period and attempts to deliver probable explanations to support the results.

5.2 Demographic results

5.2.1 Gender

According to Borda and Wikramanayake (2015) and Okokon *et al.* (2015) SD is more common in males than females. However, it was observed that more females participated in this study than males in both control and treatment groups. This could be due to the fact that males are more reserved compared to females about their skin conditions, unlike females who are more open about discussing it and seeking solution for their skin problems (Kent 2005).

5.2.2 Race

Gary (2013) and Borda and Wikramanayake (2015) reported that SD occurs equally in all races or ethnic groups. It was expected that there would be equal participation from all the races. However, it was observed that more African patients participated in this study for both the control (96.7%) and the treatment (93.5%) group compared to other racial groups even though the study was open to everyone. Only 3.2% Indian patients for the treatment group participated in this study and none for the control group. There were only 3.3% of White patients within the control group whilst the treatment group consisted of 3.2%.

5.2.3 Age

Adult SD occurs in 30% to 35%% healthy adults between ages 30 to 60 years (Mia 2016) yet 65.5% of the participants participated in this study were within the age group

20 to 29 years. The study was open to age groups between 18 to 50 years as adverts in public places such as malls, salons and health shops invited those interested to take part in the study to the university. This could be due to the fact that the study was carried out within the DUTHDC where the majority of the population are students who are within the 20 to 29 years' age group.

5.3. Interpretation between the control and the treatment groups analysis

5.3.1 Irritation

a) Mean scores

With regards to the mean scores in Figure 12, the control group perceived improvement from visit 1 to visit 3, even though the researcher scored lower than both clinician and patients. However, they all scored significant improvement, the overall mean score for the researcher improved by 2.9, whilst that by the clinician and the patients improved by 2 and 1.5 respectively. However, their strength of agreement was poor which indicated poor correlation between all raters since the *K* values were < 0.20 and there was no statistical significance since $p > 0.05$ for all visits.

The treatment group also displayed improvement from visit 1 to visit 3. However, the clinician's mean scores were observed to be higher on both visit 2 (3.3) and visit 3 (3.19) compared to that of the researcher (1.35 and 0.81) and patients (2.84 and 1.74) on aforementioned visits. Even though the researcher and patients showed a similar trend of scoring, their strength of agreement was poor for both visit 2 ($k = 0.023$) and visit 3 ($k = 0.155$) which indicated poor correlation since their values were < 0.20. Additionally, there was no statistically significant improvement for both visits ($p = 0.724$ and 0.074 respectively) with regard to irritation.

b) Percentage mean scores

Figure 13 shows the percentage of the mean scores on irritation. With regard to the control group, the researcher, clinician and patients perceived improvement; the more there was a decrease on the percentage, the greater was the improvement. For instance, if one looks at the sum of *moderate* and *marked* severities for the control group for the researcher, it indicated a total above 30% on the first visit which improved to 10% for visit 2 and was 3.3% by visit 3. The clinician indicated a total of 53% on visit

1 and improved to 30% on visit 2 and 16% by visit 3 whilst the patients indicated 62% for visit 1 and improved to 23.3% for visit 2 and 16% on visit 3.

If we take a look at the treatment group, the sum of *mild* and *moderate* severities for both the researcher and the patients perceived improvement. The researcher indicated 45.1% for visit 1, which improved to 25.8% for visit 2 and 9.7% by the last visit whilst that by the patients was 64.5% for visit 1, which improved to 41.1% for visit 2 and 25.8% for visit 3. The clinician perceived an increase in percentage for visit 2, visit 1 indicated 64.5% and increased to 67.7% for visit 2 and showed lesser improvement in visit 3 by 61.3%.

The researcher's scores indicated significant improvement for both the control and treatment groups. The clinician scores also perceived improvement for both groups, however their mean scores percentage showed an increase for visit 2 from visit 1 which indicated no improvement for the treatment group, but the percentage mean score later decreased from visit 2 to visit 3 and indicated improvement. According to the patients' perception they indicated greater improvement in the treatment group compared to the control group.

5.3.2 Flaking

a) Mean scores

As shown in Figure 14, the control group perceived improvement on all three visits according to the researcher, the clinician and the patients' ratings. However, it is also observed that the clinician perceived less improvement by scoring higher (5) on visit 2 compared to the researcher and the patients who scored 4.20 and 3.77 respectively. This is also observed on visit 3, the clinician scored 4.13 whilst the researcher scored 3.20 and patients scored 2.90 respectively. Furthermore, all ratings between the researcher, clinician and patients displayed poor correlation on all visits since the *K* values were < 0.20 and showed no significant improvement *(p > 0.05)*.

Figure 14 demonstrates that there was improvement perceived by both the researcher and patients for the treatment group. It is observed that the ratings by the clinician increased on visit 3 from 4.39 to 4.26 on visit 2 instead of decreasing therefore no improvement. The researcher and patients showed a similar trend of scoring from visit 1 to visit 3; the researcher scored 2.94 and the patients scored 2.68 for the last visit respectively. However, all visits indicated poor correlation between all raters since their

K values were < 0.20 but the ratings between the clinician and patients showed statistically significance on visit 3 *(p* = 0.019).

b) Percentage means scores

As demonstrated in Figure 15 the percentage mean scores for the control group by the researcher, clinician and the patients showed improvement with the decrease in percentage for the sum of *moderate* and marked severities for flaking. Even though they did not score the same on visit 1 one can conclude that the clinician perceived less improvement with a smaller decrease in percentage on visit 2 (50%) and visit 3 (36.7%) compared to that by the researcher and the clinician. The researcher's score improved to 36.6% for visit 2 and to 23.3% by visit 3 whilst the patients showed significantly improvement by scoring 26.6% on visit two and 6.6% by the last visit.

The treatment group also exhibited improvement for the sum of moderate and marked severities by the researcher and the patient as shown in Figure 15. For instance, the researcher's rating was above 70% for visit 1 and improved to 22.6% by visit 1 and the patient's ratings was 54% for visit 1 and significantly improved to 16.2% for the last visit. Unlike the clinician which showed no improvement due to their rating which increased to 48.4% for visit 3 from that of visit 2 which was 45.2%.

Thus the researcher ratings indicated overall improvement for both the control and the treatment group. The clinician's ratings indicated improvement only for the control group, with regards to the treatment group, clinician's ratings showed improvement only on visit 2 and there was no improvement by visit 3. According to the patients' perception they indicated greater improvement for the treatment group compared to the control group.

5.3.3 Greasiness

a) Mean scores

Figure 16 demonstrated perceived improvement by the researcher, clinician and the patients on all visits for the control group; however, it was also observed that the patients scored lower on the first visit compared to the researcher and the clinician. The patients had indicated 3.0 for the greasiness on visit 1 whilst the researcher's assessments were 4.93 and the clinician's 5.2. This could mean that the majority of patients did not experience or had less greasiness. The strength of agreement

between all raters was poor for all visits, although the ratings between the clinician and patients indicated statistical significance *(p* = 0.027) for visit 3.

The researcher, the clinician and patients' ratings exhibited improvement on all visits for the treatment group as shown in Figure 16. Again the patients scored lower from the first visit (3.71) compared to the researcher 4.45 and the clinician 5.58; this could also mean that the majority of patients did not have or had less greasiness. The correlation was poor between all raters for all visits but the ratings between the researcher and patients showed significant improvement (*p* = 0.012) for visit 2.

b) Percentage means scores

As shown in Figure 17, the sum of *mild and moderate* severities demonstrated higher percentage on visit 1 by the researcher, the clinician and the patients. However, the patients showed a lower percentage of 46.6% compared to the researcher 86.7% and the clinician 56.6% for visit 1, therefore patients experienced less or had no greasiness. Interestingly patients showed an increased in percentage to 40% for visit 3 from that of visit 2 which was 36.6%; this indicated no improvement according to patients. *Olea europaea* oil might have contributed to increasing oiliness of the scalp since the control group received only *Olea europaea* oil as a medication.

Figure 17 also observed the sum of *mild* and *moderate* severities for the treatment group. Both the researcher and the clinician had a decrease in percentage by visit 3 which indicated improvement. However, the patients showed an increase of 51.6% on visit 2 from that of visit 1 which was 38%; this indicated abnormality and no improvement. Moreover, significant improvement was seen by visit 3, the patients moved from 51.6% to 19.3%, this could be the results of anti-fungal properties in *Calendula officinalis* which assisted in decreasing the greasiness of the scalp (Akhtar *et al.* 2011).

In conclusion, both the researcher and clinician's ratings indicated overall improvement for both the control and the treatment groups. Patients' perception indicated greater improvement in the treatment group compared to the control group.

5.3.4 Percentage of the scalp involved

a) Mean scores

Figure 18 shows that both the researcher and the clinician perceived improvement on all visits for the control group. It was also observed that the researcher perceived greater improvement than the clinician. The researcher's overall improvement was 3.9 compared to that of the clinician's which was 2.7.

Figure 18 also demonstrated perceived improvement by both the researcher and the clinician for the treatment group; however, it was observed that the clinician perceived less improvement compared to the researcher. The overall perceived improvement by the researcher was 3.6 compared to that of the clinician which was 2.6. The ratings between the researcher and patient were statistical significant (p = 0.013) for visit 2.

b) Percentage mean scores

Figure 19 shows improvement of the sum of moderate and marked severities by both the researcher and the clinician. The researcher scored 80% on visit 1 which significantly improved to 23% by the last visit whilst the clinician scored 73.4% for visit 1 which significantly improved to 33.3% by visit 3.

In Figure 19, the sum of *mild* and *moderate* severities showed perceived improvement by both the researcher and the clinician. The researcher scored 83% on visit 1 which significantly improved to 38% on visit 2 and 22.6% by visit 3 while the clinician scored 67% on visit 1 and improved to 51, 6% in visit 2 and 42% for visit 3.

In conclusion both the researcher and clinician indicated overall improvement for both the control and the treatment groups.

5.3.5 Itching

a) Mean scores

As can be seen from Figure 20, patients perceived improvement from visit 1 to visit 3 for both the control and the treatment groups. The overall improvement was 3.1 for the control group whilst that by the treatment group was 3.8. This indicated that the treatment group showed greater improvement than the control group. This could be due to *Calendula officinalis* anti-inflammatory and anti-fungal properties which relieved

itching and irritation (Muley, Khadabadi and Banarase 2009; Mullaicharam, Amaresh and Balasubramanian 2014; Edwards *et al.* 2015).

b) Percentage mean scores

Figure 21 shows changes for the sum of *moderate* and *marked* severities, the control group ratings was 60% for visit 1 and significantly improved to 16.6% by visit 3 and the treatment group ratings was 61% for the first visit which significantly improved to 9.7% for visit 3.

The score for the sum of *none* and *almost none* severities for both the control and the treatment group illustrates that the percentage mean scores were low in visit 1 and later increased on visit 2 and visit 3. The control group ratings was 10.0% for visit 1 and increased to 56.6% by visit 3 whilst the treatment group ratings was 3.2% for visit 1 and 58.1% by visit 3. This indicates that less patients had *none or almost none* itching on their visit 1 and showed improvement by visit 3 as the percentage increased.

Thus the patient indicated overall improvement within the treatment group.

5.3.6 Overall impression

a) Mean scores

The researcher, clinician and patients showed improvement on all visits as shown in Figure 22. However, it was observed that the patients scored significantly higher on visit 1 than the researcher and the clinician, this showed how patients were not happy with the condition. However, they indicated improvement by visit 2 and visit 3, for instance in visit 1 they scored 7 which improved to 4 for visit 2 and 3.13 by visit 3. Even though there was poor correlation between all raters on all visits ($k = <0.20$), the ratings between the researcher and patients showed statistical significance ($p = 0.026$) for visit 2.

As seen in Figure 22, the researcher, clinician and the patients displayed improvement on all visits for the treatment group. Like the control group, the patients scored higher on visit 1 than the researcher and the clinician and showed significant improvement by visit 2 and visit 3. They scored 7.23 for visit 1 which improved to 4.35 for visit 2 and to 2.45 for visit 3. Again this showed how patients were not happy with the condition. All raters indicated poor correlation with regard to their ratings, however the ratings

between the researcher and the clinician indicated statistical significance of $p = 0.013$ for visit 3.

b) Percentage means scores

The researcher, the clinician and the patients perceived significant improvement for the sum of *moderate* and *marked* severities for the control group as shown in Figure 23; they all showed changes for overall impression which was indicated by the decrease in percentage. The researcher scored 83.4% for visit 1 which improved to 36.7% on visit 2 and 20% by visit 3, the clinician ratings were 70% for visit 1 and improved to 53% for visit 2 and 33.4 % for visit 3 whilst that of the patients indicated 60% for visit 1 which improved to 33.3 for visit 2 and 16.6 in visit 3. Even when one considers the *severe or heavy* severities of patients they indicated 20% for their visit 1 and improved to 3.3% for visit 2, however the percentage increased to 6.7% for visit 3 which indicated no improvement.

Figure 23 indicated that the researcher, the clinician and the patients perceived greater improvement in visit 2 and visit 3 for the sum of moderate and marked severities for the treatment group. Both the researcher and the clinician scored 83.9% in visit 1 respectively which improved to 16.2% for the researcher and to 29.1% by the clinician on visit 3. The patients indicated 58.1% for visit 1 which improved to 41.9 % for visit 2 and 12% by visit 3. Once more, like the control group, the *heavy severity* of patients was high for their first visit by 29% which improved to 3.2% on their both visit 2 and visit 3.

The researcher's and clinician's ratings indicated general improvement for both the control and treatment groups. According to the patients' perception they indicated greater improvement within the treatment group compared to the control group

5.4 Comparisons with other studies

This study was adapted from Kent (2005) and Teleman (2005) who simultaneously yet independently conducted a double blind, placebo controlled study which evaluated the effectiveness of homoeopathic *Selenium sulphide* in the management of SD. Kent (2005) determined the effectiveness of oral homoeopathic preparation of *Selenium sulphide* 12X in the management of SD. Participants between ages 18 and 50 were randomly allocated into treatment and placebo groups. The duration of the study was four weeks with three consultations which occurred on day one, day 21 and day 28.

The treatment group consisted of 18 participants whilst the control group had 15 participants. Participants sucked a quarter capful granules of *Selenium sulphide* 12X every morning on waking and were assessed on each consultation by the participant themselves, the researcher and the clinician using a VAS scale. Both treatment and placebo groups displayed significant improvement after using the medication but displayed no significant improvement when both treatment and placebo groups were compared on statistical analysis. The treatment group displayed significant improvement for all six variables (scaling $p = 0.000$, irritation = p 0.002, greasiness $p = 0.013$, global impression $p = 0.000$, percentage of the scalp affected p = 0.000 and itching $p = 0.003$. With regard to the placebo group significant improvement was showed only in three variables (scaling p = 0.005, global impression $p = 0.012$ and itching $p = 0.018$). The study concluded that *Selenium sulphide* 12X was not effective in the management of SD.

Teleman (2005) determined the effectiveness of topical homoeopathic preparation of *Seleneum sulphide* 8X shampoo in the management of SD. The duration of the study was also four weeks with three consultations which were two weeks apart. Thirty-one participants between ages 18 and 50 were randomly allocated into treatment (15) and placebo (16) groups. Participants topically applied the shampoo three times a week on their wet hair on the scalp and left it for 2-3 minutes thereafter thoroughly rinsing it off. Participants were assessed on each consultation by the participants themselves, the researcher and the clinician using VAS. Both placebo and treatment group displayed significant improvement, however when both these groups were compared they exhibited no significant improvement on statistical analysis. The total average of p values between the treatment and the control group for each consultation were indicated as follows: day 1 $p = 0.922$, day 14 $p = 0.922$ and day 28 $p = 0.572$. The study concluded that *Selenium sulphide* 8x shampoo was not effective in the management of SD.

Smith, Baker and Williams Jr (2002) conducted a homoeopathic study on SD with the aim of determining the effectiveness of low dose, oral homoeopathic medication of *Potassium bromide* 1X, *Sodium bromide* 1X, *Nickel sulfate* 3X and *Sodium chloride* 6X. This study was a double blind, placebo controlled study, with treatment and placebo groups. The duration of the study was 20 weeks with 41 participants who were randomly allocated between the two groups. At the end of the initial 10-week study period all participants crossed over to the active medication for another 10 weeks.

Unlike the studies conducted by Kent (2005) and Teleman (2005), on statistically analysis the results showed that the active medication was effective (p = 0.004), showing improvement in SD compared to placebo. Even when the placebo group crossed over to active medication they demonstrated statistically significance results (p = 0.01).

Another homoeopathic study of interest was conducted recently by Mia (2016). This was a double blind, placebo controlled study which determined the effectiveness of sodium shale oil sulphonate 1% shampoo on the appearance of dandruff. The duration of the study was 16 days with three consultations which were eight days apart. Forty participants between ages 18 and 45 were included in this study. Participants washed their scalp with sodium shale oil sulphonate shampoo once every second day and were assessed using Adherent Scalp Modified Flaking Score by the researcher and VAS by both the researcher (scaling, irritation, greasiness and global impression) and the participant (scaling, irritation, greasiness, itchiness and global impression). According to parametric and non-parametric analyses both sodium shale oil sulphonate 1% shampoo and control shampoo groups displayed global significant improvement however the treatment group showed greater improvement than the control group. The treatment group showed significant improvement over the control group with regards to the following parameters: scaling (participant rated p = 0.012 and the researcher rated p = 0.020) and global impression (participant rated p = 0.048).

5.5 Challenges experienced in this study

Several difficulties were experienced during the period of this study. The study allowed a large number of participants (64) to take part in this trial around Durban since dandruff is a common condition; however, it was difficult to recruit participants regardless of the adverts being placed in different places such as malls, salons etc. This study was contextualized and based at the DUTHDC, which is located at the Durban Ritson Road Campus of DUT. Recruitment of participants was almost exclusively, staff and students of DUT due to the easy accessibility of these groups to the DUTHDC. As a result, potential participants outside of the DUT campus were unable to make appointments because of the travelling distance and were therefore unable to participate.

Further, the DUTHDC only operates during office hours and is closed on weekends. This made availability and accessibility for the participants for follow-up consultations rather difficult.

Patients were discouraged by the lengthy duration of the study (six weeks, with an initial consultation and two follow-up appointments) due to the fact that it was time consuming and during their working and study hours.

This study was adapted from Kent (2005) Teleman (2005) who conducted a similar study over a period of four weeks and recommended that the duration of the study be extended for the next study, for the research medication to exert its influence over a longer period due to the chronicity of the condition. Therefore, this study was conducted over a period of six weeks with an interval of three weeks between the second and the third visit. However, the researcher recommends that the study should preferably conduct the follow-up visits after every two weeks instead of three weeks to allow closer monitoring of patients.

Participants were provided with simple and straightforward instructions on how to apply the research medication. They were advised not to apply any other anti-dandruff products, as this would affect the validity of the results; however, it was not possible to confirm if participants complied with the instructions truthfully.

Participants were instructed to apply the medication twice a week, every third day and were discouraged from the application of any other moisturizing hair care products during the study. Further the participants, were not given any moisturizer to apply, after rinsing off the research medication and this resulted in the majority of patients from both the control and the treatment groups, complaining of itchiness of the scalp on the days of not using the medication. As a result, the results regarding dryness and itchiness could be influenced by the lack of external moisturizing that the participants were accustomed to.

The majority of participants from the control group were positive and encouraged by the changes and improvement they experienced by visit 2 (first follow-up), however some participants complained about the dryness of the scalp which caused itching resulting in flaking or less improvement in flaking which was visible by visit 3 (second follow-up). This result may be attributed to the fact that the control participants had lack of accustomed moisturizing and the absence of *Calendula officinalis Ø* in their

research medication. The anti-fungal properties of *Calendula officinalis* could have assisted in improving dryness, itching and flaking (Gazim *et al.* 2008; Efstratiou, Hussain, Nigam, Moore, Ayub and Rao 2012).

The majority of participants from the control group complained about a stinging sensation with itchiness, when they were exposed to sunlight. A possible explanation is the fact that *Calendula officinalis* has been shown to exhibit dermal sun protection properties. This is concluded from a study conducted by Mishra, Mishra and Chattopadhyay (2012) where the sunscreen activity of *Calendula officinalis* in a herbal formulation was evaluated. The study investigated the in vitro Sun Protection Factor (SPF) utilizing ultraviolet spectrophotometry of *Calendula officinalis* flower oil in a cream formulation. The SPF of *Calendula officinalis* oil in cream formulation showed enhanced SPF activity (SPF = 14.84 ± 0.16). This study recommended that *Calendula officinalis* oil cream can be used to protect the skin from UV radiations in the form of sunscreen cream. Therefore, it can be concluded that the control group experienced the stinging sensation with itchiness, due to the fact that their research medication consisted of only *Olea europaea* oil and not a combination of *Olea europaea* and *Calendula officinalis Ø.*

Participants complained of physical discomfort due to the inconvenient method of application of the research medication. Participants were instructed to apply the medication before bedtime, and then cover the scalp with a plastic shower cap, to prevent soiling of the linen. This was done in order to allow the research medication to diffuse into the scalp during sleep and they were instructed to only rinse the scalp the following morning. This caused discomfort to the majority of participants in terms of physical discomfort, in that there was increased perspiration and a sensation of heat that was generated as a result of the shower cap. Some participants conveyed that they felt that it was inconvenient as it was a “messy” method of application.

At the initial consultation and during the course of the study, participants were discouraged from elaborate and potentially scalp irritating hair style applications e. g. weaves wigs and artificial hair implantation. However, some participants did apply a basic weave and experienced irritation of the scalp due to the lengthy period of time that the hair on the scalp was being pulled to apply the weave. This irritation can persist for a few days after application. So this too could influence the results.

This study was designed predominantly to document the patient's perception of improvement in SD. However, in the interest of scientific validity of the data the researcher was a second rater of this perception and an objective clinician was appointed as a third party to avoid any bias, however that seemed to create challenges as there was more than one clinician involved in rating the participants. This is as a result of the fact that the DUTHDC allocates different clinicians for each day of the week, which resulted in four different clinicians rating the VAS which created confusion, lack of understanding and inconsistency of VAS measurements, resulting in inconsistency of scoring between the researcher, the clinician and the patient. The fact that the clinician, changed from visit to visit, was a challenging and limiting variable of this study. This is because the frame of reference for the scoring of the participant was not established by a consistent clinician. Therefore, the clinician ratings in this study are weighted to a lesser degree than, firstly the patient and secondly the researcher.

Olea europaea oil was chosen as a control medium as a result of the observed effective usage of this oil at the homoeopathic community clinics at DUT (Steele, pers. comm. 08 April 2015). This is due to the increased availability and cost-effectiveness of olive oil. Further, *Olea europaea* has established anti-fungal properties as is seen in various studies (Tripoli *et al.* 2005; Báidez, Gómez, Del Río and Ortuño 2006; Pereira *et al.* 2007). However, the main focus of anti-fungal activity seems to be on *Tricophyton mentagrophytes* (Battinelli, Daniele, Cristiani, Bisignano, Saija and Mazzanti 2006) and SD seems to have *Mallasseiza spp.* as the chief fungal causative factor implicated in dandruff (Zhang *et al.* 2013). This has not been documented as an effect of *Olea europaea* as yet. A possible explanation as to why some participants experienced relief in the control group as well is proposed as an effect of the moisturizing property of *Olea europea* and possible overlapping anti-fungal activity. However, this was not maintained throughout the study in the control group. So it is proposed, that the initial moisturizing effect was due to the anti-fungal effect of *Olea europea*, or else the therapeutic effect would have been seen throughout the study.

Calendula officinalis was chosen as a treatment due to its well-known effective anti-inflammatory properties (Preethi, Kuttan and Kuttan 2009; Parente *et al.* 2012; Edwards *et al.* 2015) and anti-fungal properties (Gazim *et al.* 2008; Muley, Khadabadi and Banarase 2009; Efstratiou *et al.* 2012). Even though Calendula *officinalis Ø* was effective in the management of SD caused by a fungal called *Malassezia spp*, no

studies have been conducted in relation to *Malassezia spp*. and *Calendula officinalis.* The main focus of anti-fungal activity seems to be on *Candida, Aspergillus and Rhodotorula* species (Gazim *et al.* 2008; Muley, Khadabadi and Banarase 2009; Efstratiou *et al.* 2012).

5.6 Conclusion

The results (raw data) depict improvement in both treatment and control group. According to the patients' perception there was greater improvement in the treatment grouped compared to the control group. However, there was no statistical difference between the treatment and the control group.

CHAPTER 6: CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

The study aimed to determine the efficacy of a topical application comprising *Calendula officinalis Ø* and *Olea europaea* in the management of SD of the scalp (dandruff). This efficiency was determined by the patients' perception of the treatment. The researcher and clinician recorded findings at each consultation as a possible objective rating for treatment.

The results indicated that the treatment group indicated overall improvement in the management of SD with respect to all VAS categories (irritation, flaking, greasiness, percentage of the scalp involved and overall impression) and PPQ categories (irritation, flaking, greasiness, itching and overall impression). This supported the first hypothesis since Olea *europaea* with *Calendula officinalis Ø* was effective in the management of SD.

It was also observed that results for the control group showed overall improvement in the management of SD with respect to all VAS categories (irritation, flaking, greasiness, percentage of the scalp involved and overall impression) and PPQ categories (irritation, flaking, greasiness, itching and overall impression). This supported the second hypothesis since *Olea europaea* was effective in the management of SD.

Therefore, both the control and treatment groups displayed overall improvement, which means that a combination of *Olea europeae* with *Calendula officinalis Ø* (treatment group) and *Olea europeae* only (control group) were effective in the management of SD. However, no significant difference was established between the effect of a combination of *Olea europaea* with *Calendula officinalis Ø and Olea europaea* only. This supported the null hypothesis since there was no difference in effect for both groups.

There was no statistical difference found between the control and the treatment groups, however statistical significance was found in all VAS and PPQ categories with

the exception of irritation between the researcher, clinician and patient ratings with regard to only the following visits:

- Flaking (clinician and patient rated $p = 0.019$) on visit 3 for the control group.
- Greasiness (clinician and patient rated $p = 0.027$) on visit 3 for the control group.
- Greasiness (researcher and patient rated $p = 0.012$) on visit 2 for the treatment group.
- Percentage of the scalp involved (researcher and clinician rated $p = 0.013$) on visit 2 for the treatment group.
- Overall impression (researcher and patient rated $p = 0.026$) on visit 2 for the control group.
- Overall impression (researcher and clinician rated $p = 0.026$) on visit 3 for the treatment group.

6.2 Recommendations

Future studies adapted from this study are advised to perform the following recommendations arising from this study:

- The study should also be conducted in homoeopathic community clinics outside DUT in order to allow easy accessibility to other participants who work, study and reside far from DUT.
- Future studies should develop strategies of involving equal distribution of age, gender and race in order to compare the results between different ethnic groups as well as age and gender.
- Future studies should conduct the follow-up consultations every two weeks instead of three weeks to allow closer monitoring of patients and ensure better patient compliance.
- Other methods of applying research medication should be proposed. Participants should still apply the medication three times a week but at least during the day or at their own convenient time and rinse it off after 1 hour instead of allowing it to diffuse overnight due to physical discomfort.
- Extend the duration of the study to more than six weeks since SD is a chronic disease.
- Participants should receive a moisturizer to apply on their scalp after rinsing off the shampoo in order to prevent dryness of the scalp.

- The exclusion criteria should include discouraging participants from practicing scalp irritating hair style applications e. g. weaves wigs and artificial hair implantation since this affect the validity of results.
- One clinician should be allocated in the study or all clinicians that will be involved in the study should be trained about the condition (SD) and VAS scale before the commencement of the study.
- The use of camera for dermatological photography is recommended for documentation of patient's visual features. This will be of beneficial for follow up consultations especially if there is more than one clinician involved in the study as well as for logical validity and consistency of results.
- The next study should be conducted by means of cross over design in order to compare the effectiveness between the combination of *Olea europeae* with *Calendula officinalis* Ø and *Olea europaea* only.

REFERENCES

Akhtar, N., Khan, B. A., Haji, M., Khan, S., Ahmad, M., Rasool, F., Mahmood, T. and Rasul, A. 2011. Evaluation of various functional skin parameters using a topical cream of Calendula officinalis extract. *African Journal of Pharmacy and Pharmacology*, 5(2): 199-206.

Al-Snafi, A. 2015. The chemical constituents and pharmacological effects of Calendula officinalis – a review. *Indian Journal of Pharmaceutical Science & Research*, 5(3): 172-185.

Allen, L. and Ansel, H. C. 2013. *Ansel's pharmaceutical dosage forms and drug delivery systems*. Baltimore, MD: Lippincott Williams & Wilkins.

Altman, D. 1991. Mathematics for kappa. *Practical statistics for medical research.* London: Chapman & Hall.

Ameh, S. J., Obodozie, O. O., Inyang, U. S., Abubakar, M. S. and Garba, M. 2010. Current phytotherapy – a perspective on the science and regulation of herbal medicine. *Journal of Medicinal Plants Research*, 4(2): 72-81.

Araya, M., Kulthanan, K. and Jiamton, S. 2015. Clinical characteristics and quality of life of seborrheic dermatitis patients in a tropical country. *Indian Journal of Dermatology*, 60(5): 519-519.

Báidez, A., Gómez, P., Del Río, J. and Ortuño, A. 2006. Antifungal capacity of major phenolic compounds of Olea europaea L. against Phytophthora megasperma Drechsler and Cylindrocarpon destructans (Zinssm.) *Physiological and Molecular Plant Pathology*, 69(4): 224-229.

Battinelli, L., Daniele, C., Cristiani, M., Bisignano, G., Saija, A. and Mazzanti, G. 2006. In vitro antifungal and anti-elastase activity of some aliphatic aldehydes from Olea europaea L. fruit. *Phytomedicine*, 13(8): 558-563.

Beauchamp, G. K., Keast, R. S., Morel, D., Lin, J., Pika, J., Han, Q., Lee, C. -H., Smith, A. B. and Breslin, P. A. 2005. Phytochemistry: ibuprofen-like activity in extra-virgin olive oil. *Nature*, 437(7055): 45-46.

Belekar, A. R. and Raut, S. V. 2015. Characterization of normal and dandruff causing micro-flora from human scalp of various age groups. *Research Journal of Pharmacognosy and Phytochemistry*, 7(3): 146-162.

Biber, A., Franck-Karl, G., Waimer, F., Riegert, U. and Wiget, R. 2009. Analytical characterisation of homoeopathic mother tinctures. *Pharmeuropa Scientific Notes*, 1: 1-4.

Boericke, W. 2007. *Boericke's new manual of homeopathic materia media with repertory*. Third revised and augmented edition based on ninth edition. New Delhi, India: B. Jain Publishers, Ltd.

Borda, L. J. and Wikramanayake, T. C. 2015. Seborrheic dermatitis and dandruff: a comprehensive review. *Journal of Clinical and Investigative Dermatology*, 3(2).

Boyd, P. 1989. *Introduction to homoeopathic medicine*. Beaconsfield, England: Beaconsfield Publishers.

Bragulla, H. H. and Homberger, D. G. 2009. Structure and functions of keratin proteins in simple, stratified, keratinized and cornified epithelia. *Journal of Anatomy*, 214(4): 516-559.

Calixto, J. 2000. Efficacy, safety, quality control, marketing and regulatory guidelines for herbal medicines (phytotherapeutic agents). *Brazilian Journal of Medical and Biological Research*, 33 (2): 179-189.

Chakraborthy, G. 2010. Phytochemical screening of Calendula officinalis Linn leaf extract by TLC. *International Journal of Research in Ayurveda and Pharmacy (IJRAP)*, 1(1): 131-134.

Chauhan, V. K. and Gupta, M. 2007. *Homoeopathic principles and practice of medicine*. New Delhi, India: B Jain Publishers(P) LTD.

Chhavi, S., Sushma, D. and Mahammad, A. 2011. Potential of herbals as antidandruff agents. *International Research Journal of Pharmacy*, 2(3): 16-18.

Chuu, C. -P., Kokontis, J. M., Hiipakka, R. A., Fukuchi, J., Lin, H. -P., Lin, C. -Y., Huo, C. and Su, L. -C. 2011. Androgens as therapy for androgen receptor-positive castration-resistant prostate cancer. *Journal of Biomedical Science*, 18(1): 63.

Cicerale, S., Lucas, L. and Keast, R. 2012. Antimicrobial, antioxidant and anti-inflammatory phenolic activities in extra virgin olive oil. *Current Opinion in Biotechnology*, 23(2): 129-135.

Cichorek, M., Wachulska, M., Stasiewicz, A. and Tyminska, A. 2013. Skin melanocytes: biology and development. *Postepy Dermatol Alergol*, 30(1): 30-41.

Clark, G. W., Pope, S. M. and Jaboori, K. A. 2015. Diagnosis and treatment of seborrheic dermatitis. *American Family Physician*, 91(3): 185-190.

Crichton, N. 2001. Visual analogue scale (VAS). *Journal of Clinical Nursing*, 10(5): 706-706.

Del Rosso, J. Q. 2011. Adult Seborrheic Dermatitis. *Population*, 4(5): 32-38.

Dessinioti, C. and Katsambas, A. 2013. Seborrheic dermatitis: etiology, risk factors, and treatments: facts and controversies. *Clinics in Dermatology*, 31(4): 343-351.

Edwards, S. E., da Costa Rocha, I., Williamson, E. M. and Heinrich, M. 2015. *Calendula officinalis L. Phytopharmacy: an evidence-based guide to herbal medicinal products.*WileyOnline Library. Available from: http://onlinelibrary.wiley.com/doi/10.1002/9781118543436.ch20/summary.(Accessed August 08 2016).

Efstratiou, E., Hussain, A. I., Nigam, P. S., Moore, J. E., Ayub, M. A. and Rao, J. R. 2012. Antimicrobial activity of Calendula officinalis petal extracts against fungi, as well as Gram-negative and Gram-positive clinical pathogens. *Complementary Therapies in Clinical Practice*, 18(3): 173-176.

Farhat, E. and Gold, L. S. 2014. *Seborrheic dermatitis*. *Acneiform eruptions in dermatology: a differential diagnosis*. New York, NY: Springer.

Fenner, J. and Clark, R. A. 2016. Anatomy, physiology, histology, and immunohistochemistry of human skin. In: Albanna, M. Z. and Holmes, J. H. eds. *Skin tissue engineering and regenerative medicine*. Amsterdam: Academic Press, 1-17.

Fitó, M., Cladellas, M., De la Torre, R., Marti, J., Munoz, D., Schröder, H., Alcántara, M., Pujadas-Bastardes, M., Marrugat, J. and López-Sabater, M. 2008. Anti-inflammatory effect of virgin olive oil in stable coronary disease patients: a randomized, crossover, controlled trial. *European Journal of Clinical Nutrition*, 62(4): 570-574.

França, K., Rodrigues, T. S., Ledon, J., Savas, J. and Chacon, A. 2013. Comprehensive overview and treatment update on hair loss. *Journal of Cosmetics, Dermatological Sciences Applied,* 3: 1-8.

Gary, G. 2013. Optimizing treatment approaches in seborrheic dermatitis. *The Journal of Clinical and Aesthetic Dermatology*, 6(2): 44.

Gazim, Z. C., Rezende, C. M., Fraga, S. R., Svidzinski, T. I. E. and Cortez, D. A. G. 2008. Antifungal activity of the essential oil from Calendula officinalis L. (Asteraceae) growing in Brazil. *Brazilian Journal of Microbiology*, 39(1): 61-63.

Ghaima, K. K., Rasheed, S. F. and Ahmed, E. F. 2013. Antibiofilm, antibacterial and antioxidant activities of water extract of Calendula officinalis flowers. *International Journal of Biolological & Pharmaceutical Research*, 4(7): 465-470.

Graf, J. 2000. Herbal anti-inflammatory agents for skin disease. *Skin Therapy Letters*, 5(4): 3-5.

Gulati, K. R. 2004. *Perfect cure through homoeopathy*. New Delhi, India: B. Jain Publishers Pvt. Ltd.

Hahnemann, S. and O'Reilly, W. B. 1996. *Organon of the medical art.* Redmond, WA: Birdcage Books.

Heinrich, M., Barnes, J., Gibbons, S. and Williamson, E. M. 2012. *Fundamentals of pharmacognosy and phytotherapy*. Amsterdam: Elsevier Health Sciences.

Hirobe,T. 2014. Keratinocytes regulate the function of melanocytes. *Dermatologica Sinica*, 32(4): 200-204.

Isaiah, S. and Karthikeyan, S. 2015. Review on scientific insight of Dandruff/Seborrheic Dermatitis: A common skin disorder. *International Journal of Pharmacologicy and Biological Sciences*, 6(1): 742-749.

Jackson-Richards, D. and Pandya, A. G. 2014. *Dermatology atlas for skin of color*. New York, NY: Springer.

Jackson, Simon M.; Williams, Mary L.; Feingold, Kenneth R.; Elias, Peter M. (1993). "Pathobiology of the Stratum Corneum". *The Western Journal of Medicine.* 158 (3): 279–85.

Jenkins, G. and Tortora, G. J. 2011. *Anatomy and physiology*. Chichester, England: Wiley-Blackwell.

Jessica, D. 2014. *Layers of the epidermis*. Available: https://www. studyblue. com/notes/note/n/ch-5-integumentary-system-whitehead/deck/10355982 (Accessed January 18 2017).

Jouanny, J. 1990. *The essentials of homeopathic materia medica*. Ste-Foy-les-Lyon, France: Boiron.

Jourdain, R., Moga, A., Vingler, P., el Rawadi, C., Pouradier, F., Souverain, L., Bastien, P., Amalric, N. and Breton, L. 2016. Exploration of scalp surface lipids reveals squalene peroxide as a potential actor in dandruff condition. *Archives of Dermatological Research*, 308(3): 153-163.

Karanović, Z. and Jokić, J. 2009. *Plants and herbs in traditional Serbian culture*. Belgrade: Novi Sad.

Kaur, J., Sidhu, S. and Khan, M. 2015. In vitro antioxidant and antiinflammatory activity of Calendula officinalis and Mimosa pudica. *World Journal of Pharmacy and Pharmaceutical Sciences*.

Kent, J. T. and Savage, R. B. 1989. *Materia medica of homoeopathic remedies: new remedies and an alphabetical list*. London: Homoeopathic Book Service.

Kent, K. 2005. The effectiveness of an oral homoeopathic preparation of selenium sulphide 12X in the management of dandruff (seborrheic dermatitis of the scalp). Master's dissertation, Durban University of Technology, Durban.

Kerr, K., Darcy, T., Henry, J., Mizoguchi, H., Schwartz, J. R., Morrall, S., Filloon, T., Wimalasena, R., Fadayel, G. and Mills, K. J. 2011. Epidermal changes associated with symptomatic resolution of dandruff: biomarkers of scalp health. *International Journal of Dermatology*, 50(1): 102-113.

Khalid, K. A. and Teixeira da Silva, J. 2012. Biology of Calendula officinalis Linn.: focus on pharmacology, biological activities and agronomic practices. *Medicinal and Aromatic Plant Science And Biotechnology*, 6(1): 12-27.

Kiechl-Kohlendorfer, U., Berger, C. and Inzinger, R. 2008. The effect of daily treatment with an olive oil/lanolin emollient on skin integrity in preterm infants: a randomized controlled trial. *Pediatric Dermatology*, 25(2): 174-178.

Kolarsick, P. A., Kolarsick, M. A. and Goodwin, C. 2011. Anatomy and physiology of the skin. *Journal of the Dermatology Nurses' Association*, 3(4): 203-213.

Kowalczyk, A. P. and Green, K. J. 2013. Structure, function and regulation of desmosomes. *Progress in Molecular Biology and Translational Science*, 116: 95.

Landscape Artchitect's Pages. 2011. *Olea europaea.* Available: https://davisla.wordpress.com/category/olea-europaea/ (Accessed October 03 2016).

LaRosa, D. F. and Orange, J. S. 2008. Lymphocytes. *Journal of Allergy and Clinical Immunology*, 121(2): S364-S369.

Liu, Y. -C., Zou, X. -B., Chai, Y. -F. and Yao, Y. -M. 2014. Macrophage polarization in inflammatory diseases. *International Journal of Biological Sciences*, 10(5): 520-529.

Mia, Z. 2016. The effect of sodium shale oil sulphonate 1% shampoo on dandruff. Master's dissertation, University of Johannesburg, Johannesburg.

Misery, L., Rahhali, N., Duhamel, A. and Taieb, C. 2013. Epidemiology of dandruff, scalp pruritus and associated symptoms. *Acta Dermato-Venereologica*, 93(1): 80-81.

Mishra, A., Mishra, A. and Chattopadhyay, P. 2012. Assessment of in vitro sun protection factor of Calendula officinalis L. (asteraceae) essential oil formulation. *Journal of Young Pharmacists*, 4(1): 17-21.

Mohamed, H. S., Farahat, N. H., Megallaa, N. G. and Elhaleem, M. A. 2014. Nursing guidelines on hair dandruff symptoms for adult patients. *Life Science Journal*, 11(1s).

Moore, K. L., Dalley, A. F. and Agur, A. M. 2013. *Clinically oriented anatomy*. Baltimore, MD: Lippincott Williams & Wilkins.

Muley, B., Khadabadi, S. and Banarase, N. 2009. Phytochemical constituents and pharmacological activities of Calendula officinalis Linn (Asteraceae): a review. *Tropical Journal of Pharmaceutical Research*, 8(5).

Mullaicharam, A., Amaresh, N. and Balasubramanian, H. 2014. Phytochemistry and pleiotropic pharmacological properties of Calendula officinalis Linn. – a review. *Journal of Pharmacognosy and Phytochemistry*, 2(4): 1-10.

Okokon, E. O., Verbeek, J. H., Ruotsalainen, J. H., Ojo, O. A. and Bakhoya, V. N. 2015. Topical antifungals for seborrhoeic dermatitis. *Cochrane Database of Systematic Reviews*, 2(5).

Owen, R. W., Giacosa, A., Hull, W. E., Haubner, R., Würtele, G., Spiegelhalder, B. and Bartsch, H. 2000. Olive-oil consumption and health: the possible role of antioxidants. *The Lancet Oncology*, 1(2): 107-112.

Paetow, G. 2014. *Skin structure*. Available: http://hqmeded. com/hidradenitis-suppurativa/ (Accessed September 08 2016).

Parente, L. M. L., Lino Júnior, R. d. S., Tresvenzol, L. M. F., Vinaud, M. C., de Paula, J. R. and Paulo, N. M. 2012. Wound healing and anti-inflammatory effect in animal models of Calendula officinalis L. growing in Brazil. *Evidence-Based Complementary And Alternative Medicine*, 2012. 10.1155/2012/375671.

Patient.info. 2016. *Seborrheic dermatitis*. Available: http://patient. info/doctor/seborrhoeic-dermatitis-pro (Accessed January 18 2017).

Pereira, A. P., Ferreira, I. C., Marcelino, F., Valentão, P., Andrade, P. B., Seabra, R., Estevinho, L., Bento, A. and Pereira, J. A. 2007. Phenolic compounds and antimicrobial activity of olive (Olea europaea L. Cv. Cobrançosa) leaves. *Molecules*, 12(5): 1153-1162.

Perricon, N. V. 2002. *Treatment of skin damage using olive oil polyphenols*: US 6437004 B1: Available: https://www.google.com/patents/US6437004(Accessed September 28 2016).

Potluri, A., Harish, G. and Kumar, B. P. 2013. Formulation and evaluation of herbal anti-dandruff shampoo. *Indian Journal of Research in Pharmacy and Biotechnology*, 1(6): 835.

Preedy, V. R. 2012. *Handbook of hair in health and disease*. New York, NY: Springer Science & Business Media.

Preethi, K. C., Kuttan, G. and Kuttan, R. 2009. Anti-inflammatory activity of flower extract of Calendula officinalis Linn. and its possible mechanism of action. *Indian Journal of Experimental Biology*, 47(2): 113-120.

Razlog, R., Pellow, J. and White, S. J. 2012. A pilot study on the efficacy of Valeriana officinalis mother tincture and Valeriana officinalis 3X in the treatment of attention deficit hyperactivity disorder. *Health SA Gesondheid*, 17(1): 1-7.

Roberts, E. M. 1993. *A textbook of the principles of homoeopathic practice*. London: Winter Press Publishers.

Rousso, J. J. and Bassiri-Tehrani, M. 2015. Skin anatomy and physiology. In: Sataloff, R. T. and Sclafani, A. P. eds. *Sataloff's comprehensive textbook of otolaryngology: head & neck surgery: facial plastic and reconstructive surgery*, VolumeAvailable:http://www.jaypeedigital.com/Book/BookDetail?isbn=9789351524595 (Accessed September 12 2016)

Schneider, M. R. and Paus, R. 2010. Sebocytes, multifaceted epithelial cells: lipid production and holocrine secretion. *The International Journal of Biochemistry & Cell Biology*, 42(2): 181-185.

Schwartz, J. R., Messenger, A. G., Tosti, A., Todd, G., Hordinsky, M., Hay, R. J., Wang, X., Zachariae, C., Kerr, K. M. and Henry, J. P. 2013. A comprehensive pathophysiology of dandruff and seborrheic dermatitis–towards a more precise definition of scalp health. *Acta Dermato-Venereologica*, 93(2): 131-137.

Shenefelt, P. D. 2011. Herbal Treatment for Dermatologic Disorders. In: Benzie, I. F. F. and Wachtel-Galor S. eds. *Herbal medicine: biomolecular and clinical aspects*. 2nd ed. Boca Raton, FL: CRC Press/Taylor & Francis, Chapter 18.

Silva, E. J., Gonçalves, E. S., Aguiar, F., Evêncio, L. B., Lyra, M., Coelho, M. C. O., Fraga, M. d. C. C. and Wanderley, A. G. 2007. Toxicological studies on hydroalcohol extract of Calendula officinalis L. *Phytotherapy Research*, 21(4): 332-336.

Smith, S. A., Baker, A. E. and Williams Jr, J. H. 2002. Effective treatment of seborrheic dermatitis using a low dose, oral homeopathic medication consisting of potassium bromide, sodium bromide, nickel sulfate, and sodium chloride in a double blind, placebo-controlled study. (Original research: seborrhea). *Alternative Medicine Review*, 7(1): 59-68.

Stefanaki, I. and Katsambas, A. 2010. Therapeutic update on seborrheic dermatitis. *Skin Therapy Letters*, 15(5): 1-4.

Stibbe, J. 1999. Homeopathy in dermatology. *Clinics in Dermatology*, 17(1): 65-68.

Sujay, K., Sharma, V. and Sumanth, K. 2004. Topical immunomodulators in dermatology. *Journal of Postgraduate Medicine*, 50(2): 131-139.

Steele, R. 2015. Inteviewed by S.Zondi.Durban University of Technology,Durban,14 April.

Taavoni, S., Soltanipour, F., Haghani, H., Ansarian, H. and Kheirkhah, M. 2011. Effects of olive oil on striae gravidarum in the second trimester of pregnancy. *Complementary Therapies in Clinical Practice*, 17(3): 167-169.

Teleman, S. 2005.The effectiveness of topical homoeopathic preparation of *Selenium sulphide* 8X shampoo in the management of dandruff (Pityriasis capitis). Master's dissertation, Durban University of Technology, Durban.

Teoh, Y-L. and Tay, Y-K. 2015. Seborrhoeic dermatitis in children. In: Silverberg, N. B., Durán-McKinster, C. and Tay, Y-K. eds. *Pediatric Skin of Color*. New York, NY: Springer, 289-294.

Thambyayah, M. and Amuthan, A. 2015. Infantile seborrheic dermatitis: a pediatric Siddha medicine treatise. *Clinics in Dermatology*, 33(3): 355-361.

Tivoli, Y. A. and Rubenstein, R. M. 2009. Pruritus: an updated look at an old problem. *The Journal of Clinical and Aesthetic Dermatology*, 2(7): 30.

Tripoli, E., Giammanco, M., Tabacchi, G., Di Majo, D., Giammanco, S. and La Guardia, M. 2005. The phenolic compounds of olive oil: structure, biological activity and beneficial effects on human health. *Nutrition Research Reviews*, 18(01): 98-112.

Van Wyk, H. 2015. Treatment options for dandruff. *South African Pharmacist's Assistant*, 15(4): 28-29.

Vemeulen, F. and Bakker, A. 2001. *Concordant materia medica*. Haarlem NL: Emryss.

Vesuvio Olive Estate. 2016. *Olive oil*. Available: http://www.vesuvioestates.co.za/home/ (Accessed September 08 2016).

Visioli, F., Poli, A. and Gall, C. 2002. Antioxidant and other biological activities of phenols from olives and olive oil. *Medicinal Research Reviews*, 22(1): 65-75.

Walker, B. R. and Colledge, N. R. 2013. *Davidson's principles and practice of medicine*. Amsterdam: Elsevier Health Sciences.

Xu, Y. and Chen, G. 2015. Mast cell and autoimmune diseases. *Mediators of Inflammation*, 2015. Doi.org/10.1155/2015/246126.

Yamaguchi, K., Suganuma, N. and Ohashi, K. 2012. Quality of life evaluation in Japanese pregnant women with striae gravidarum: a cross-sectional study. *BMC Research Notes*, 5(1): 450.

Zareei, M., Mohammadi, A., Borjian Borujeni, Z. and Hashemi, S. J. 2016. Frequency of different Malassezia species in scalp dandruff. *Infection, Epidemiology and Medicine*, 2(2): 22-25.

Zhang, H., Ran, Y., Xie, Z. and Zhang, R. 2013. Identification of Malassezia species in patients with seborrheic dermatitis in China. *Mycopathologia*, 175(1-2): 83-89.

APPENDICES

Appendix A: Information letter

INSTITUTIONAL RESEARCH ETHICS COMMITTEE (IREC)

LETTER OF INFORMATION

Dear Participant

Thank you for agreeing to participate in this study.

Title of the Research Study: The efficacy of a topical application comprising *Calendula officinalis Ø* and *Olea europaea* in the management of seborrheic dermatitis of the scalp (dandruff)

Principal Investigator/s/researcher: Miss Minenhle Zondi, B. Tech. Homoeopathy

Co-Investigator/s/supervisor/s: Dr. J. C. Ngobese-Ngubane (Supervisor), M. Tech. Hom. (Supervisor) and Dr. M. Maharaj, M. Tech. Hom. (Co-supervisor)

Brief Introduction and Purpose of the Study: The purpose of this proposed randomized, double blind randomized controlled study is to determine the efficacy of a topical application comprising *Calendula officinalis Ø* and *Olea europaea* in the management of seborrheic dermatitis of the scalp (dandruff). Seborrheic dermatitis (dandruff) is one of the most common ailments affecting the scalp. Recent studies suggest that seborrheic dermatitis is a common skin condition that mainly affects the scalp.

It causes scaly patches, red skin and stubborn dandruff. Seborrheic dermatitis doesn't affect overall health, but it can be uncomfortable and cause embarrassment and low self-esteem (Del Rosso, 2011). It is a benign but recurrent, inflammatory, chronic and frequent disease (Preedy, 2012). The presence of dandruff almost always indicates an over activity of the sebaceous glands. These glands, which are connected to the roots of the hair, produce an oily material called sebum. This oily substance makes the scales or flakes greasy, which can cause the scalp to itch (Que, 2000).

Outline of the Procedures: The consultations where data relating to dandruff will be collected will take place at the Durban University of Technology (DUT), Homoeopathic Day Clinic (HDC). The total duration of the study is 6 weeks with only 3 consultations. The Initial consultation will be an hour long and thereafter the follow-up consultations will be about 30 minutes long. At the initial and final consultation, a detailed case and physical examination will be performed you will be requested to complete the consent form before you may participate in this study. On consenting to participate you will be requested to complete the scales that will be explained to you. The completion of the scales may take 10 minutes. These scales will be completed before each consultation.

Non-participation: You are not forced to participate in this study. Participation in this study is voluntarily. If you don't participate in this study it will not affect the service offered to you by the HDC.

Randomisation: A sample size of 64 consenting participants will be evenly distributed between the active and placebo groups according to the randomisation list (32 participants in each group). Randomisation will be done by an independent qualified and registered homoeopath within the Department of Homoeopathy nominated by the Department of Homoeopathy Research Committee (DRC). Randomisation table will be drawn from 1-64 by the researcher and submitted to the above mentioned independent person by the supervisor who is not blinded. The independent person will then perform randomisation by assigning the random numbers from random number tables (1-64) to the treatment conditions (treatment or control group). The Randomisation list will be kept at the clinic where the research student does not have access to it until the study is completed where un-blinding will then be done

Risks or Discomforts to the Participant: There are no known discomforts from participating in this study. Application of the test substance may have transient aggravation which may vary according to individuals. DUT Research-adverse effect protocol will be followed should a participant develop adverse reaction to the treatment and will also be referred to the homoeopathic day clinic and somatology clinic.

Benefits: The information given by you will help to draw conclusions about the efficacy of a topical application comprising *Calendula officinalis* Ø and *Olea europaea* in the management of seborrheic dermatitis of the scalp (dandruff).

What is expected of the participant?

You will be applying a treatment spray into your scalp at night before you go to bed twice a week. You are advised not to apply any other anti-dandruff cream/ lotion/ ointment/ shampoo or conditioner on your hair during the study period as this could affect the validity of the results. Full instructions on the application of the hair spray will be given to you. There is a 50% chance that you will be in a treatment group that will get treatment hair spray comprising *Calendula officinalis* Ø and *Olea europaea* or in a control group that will get a hair spray comprising *Olea europaea* only. Both the sprays have some therapeutic properties.

Pooling of data: All data collected will be stored in the locked research store room within the Department of homoeopathy (the keys are with the research gatekeepers of the department) and ultimately shredded and disposed of after five years.

Reason/s why the Participant May Be Withdrawn from the Study: You are free to withdraw from the study at any time without any form of penalty.

Remuneration: There is no remuneration for participating in this study.

Costs of the Study: You will not be expected to cover any costs towards the study.

Confidentiality: Please do not write your personal information like name, contact details on the scales. All data collected will be pooled to ensure anonymity. Pooled data will be communicated scientifically. Data will be stored in a locked cupboard for 5 years

Research-related Injury: There are no injuries that you may be exposed to during the course of the study. Please inform the researcher/ supervisors of the study if any of the following is experienced:

- Any unfavorable changes on the scalp
- Any discomfort attributed to the treatment
- Or for any queries regarding your treatment

Results of the study: At the completion of the research study and completion of the mini-dissertation, the results of the study will be made available in the DUT library repository and online. Potential journal article about the study.

Persons to Contact in the Event of Any Problems or Queries:

Ms. M. Zondi (Student) Telephone no: 072 890 6470

Dr. J. C. Ngobese-Ngubane (Supervisor) Telephone no: 031 373 2484

Dr. M. Maharaj (Co-supervisor) Telephone no: 031 536 2481

The Institutional Research Ethics administrator: - 031-373 2900.Complaints can be reported to the DVC: TIP F. Otieno on 031-3732382 or dvctip@dut. ac. za.

Incwadi yolwazi yalabo ababamba iqhaza

IKOMIDI LWEZOCWANINGO NEMIGOMO YESIGUNGO/ INSTITUTIONAL RESEARCH ETHICS COMMITTEE

Mbambiqhaza,

Ngiyabonga ngokuba uvume ukuba yingxenye yalolucwaningo

Isihloko socwaningo: Amandla okukwazi ukufaka isigcobo esibandakanya i-*Calendula officinalis* Ø kanye ne-*Olea europaea* ekulawuleni i-seborrheic dermatitis yenkwethu

Umcwaningi oqavile noma ophezulu: UNkosazana Minenhle Zondi, B. Tech. Homoeopathy

Umhloli omkhulu wocwaningo: U-Dkt. J. C. Ngobese-Ngubane, M. Tech. Hom. (Umhloli)

I**sekela likamhloli:** U-Dkt. Madhu Maharaj, M. Tech. Hom. (Umhloli olekelelayo)

Isingeniso kanye nenhloso yalolucwaningo: Inhloso enkulu yalolu cwaningo ukufuna ukuthola amandla okukwazi ukufaka isigcobo esibandakanya i-Calendula officinalis Ø kanye ne-Olea europaea ekulawuleni i-seborrheic dermatitis yenkwethu. I-Seborrheic dermatitis (inkwethu) ingezinye yezifo ezijwayelekile ezithinta isikhumba sekhanda esinezinwele. Uphenyo lwakamuva luveza ukuthi i-seberrheic dermatitis iyinkinga yesikhumba ejwayelekile isikhathi esiningi elimaza isikhumba sekhanda esinezinwele.

Idala amabala anemigqa, isikhumba esibomvu kanye nenkwethu eningi. I-seborrheic dermatitis ayisihlukumezi isimo sempilo nje ngokuphelele, kodwa ingadala ukungakhululeki kanti futhi ingadala ukuphoxeka kanye nokwehlelwa izinga lokuzithemba. (Del Rosso, 2011). Iyisifo esijwayelekile kodwa esiqhubekayo, kanti futhi esiphathana kaningi (Preedy, 2012). Ukuba khona kwenkwethu kuhlale kuveza ukusebenza ngokweqile kwesikhiqizo esiluketshezi esibizwa ngokuthi isebaceous elimunca umongo egazini liwugodle ukuze ubuye usebenze umsebenzi othile. Lesi sikhiqizo esixhumene neziqu zezinwele, likhiqiza uketshezi olubizwa nge-sebum. Lolu

ketshezi olusamafutha lwenza izindlela zezinwele ukuba zigcwale amafutha zishelele, lokho ke okudala isikhumba sekhanda esinezinwele ukuba silume (Que, 2000).

Ukuchazwa kwemigudu ezolandelwa: Ukuxoxisana lapho ulwazi oluhlobene nenkwethu luzoqoqwa khona kuzokwenzeka e-Durban University of Technology (DUT), e-Homoeopathic Day Clinic (HDC). Isikhathi esiphelele socwaningo sizoba ngamasonto ayisithupha (6) kuphela, lapho kuzoba nokuxoxisana okuzoba kuthathu (3) kuphela nababambiqhaza. Ukubonwa kokuqala kuzoba ihora elilodwa (1) kuphela emva kwalokho ukuxoxisana okulandelayo kuzobe sekuthatha imizuzu engamashumi amathathu (30) kuphela ubude. Ekuxoxisaneni kokuqala nokokugcina kuzokwenziwa ukuhlolwa okunzulu komzimba lapho ozobe usucelwa khona ukuba ugcwalise ifomu lokuvuma ukubamba iqhaza ngaphambi kokuba uqale ubambe iqhaza kulolu cwaningo. Emva kokugcwalisa ifomu uvume ukubamba iqhaza kulolu cwaningo uzocelwa ukuba ugcwalise izikali ozochazelwa ngazo. Ukugcwaliswa kwalezi zikali kuzothatha imizuzu elishumi (10). Izikali zizogcwaliswa njalo emva kokubonwa

Ukungabambi iqhaza: Awuphoqiwe ukuba ubambe iqhaza kulolu cwaningo. Ukubamba iqhaza kulesi sifundo kungukuzithandela kwakho. Uma ungavumi ukubamba iqhaza kulesi sifundo angeke kwaphazamisa noma kwalimaza usizo olunikezwa i-HDC.

Ukukhethwa kwababambiqhaza: Isampula lalolu cwaningo amalunga angu 64.Ayobe esehlukaniswa ukuba kuphume amaqoqo amabili anamalungu angu32 ngalinye. Enye yalamaqoqo iyothola isithako esinalamakhambi okulapha enye ithole okungenasithako sokwelapha. Lokhu kwehlukanisa kuyokwenziwa elinye lamalungu esikhungo ngaphansi komnyango wezehomoeopathy futhi okubhalisele ngokusemthethweni ukuba Ihomoeopath oyobe eqokwe umnyango wezehomoeopathy futhi ke yena akafihlelwe ukwazi ukuthi iliphi iqoqo elithola kuphi. Umhloli wocwaningo uyonikeza itafula elinezinombolo eziqala ku 1 kuya ku64.Loluhla lwetafula luyogcinwa emtholampilo lapho umncwaningi engenakulibona khona kuze kuphele ucwaningo. Isibalo sababambiqhaza abangu-64 abavume ukuba ingxenye yalolu cwaningo sizokhishwa ngokulingana phakathi kwamaqoqo asebenzayo kanye ne-placebo lokhu kuzokwenziwa ngokukhetha okujwayelekile okungezukulandela uhla oluthile (ababambiqhaza abangu-32 eqoqwini ngalodwa). Ukukhethwa kwababambiqhaza ngokwamaqoqo kuzokwenziwa ngudokotela we-homeophathy ozimele futhi oneziqu ezifanele oqhamuka ngaphakathi emnyangweni we-

Homeopathy ozobe ekhethwe i-Homeopathy Research Committee (DRC). Itafula lokukhethwa kwababambiqhaza lizodetshwa kusukela ku- 1-64 kwenziwa ngumcwaningi bese lithunyelwa kulomuntu ozimele obalulwe ngenhla lokho kwenziwa ngumhloli. Lo muntu ozimele uzobe esekhetha ababambiqhaza ngokukhetha noma iziphi izinombolo ematafuleni akhona (1-64) ezimo zokulapha (iqoqo lokulapha noma lokulawula). Uhla lapho kukhethwa khona ababambiqhaza lizogcinwa emtholampilo lapho umcwaningi engakwazi ukungena khona kuze kuphele ucwaningo lapho kuzobe sekuvezwa khona yonke into.

Ubungozi noma ukungakhululeki kombambiqhaza: Akukho ukungakhululeki okukhona okwaziwayo ngokubamba iqhaza kulolu cwaningo. Ukufakwa komuthi wokuhlola kungadala ukungakhululeki kwesikhashana okungenzeka ngokuhluka kubantu abahlukene. Imigomo yocwaningo ebhekele ukulimala yase-DUT izolandelwa uma kwenzeka umbambiqhaza eqala ukuba nokuzwela okuthile kwimishanguzo futhi uzobe esethunyelwa emtholampilo wakwa-homoeopathy nakwa-somatology.

Inzuzo: Ulwazi ozolunikeza luzosiza ekuqhamukeni nezisombululo emandleni okukwazi ukufaka isigcobo esibandakanya i-*Calendula officinalis Ø* kanye ne-*Olea europaea* ekulawuleni i-seborrheic dermatitis yenkwethu.

Yini elindeleke kumbambiqhaza?

Uzobe ufaka umuthi ofuthwayo esikhumbeni sakho sasekhanda kabili ngesonto njalo ebusuku ngaphambi kokuba ulale. Uyayalwa ukuba ungafaki muthi noma yini enye egcotshwayo ezinweleni zakho ngesikhathi salolu cwaningo njengoba lokhu kungaphazamisa imiphumela yokuqiniseka ukuthi lolu cwaningo lwenzeka ngendlela yini. Imigomo ephelele okumele ilandelwe yokusebenzisa umuthi uzoyinikezwa. Kunamathuba angamaphesenti awu-50 okuthi uzobe useqoqweni lokulashwa oluzothola umuthi ofuthwayo one-*Calendula officinalis Ø* kanye ne- *Olea europaea* noma uzoba seqoqweni elizothola umuthi ofuthwayo one- *Olea europaea* kuphela. Yomibili le mithi efuthwayo izobe inezimpawu eziphathelene nokwelapha.

Ukugcinwa kolwazi oluqoqiwe: Lonke ulwazi oluqoqiwe luzogcinwa egunjini locwaningo elukhiywayo ngaphakathi komnyango wezehomoeopathy (izikhiye zigcinwa ngabagcini bocwaningo emnyangweni) kanti luzodatshulwa lulahlwe emva kweminyaka emihlanu.

Izizathu lapho umbambiqhaza engakhishwa khona kulolu cwaningo: Uvumelekile ukusula kulolu cwaningo noma ngasiphi isikhathi futhi ngeke kube khona sijeziso.

Isinxephezelo: Akukho sinxephezelo esizoba khona ngokubamba iqhaza esifundweni.

Izimali ezihlobene nalolu cwaningo: Awulindelekile ukuthi ukhiphe imali ngokubamba iqhaza kulolu cwaningo.

Ukugcinwa kwemininingwane: Uyacelwa ukuba ungabhali imininingwane yakho ebalulekile njengegama, indlela ongatholakala ngayo njengenombolo yocingo nekheli. Lonke ulwazi oluqoqiwe luzohlanganiswa ukuvikela isithunzi. Ulwazi oluhlanganisiwe luzochazwa ngokwesayensi. Ulwazi luzogcinwa ekhabetheni elikhiyiwe iminyaka emihlanu.

Ukulimala okuhlobene nalolu cwaningo: Akukho kulimala okulindelekile nokungenzeka ngesikhathi sesifundo. Uyacelwa ukuba wazise umcwaningi/abahloli bocwaningo uma kwenzeka noma yini kulokhu okulandelayo:

- Noma iluphi ushintsho olungajwayelekile esikhunjeni sekhanda
- Noma ikuphi ukungakhululeki okudalwa imithi yokulapha
- noma imiphi imibuzo ongaba nayo ngemithi yakho yokulapha

Imiphumela yocwaningo: Uma ucwaningo seluphelile kanye nebhuku elincane locwaningo selibhaliwe, imiphumela izokwenziwa kumtapo wolwazi nakwezinye izindawo zolwazi ezitholakala ezinhlelweni zokuxhumana. Kuzoba nephepha elingahle libhale ngaso lesi sifundo.

Abantu abangathintwa uma kukhona izinkinga noma imibuzo:

UNkosazana. M. Zondi (Umfundi) Inombolo yocingo: 072 890 6470

Dkt. J. C. Ngobese-Ngubane (Umhloli) Inombolo yocingo: 031 373 2484

Dkt. M. Maharaj (Umhloli olekelelayo) Inombolo yocingo: 031 536 2481

Umabhalane we-Institutional Research Ethics: - 031-373 2900.Izikhalazo zingadluliselwa ku-DVC: TIP F. Otieno ku-031-3732382 noma zithunyelwe ku-dvctip@dut. ac. za

Appendix B: Consent form

INSTITUTIONAL RESEARCH ETHICS COMMITTEE (IREC)

CONSENT

Statement of Agreement to Participate in the Research Study:

- I hereby confirm that I have been informed by the researcher, _____ (name of researcher), about the nature, conduct, benefits and risks of this study - Research Ethics Clearance Number: _____,
- I have also received, read and understood the above written information (Participant Letter of Information) regarding the study.
- I am aware that the results of the study, including personal details regarding my sex, age, date of birth, initials and diagnosis will be anonymously processed into a study report.
- In view of the requirements of research, I agree that the data collected during this study can be processed in a computerised system by the researcher.
- I may, at any stage, without prejudice, withdraw my consent and participation in the study.
- I have had sufficient opportunity to ask questions and (of my own free will) declare myself prepared to participate in the study.
- I understand that significant new findings developed during the course of this research which may relate to my participation will be made available to me.

_____ _____ _____ _____

Full Name of Participant **Date** **Time** **Signature / Right Thumbprint**

I, _____ (name of researcher) herewith confirm that the above participant has been fully informed about the nature, conduct and risks of the above study.

_____ _____ _____

Full Name of Researcher **Date** **Signature**

_____ _____ _____

Full Name of Witness (If applicable) **Date** **Signature**

_____ _____ _____

Full Name of Legal Guardian (If applicable) Date **Signature**

IKOMIDI LWEZOCWANINGO NEMIGOMO YESIGUNGO/ INSTITUTIONAL RESEARCH ETHICS COMMITTEE

Isivumelwano sokuzimbandakanya

Izitatimende zokuvuma ukuzimbandakanya kulolucwaningo:

Ngimilana ngiyavuma ukuthi ngazisiwe umcwaningi u, _____ (igama lomcwaningi), mayelana nohlobo, indlela, inzuzo kanye nengcuphephe yalolu cwaningo – inombolo yeResearch Igunya lokwenza ucwaningo: _____,

Ngilitholile, futhi ngiyifundile incwadi yokwazisa ngokuzimbanyakanya kulolu cwaningo ngaba nokuqondisisa okuphelele mayelana nalolu cwaningo.

Nginakho ukuqonda ngemiphumela yalolu cwaningo, ukumbandakanya ubulili, iminyaka, unyaka wokuzalwa, ama-inishiyali ami nokudalulwa kwesigulo sami ukuthi kuyobe sekudidiyelwa ukwenza umbiko ngalolu cwaningo.

Ekwazini ngezidingo zalolu cwaningo, ngiyanikeza igunya lokuba ulwazi ngami olutholakalayo ludidiyelwe bese luhlaziywa ngekhompuyutha nguye umcwaningi.

Ngingahoxa ukuba ngizibandakanye kulolu cwaningo noma inini, ngaphandle kokuba ngicwaswe kulolu cwaningo

Sengibe nesikhathi nethuba elanele lokuba ngizibuze imibuzo (futhi ngentando yami) ngizikhethele mina ukuba ngizimbandakanye kulolu cwaningo.

Ngiyaqonda ukuthi kusangatholakala ulwazi olubalulekile olusha olungaphathelene nalolu cwaningo, lolo lwazi ngiyokwazi ukuluthola uma ngiludinga

_____ _____ _____ _____

Igama eliphelele lalona ozibandakanyayo **Usuku** **Isikhathi** **Uphawu lokusayina/ isithupha sangasesandleni sokudla**

Mina, _____ (igama lomncwaningi) ngiyavuma ukuthi lona ongenhla ozibandakanyakucwaningo ngimazisile ngokuphelele mayelana nohlobo, indlela, inzuzo kanye nengcuphephe yalolu cwaningo.

_____	_____	_____
Igama eliphelele lomcwaningi lokusayina	**Usuku**	**Uphawu**
_____	_____	_____
Igama eliphelele likafakazi (Uma ekhona)	**Usuku**	**Uphawu lokusayina**
_____	_____	_____
Igama eliphelele likamqaphi (Uma lidingeka)	**Usuku**	**Uphawu lokusayina**

Appendix C: Visual Analogue Scale

Researcher/ Independent person Questionnaire

Date:

Name:

0: none
1-2: almost none/very slightly
3-4: mild
5-6: moderate
7-8: marked
9-10: severe /heavy

Consultation:

1st - Day 1	**2ND – Day 22**	**3rd – Day 42**

Irritation	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Flaking	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
% scalp #	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Greasiness	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Overall impression	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**

#***Percentage of the scalp involved***

Adapted from Teleman (2005)

Appendix D: Patient perception questionnaire

Date:

Name:

0: none
1-2: almost none/very slightly
3-4: mild
5-6: moderate
7-8: marked
9-10: severe /heavy

Consultation:

1st - Day 1	**2ND – Day 22**	**3rd – Day 42**

Irritation	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Flaking	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Itching	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Greasiness	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Overall impression	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**

Adapted from Teleman (2005)

Appendix E: Permission Application Letters

Appendix E(a): Permission Application Letter to use Homoeopathic Day Clinic (HDC) –HOD LETTER

P O Box 515,
Wartburg, 3233

Faculty of Health Clinic Director &
Homoeopathic Day Clinic Coordinator
P. O. BOX 1334
Durban
4000

Dear Dr Hall

Permission Application Letter to use the Homoeopathic Day Clinic (HDC)

Thank you for reading this letter. My name is Miss Minenhle Zondi (20604337). I am currently registered for M. Tech. Homoeopathy and I am requesting to conduct my research study at the Homoeopathic Day Clinic (HDC). The tittle of my study is: **The efficacy of a topical application comprising *Calendula officinalis Ø* and *Olea europaea* in the management of seborrheic dermatitis of the scalp (dandruff)**

Outline of the Procedures: Outline of the Procedures: The consultations where data relating to dermatitis of the scalp (dandruff) will be collected will take place at the Durban University of Technology (DUT), Homoeopathic Day Clinic (HDC). The sample size is 64 consenting participants. The total duration of the study is 6 weeks with only 3 consultations.

The Initial consultation will be about an hour long and thereafter the follow-up consultations will be 30 minutes long. Participants will be requested to complete the consent form before they may participate in this study. On consenting to participate they will be requested to complete the scales that will be explained to them. The completion of the scales may take 10 minutes. These scales will be completed before each consultation.

Yours sincerely.

_____

Miss Minenhle Zondi (20604337)-Researcher: 072 890 6470 (Minenhle. zondi@yahoo. com)

_____

Dr. J. Ngobese-Ngubane (Supervisor) – 031 373 2484 (jabulilen@dut. ac. za)

_____

Dr. Madhu Maharaj (Co-supervisor) Telephone no: 031 373 2481 (madhum@dut. ac. za)

Appendix E(b): Permission Application Letter to use Homoeopathic Day Clinic (HDC)-

Homoeopathic Clinic Director & Coordinator:

P O Box 515,
Wartburg, 3233

Faculty of Health Clinic Director &
Homoeopathic Day Clinic Coordinator
P. O. BOX 1334
Durban
4000

Dear Doctors

Permission Application Letter to use the Homoeopathic Day Clinic (HDC)

Thank you for reading this letter. My name is Miss Minenhle Zondi (20604337). I am currently registered for M. Tech. Homoeopathy and I am requesting to conduct my research study at the Homoeopathic Day Clinic (HDC). The tittle of my study is: **The efficacy of a topical application comprising *Calendula officinalis Ø* and *Olea europaea* in the management of seborrheic dermatitis of the scalp (dandruff)**

Outline of the Procedures: Outline of the Procedures: The consultations where data relating to dermatitis of the scalp (dandruff) will be collected will take place at the Durban University of Technology (DUT), Homoeopathic Day Clinic (HDC). The sample size is 64 consenting participants. The total duration of the study is 6 weeks with only 3 consultations.

The Initial consultation will be about an hour long and thereafter the follow-up consultations will be 30 minutes long. Participants will be requested to complete the consent form before they may participate in this study. On consenting to participate they will be requested to complete the scales that will be explained to them. The completion of the scales may take 10 minutes. These scales will be completed before each consultation.

Yours sincerely.

_____

Miss Minenhle Zondi (20604337)-Researcher: 072 890 6470 (Minenhle. zondi@yahoo. com)

_____

Dr. J. Ngobese-Ngubane (Supervisor) – 031 373 2484 (jabulilen@dut. ac. za)

_____

Dr. Madhu Maharaj (Co-supervisor) Telephone no: 031 373 2481 (madhum@dut. ac. za)

Appendix E(c): Permission Application Letter to use HDC

Director: Research and Postgraduate Support

P O Box 515
Wartburg, 3233

Faculty of Health Clinic Director &
Homoeopathic Day Clinic Coordinator
P. O. BOX 1334
Durban
4000

Dear Professor Moyo

Permission Application Letter to use the DUT facility, students and staff

Thank you for reading this letter. My name is Miss Minenhle Zondi (20604337). I am currently registered for M. Tech. Homoeopathy and I am requesting to conduct my research study at the Homoeopathic Day Clinic (HDC). The tittle of my study is: The efficacy of a topical application comprising *Calendula officinalis Ø* and *Olea europaea* in the management of seborrheic dermatitis of the scalp (dandruff)

Outline of the Procedures: Outline of the Procedures: The consultations where data relating to dermatitis of the scalp (dandruff) will be collected will take place at the Durban University of Technology (DUT), Homoeopathic Day Clinic (HDC). The sample size is 64 consenting participants. The total duration of the study is 6 weeks with only 3 consultations.

The Initial consultation will be about an hour long and thereafter the follow-up consultations will be 30 minutes long. Participants will be requested to complete the consent form before they may participate in this study. On consenting to participate they will be requested to complete the scales that will be explained to them. The completion of the scales may take 10 minutes. These scales will be completed before each consultation.

Yours sincerely.

_____

Miss Minenhle Zondi (20604337)-Researcher: (Minenhle. zondi@yahoo. com)

_____

Dr. J. Ngobese-Ngubane (Supervisor) – 031 373 2484 (jabulilen@dut. ac. za)

_____

Dr. Madhu Maharaj (Co-supervisor) Telephone no: 031 373 2481 (madhum@dut. ac. za)

Appendix F: Ethics approval

Institutional Research Ethics Committee
Research and Postgraduate Support Directorate
2nd Floor, Berwyn Court
Gate 1, Steve Biko Campus
Durban University of Technology

P O Box 1334, Durban, South Africa, 4001

Tel: 031 373 2375
Email: lavishad@dut.ac.za
http://www.dut.ac.za/research/institutional_research_ethics

www.dut.ac.za

9 May 2017

IREC Reference Number: **REC 134/15**

Ms S M Zondi
P O Box 515
Wartburg
3233

Dear Ms Zondi

The efficacy of a topical application comprising *Calendula officinalis* Ø and *Olea europaea* in the management of seborrheic dermatitis of the scalp (dandruff)

The Institutional Research Ethics Committee acknowledges receipt of the **late submission** of your gatekeeper permission letters. Provisional approval was granted to you on 24 February 2016. Please be advised that you were required to submit the necessary gatekeeper permissions to the IREC before commencing with data collection, failure to do so could result in penalty.

Please note that FULL APPROVAL is granted to your research proposal.

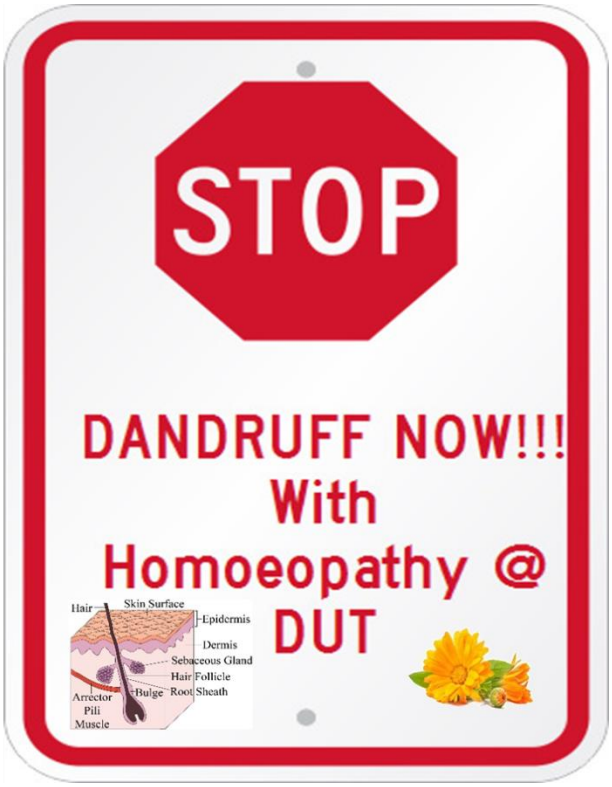
Yours Sincerely,

[redacted]

Professor J K Adam
Chairperson: IREC

DUT DURBAN UNIVERSITY OF TECHNOLOGY
2017 -05- 09
INSITUTUTIONAL RESEARCH ETHICS COMMITTEE
P O BOX 1334 DURBAN 4000 SOUTH AFRICA

Appendix G: Advert



Are you experiencing noticeable flaking of the scalp, irritation, itchiness and greasiness of the scalp?

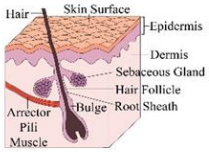
If you are between the ages of 18 & 50 years you could qualify for a free non-invasive management of dandruff. This study is gender_inclusive (both males & females are welcome)

The research study is conducted at the Durban University of Technology: Homoeopathic Day Clinic.

For more information please contact:
Miss Minenhle Zondi (0728906470)
Or
Clinic reception: 031 373 2041

MISA

INKWETHU MANJE NGEHOMOEOPATHY



eDUT

Ingabe unakho ukoma kwesikhumba sekhanda, kuyenzeka ulunywe ekhanda noma libe nokusamafutha?

Uma uneminyaka elinganiselwa phakathi kweminyaka engu 18-50 ungowesifazane noma wesilisa ungakwazi ukuthola usizo mahhala.

Lolu cwaningo lwenziwa e-Durban University of Technology. Uma udinga ulwazi oluthile mayelana nalesi sikhangiso ungasebenzisa le mininingwane:

UNkosazana Minenhle Zondi (0728906470)

noma

031 373 2041 (umtholampilo wezehomoeopathy)

Appendix H: Application Letter to use Notice Boards to paste advert for research

P O Box 515,

Wartburg, 3233

To whom it may concern.

Permission Letter to use Notice Boards for pasting research advert

Thank you for reading this letter. My name is Ms Minenhle Zondi (20604337). I am currently registered for M. Tech. Homoeopathy and I am requesting permission to paste my research advert to recruit participants for my research.

The tittle of my study is: The efficacy of a topical application comprising *Calendula officinalis Ø* and *Olea europaea* in the management of seborrheic dermatitis of the scalp (dandruff).

Outline of the details of research advert: The advert outlines the symptoms of dandruff, location of the study, name of the researcher, contact details of the researcher and location of the study and that participation is free.

For further information regarding this study please contact the researcher or supervisors of the study.

Thanking you in advanced for your assistance in the above request.

Yours sincerely.

_____

Ms. Minenhle Zondi (20604337)-Researcher

072 890 6470

_____

Dr. J. Ngobese-Ngubane (Supervisor) – 031 373 2484 (jabulilen@dut. ac. za)

_____

Dr. Madhu Maharaj (Co-supervisor) Telephone no: 031 373 2481 (madhum@dut. ac. za)

Appendix I: Preparation of *Calendula officinalis Ø* and *Olea europaea oil*

Aim:

- To combine 20 ml of Calendula *officinalis Ø* and 80 ml of *Olea* europaea oil into 32 x 125 ml empty spray bottles.

Apparatus:

- *Calendula officinalis Ø*
- *Olea* europaea oil
- 32 x 125 ml empty spray bottles
- Funnel
- 100 ml measuring cylinder
- 20 ml measuring cylinder
- Aqua distilled water and paper towel
- 96% S. V. R.

Procedure:

(a) Condition the room.
(b) Ensure that all equipment is clean.
(c) Place the funnel on top of each empty spray bottle
(d) Add 80 ml of *Olea europaea* oil into each 32 empty spray bottle using 100 ml measuring cylinder
(e) Then add 20 ml of Calendula *officinalis Ø* into (d) using 20ml measuring cylinder
(f) Cap the bottle
(g) Gentle shake the bottle for 10 seconds and store medication away from light

Appendix J: Preparation of *Olea* europaea oil

Aim:

- To add *Olea europaea* oil into 32x125ml empty spray bottles.

Apparatus:

- *Olea* europaea oil
- 32x120ml empty spray bottles
- funnel
- 100ml measuring cylinder
- Aqua distilled water and paper towel
- 96% S. V. R

Procedure:

(a) Condition the room.
(b) Ensure that all equipment is clean.
(c) Put the funnel on top of each empty spray bottle
(d) Add 100 ml of *Olea europaea* oil into each 32 empty spray bottle using 100ml measuring cylinder
(e) Cap the bottle
(f) Gently shake the bottle for 10 seconds and store away from light

Appendix K: Case History Form

Date: _____/_____2016_____

Title:

Surname…….. First Name……. ……..

Address (area where patient lives)…….. …….

Contact Details……. ……..

Age……. …….. Gender…….

Marital status S/M/W/D (Please circle one)

Occupation (if unemployed, previous)……. ……..

Children: Yes / No

(if yes –include gender & ages)1……2……3…….

4……5……6……. 7……8…….

Note:

- For any symptom: description now, **location, sensation, aetiology, modalities, concomitants, history, treatment/ management** so far.
- If no symptoms for any section of the case, write **NAD (No Appreciable Disease)** in the space provided.

---

1. **MAIN COMPLAINT/S**:

2. **PAST MEDICAL HISTORY:** Childhood illnesses, vaccinations, hospitalization, surgery. Accidents. Any other chronic illnesses still currently active e. g. hypertension, diabetes, asthma.

Allergies:_____ If the patient does not understand the question, **do not pursue** it because you will not get useful information.

Smoking History: TYPE/BRAND_____

a) Number of cigarettes per day_____÷ 20 = A
b) Number of years _____= B
c) Number of pack years_____ = A x B

A pack year is a measure of exposure/ risk. Equivalent to smoking a 20-cigarette pack a day for one year. Work this out after taking the case if need be.

Alcohol History: TYPE OF DRINK_____

a) Everyday? YES/ NO
b) Average number of drinks: cans/bottles/cartons beer_____
: bottle wine_____
: bottles spirits_____

---

3. CURRENT MEDICINES: Pharmaceutical or other, including **contraceptive pill/injection**, **HRT, sleeping tablets.**

Name:	For:

Current Supplements: (Vitamins, special drinks etc)

Name:	For:

4. **FAMILY MEDICAL HISTORY**:

MOTHER	FATHER
MOTHER'S MOTHER	FATHER'S MOTHER

MOTHER'S FATHER	FATHER'S FATHER
SIBLINGS	

5. **GASTROINTESTINAL**: Indigestion, heartburn, cramps, flatulence, appetite, cravings and aversions. Aggravations. Thirst.

TYPE OF DRINK: QUANTITY PER DAY:
How many teaspoons of sugar in tea/ coffee? How many cups a day?

6. **BOWEL FUNCTION**: Constipation, diarrhea, haemorrhoids (**detail is necessary only if problem is present**).

7. **URINATION**: Frequency, urgency, pain. (**detail is necessary only if UTI is present**). **Males over 40 years of age: strength of stream, stop-start, pain on ejaculation = Prostate.**

8. **MENSTRUATION**: Duration of overall cycle and regularity, duration of menses, volume, colour, consistency, pain, concomitants (e. g. headaches, constipation, diarrhea etc). **Menarche**. **Pre-menstrual symptoms**. Date of start of last menstrual period. **Pregnancies** – how many [reason for termination], complications, including post-natal depression. **Peri-menopause**: all of the above, as well as symptoms of hot flushes, dry skin, dyspareunia, mood swings. **Menopause**: age of onset. Brief history of menstruation i. e. any problems with menstruation?

9. **GENITALS**: Eruptions, discharge, infections. Females: history of thrush.

10. **SEXUALLY ACTIVITY**: Any problems? Desire/libido? History of **STD's. HIV STATUS**? **Cd4 Count** if positive. When? **How many partners**? **Emotions regarding a positive status? Education regarding safe sex.**

11. **CHEST**: Problems with breast, breathing, cardiac.

12. **HEAD**: Ears, eyes, nose, throat/ voice. Headache: **painkillers**? Name, how many, how often? **Issue of medication overuse headache** (= **rebound headache** due to **addiction/dependency**. **Combination ingredient medicines worse than single ingredient medicines**. **Medication overuse** is defined in terms of **treatment days per month**, such that **treatment occurs at least three months**. The headache is present **on more than 15 days per month**.

13. **SLEEP:** Pattern, quality, position. Dreams (only worth pursuing if outstanding/ recurrent dreams)

14. **SKIN**: Current and history, rashes, warts, boils, pimples, easy bruising, rate of healing.

15. **MUSCULOSKELETAL**: Location, modalities, concomitants (e. g. weather changes).

16. **GENERAL**: Energy, weather preferences.

17. **MENTAL**: Ask things that have not already come up in the consultation. **Do not go over that material again unless it seems appropriate to do so**. If you had to **describe yourself**, what **type of person** would you say you are? / What are you **characteristics**? / What is your **personality**? Anxiety / worries, anger, sadness/ depression. **Relationships**. **What makes you happy**?

Appendix L: Physical Examination Form/ SOAPE Note-Case Summary

PATIENT DETAILS

DATE: / / 2016	**Patient's name & surname:**

S **MAIN COMPLAINT(S)**

1.	**3.**
2.	**4.**

O **ON EXAMINATION**

BP: / mmHg	**OBSERVATION (Unusual)**
PULSE: bpm	
RESP: bpm	
Temp:	
WEIGHT: kg	
URINE DIPSTICK:	**PREGNANCY:**

GENERAL EXAMINATION

Jaundice
Anaemia
Cyanosis
Clubbing
Oedema
Dehydration
Lymphadenopathy

SYSTEM REVIEW

Respiratory Examination
Cardiovascular Examination
Abdominal Examination
Musculoskeletal Examination

A **DIAGNOSIS (MEDICAL)**

ICD-10 CODE:	**Written Diagnosis:**

CENTRE OF THE CASE

1.	**3.**
2.	**4.**

CASE ANALYSIS

MENTALS	GENERALS	PARTICULARS

RUBRICS [3]

P **REMEDY DIFFERENTIALS**

1.	**4.**
2.	**5.**
3.	**6.**

PRESCRIPTION

1.	**2.**	**3.**	**4.**
Rx:	**Rx:**	**Rx:**	**Rx:**
Mitte:	**Mitte:**	**Mitte:**	**Mitte:**
Sig:	**Sig:**	**Sig:**	**Sig:**

E **PATIENT EDUCATION/ADVICE**

1.
2.
3.

SIGNATURES

Clinician's Name:	Student's Name: **Minenhle Zondi**	Dispenser's name:
Clinician's Signature:	Student's Signature	Dispenser's Signature:
Date:	Date:	Date:

Appendix M: Posology and Dosage – How to apply treatment

1. For topical application participants will be required to apply the treatment on the scalp twice a week for a minimum period of 6 weeks.
2. Using a pin-tail comb or any fine-toothed comb will do (or even your fingers to part your hair as you apply the treatment to the scalp.
3. Shake the treatment bottle well before applying.
4. Before using the hair spray, make sure that the spray nozzle is not gummed up. Otherwise, the hair spray will not leave the bottle as a fine mist but rather in sticky spurts
5. Hold the spray nozzle at least 10cm away from your hair root and keep the spray can in constant motion as you are spraying.
6. From a shorter distance apply a little hair spray underneath the strands
7. The total squirts for the entire scalp should be not more than 20 squirts.
8. Massage the treatment well into the scalp using circular motion until it is fully absorbed by the scalp.
9. Apply the treatment only at night before going to bed twice a week every third day.
10. Wrap the provided head cap on your head to avoid staining the linen.
11. Wash your hair as normal the following morning to wash off the treatment oil. When washing your hair, the following morning do not rub the scalp too hard with your nails, this could cause dandruff. Completely rinse your hair until water runs out with no bubbles. This is very important for getting clean hair as not rinsing it out enough may leave a greasy film. If you are towel drying do not rub the hair with the towel as it is damaging to the hair; instead lightly squeeze and pat your hair.
12. You are advised not to apply any other anti-dandruff cream/ lotion/ointment/ shampoo or conditioner on your hair as this could affect the validity of the results.
13. Please note no other treatment for dandruff is to be used during the research study period.
14. Store the treatment away from heat, light and electromagnetic radiation (e. g. T. V., computers and cellphones)
15. Always apply the treatment as instructed/ directed on the bottle.

IMIGOMO YOKUFAKA NOKUSEBENZISA UMUTHI WENKWETHU

1.Bonke abayingxenye yalolu cwaningo bayacelwa ukuba bagcobe umuthi esikhumbeni sezinwele kabili ngeviki emasontweni ayisithupha

2.Uyacelwa ukuba usebenzise ikama olucijile noma iminwe yakho ukuvula olayini ezinweleni ukuze ukwazi ukugcoba kahle umuthi esikhumbeni

3.Uyacelwa ukuba uxukuze ibhodlela lomuthi ngaphambi kokuba uwugcobe

4.Uyacelwa ukuba uqiniseke ukuthi umlomo wembobo wesifutho uvulekile ngaphambi kokuba ufuthe, ukugwema ukuthi umuthi ungaphumi uyinhlaka eyomile uma usuwufutha

5.Uyacelwa ukuba ubambe isifutho buqamama esilinganiselweni amasentimitha alishumi. Qiniseka ukuthi isifutho siqondene nendawo oyigcobayo/oyifuthayo

6.Uyacelwa ukuba ufuthele maduzane kulezi zinwele encane

7.Uyacelwa ukuba ungafuthi kudlulele emashumini amabili ikhanda selilonke

8.Uyacelwa ukuba uhlikihle isikhumba sezinwele lonke ikhanda ngokuzingeleza ukuze umuthi umunceke wonke esikhumbeni

9.Uyacelwa ukuba ugcobe umuthi njalo ngaphambi kokuba ulale kabili ngeviki, njalo ngosuku lwesithathu

10.Uyacelwa ukuba ugoqe izinwele ngesigqoko sokugeza emva kokugcoba umuthi ukuze ungangcolisi izingubo zokulala

11.Uyacelwa ukuba uwashe izinwele zakho ngokujwayelekile ngosuku olulandelayo ekuseni ukususa umuthi. Uma usuwasha izinwele qiniseka ukuthi awusihlikihli isikhumba sezinwele ngezinzipho kakhulu ngoba lokhu kungadala inkwethu. Washisisa ikhanda lakho kuze kufinyelele lapho amagwebu engasaphumi khona. Kubalulekile ukuthi uyakazisise izinwele zakho ngaphandle kwalokho zizosala namafutha. Uma usuwomisa izinwele ngethawula, qaphelisisa ukuthi awuzihlikihli ngalo esikhundleni salokho goqa izinwele zakho ngethawula uliqinise bese uyazimbambatha.

12.Uyacelwa ukuba ungagcobi noma ungasebenzisi ezinye izigcobo zasekhanda njengokhilimu ngoba lokho kungathikabeza imiphumela yocwaningo

13. Qiniseka ukuthi ayikho eminye imithi yenkwethu oyisebenzisayo ngalesi sikhathi socwaningo

14. Gcina umuthi wakho kude nokukhanya, nendawo eshisayo /efudumele kanye nesezintweni ezisebenza ngogesi

15. Qiniseka ukuthi umuthi uwusebenzisa ngendlela oyalelwe ngayo ebhodleleni.

Appendix N: Follow-up consultation form

DATE: / /2016

MAIN COMPLAINT(S):

NEW SYMPTOMS THAT HAVE APPEARED SINCE THE REMEDY

Is this an old symptom that has reappeared or is it a new symptom altogether?

If it is an old symptom, when did it start, is it as bad as before, or not, and is it affecting the patient adversely?

If it is a new symptom, when did it start, how did it start, and was there any reason?

ENERGY:
Any change, and if there is how, when and how much?

SLEEP:
Quality:_____
Quantity:_____
Dreams:_____
Other:_____

APPETITE:
Change: _____
New cravings or aversions:_____
Thirst: _____

OTHER CHANGES:
Has anything else changed since the remedy?

MENTALS:

How have you been feeling emotionally since the remedy?