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THE USE OF PILOCARPUS JABORANDI IN THE TREATMENT
OF EMOTIONAL PALMAR HYPERHIDROSIS

A dissertation submitted in partial compliance
with the requirements for the Master's Diploma
in Technology in the Department of Homoeopathy,
Technikon Natal.

by

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November 1994

I, Varuna Singh, do hereby declare that this
dissertation represents my own work, both in
conception and execution.

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ACKNOWLEDGEMENTS

I wish to thank the following people:

Dr. A. Gerber - Supervisor

Ansumili Singh - Computer expertise

Brigitte Spitze - Advice and assistance

Mr Kevin Reich - Statistician

Tiaan van Schalkwyk - Dispensing of medication

Students of the Tongaat Secondary School and the
Seatides Secondary School for their
participation in the research

ABSTRACT

The efficacy of Pilocarpus Jaborandi in the management of emotional palmar hyperhidrosis was studied. It was hypothesised that this homoeopathic drug would cause a significant decrease in sweat production rates.

The study was double blinded and consisted of thirty patients, with fifteen patients in the treated group and fifteen patients in the placebo group.

Patients were chosen by convenience sampling with no specifications of age or sex.

The treated group received Pilocarpus Jaborandi 9 CH, and were instructed to take five pills on waking everyday for ninety days. The other group received a placebo also for ninety days.

Quantification of sweat production was done on the first day, on the forty-fifth day and on the ninetieth day of treatment, by means of sweat collection tests. In each test sweat was

collected after ten minutes of relaxation and after ten minutes of mental arithmetic to induce sweating. Sweat was measured in milligrams.

Data was analyzed using paired and unpaired t tests. The unpaired t test was used to assess the statistical difference between the treated and placebo groups. The paired t test was used to determine whether there was a statistically significant decrease in sweat production rate, from the point of starting the treatment to the ninetieth day of treatment, with an analysis also on the forty - fifth day of treatment.

In the unpaired t test no statistical difference was noted between the treated and placebo groups in all three sweat collection tests (Test 1 $P = 0.406$; Test 2 $P = 0.943$; test 3 $P = 0.659$).

Analysis of the data obtained from the paired t test for the placebo group shows no statistically significant change in sweat production rates between test 2 - test 1 ($P = 0.104$) and test 3 - test 2 ($P = 0.161$).

In the treated group, no statistically significant change occurred in the sweat production rates between all three tests:

test 2 - test 1 ($P = 0.868$), test 3 - test 2 ($P = 0.329$) and test 3 - test 1 ($P = 0.176$).

Based on the results of the paired and unpaired t tests, it was concluded that no statistically significant reduction in sweat production occurred, and consequently that Pilocarpus Jaborandi is not effective in the management of emotional palmar hyperhidrosis.

UITTREKSEL

Die doeltreffendheid van Pilocarpus Jaborandi in die behandeling van emosionele hipersekresie van sweet in die handpalms is ondersoek. Die hipotese is gestel dat hierdie homoeopatiese middel 'n merkbare vermindering in sweet produksie tot gevolg sal hê.

Die studie het uit dertig pasiënte bestaan, met vyftien pasiënte in die behandelde groep en vyftien pasiënte in die placebo groep.

Pasiënte is geselekteer deur hulle te onderwerp aan toetsing met geen aanduidings van ouderdom of geslag nie.

Die behandelde groep het Pilocarpus Jaborandi 9 CH ontvang, en hulle is gevra om elke dag vyf pille te neem wanneer hulle opstaan, vir neëntig dae lank. Die ander groep het 'n placebo ook vir neëntig dae ontvang.

Kwantifiseering van sweet produksie is op die eerste dag, die vyfenveertigste en op die negentigste dag van behandeling uitgevoer deur

middel van sweet versamelings toetse. In elke toets, is sweet versamel na tien minute van ontspanning en na tien minute van hoofrekeningkunde om sweet te induseer. Sweet is in milligram gemeet.

Die data is verwerk deur gepaarde en ongepaarde t toetse te gebruik. Die ongepaarde t toets is gebruik om 'n statisties betekenisvolle verskil tussen die placebo en behandelde groep aan te dui. Die gepaarde t toets is gebruik om aan te toon of daar 'n statisties betekenisvolle afname in sweetproduksie tempo was tydens die aanvang van behandeling en die negentigste dag van behandelig. Dit is ook gebruik vir 'n analise op die vyf en veertigste dag van behandeling.

Geen statistiese verskil is aangedui tussen die behandelde en placebo groepe in al drie toetse (Toets 1 $P = 0.406$; Toets 2 $P = 0.943$; Toets 3 $P = 0.659$).

Die ontleding van die data verkry van die gepaarde t toets van die placebo groep toon geen statisties werkbare verskil in sweet produksie

tempo tussen toets twee en toets een ($P = 0.104$) en toets drie en toets twee ($P = 0.161$) nie.

In die behandelde groep het geen statistiese werkbare verskil in sweet produksie tempo tussen al drie toetse plaas gevind nie: toets twee - toets een ($P = 0.868$), toets drie - toets twee ($P = 0.329$) en toets drie - toets een ($P = 0.176$).

Die resultate van die gepaarde en ongepaarde t toets dui op geen statisties betekenisvolle afname in sweetproduksie nie. Pilocarpus Jaborandi is dus nie effektief in die behandeling van emosionele hipersekresie van sweet in die handpalms nie.

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LIST OF ABBREVIATIONS

Pt - Patient

mg - milligrams

INTRODUCTION

Hyperhidrosis can be defined as an increase above normal in sweat production. Hyperhidrosis occurs when sweating is clinically noticeable under conditions where it would not normally be expected or is excessive in response to heat or emotional stimulation. (Fitzpatrick 1983: 696-699.) Hyperhidrosis can also be described as sweating that is in excess of that needed to cool the body (Quraishy and Giddings 1993). In most cases the diagnosis of hyperhidrosis is a subjective impression. This disorder occurs in either sex and commonly begins in childhood or around puberty. Frequently there is a family history and it is transmitted as an autosomal dominant trait (Moschella et al. 1985: 1167.) In a study cited by Cloward (1969) there seemed to be a racial as well as ethnic basis for the condition. Twenty-three percent of the participants of the research reported one or more family member suffering from the condition (Cloward 1969).

This condition of hyperhidrosis might seem relatively trivial when compared to more life threatening conditions, but upon consideration of the inconvenience caused by this condition to almost 0,6 - 1 percent of the population, then the severity is increased (Adar et al. 1977). In addition to the discomfort caused by the condition itself very little re-assurance can be obtained with regards to successful management of this condition.

Excessive sweating of the palms causes severe psychological, social and occupational disability. Some of the relatively trivial disabilities of this condition include staining of clothing and the inability of writing on paper without smearing of ink.

With a great deal of psychological stress comes the tremendous embarrassment of exchanging a cold handshake. This often drives the sufferers towards becoming socially withdrawn. It was reported in a study cited by Cloward (1969) that twenty-nine percent of the thirty-seven females

between twenty and thirty years of age, that participated in the study, were unmarried. Patients that have participated in studies that have been done have related incidences, of remaining in the background at social events throughout their adolescence and early adult lives so as to avoid the embarrassment.

Occupational disabilities that result from this condition are equally crippling. Some sufferers are unable to continue working in the field of electronics because of repeated electrical shocks. Other sufferers are unable to continue working as truck drivers because of the inability to hold the wheel.

Student and professional productivity is significantly impeded by the inability to write without smearing ink, which is exacerbated by the stress of examinations. A bank manager in the study group found that an additional stressor to his job was that of introducing himself to his clients by exchanging a cold handshake. As has been shown, as simple as the condition might seem to non-sufferers, it has

some dire consequences for those suffering from the condition.

It has been said by Munro et al. (1974: 325), "The number of different methods used is a measure of their relative ineffectiveness." This statement serves to emphasise that none of the existing modalities of cure or amelioration are really successful.

Most of the conservative forms of treatments include topical applications which although with minimal side-effects, are not very effective.

Atropine like drugs are used medically but produce many side-effects which in some cases are worse than the condition itself (Adar et al. 1977). The treatment of choice, on failure of more conservative techniques, is dorsal sympathectomy. After having done an over-view of a large number of studies carried out, it has been shown that a relatively higher success rate occurs with dorsal sympathectomy than any of the other treatments but in almost every patient

treated this way there is an associated disastrous side-effect as a result of the operation.

As a result of the relative ineffectiveness of current modalities in the treatment of emotional palmar hyperhidrosis, an attempt at amelioration of this condition by homoeopathic intervention, would contribute to the existing pool of knowledge on the management of this condition.

CHAPTER ONE - THE PROBLEM AND ITS SETTING

1.1 PROBLEM STATEMENT

The purpose of this investigation is to evaluate the efficacy of the Homoeopathic Drug, Pilocarpus Jaborandi, in the management of localized palmar hyperhidrosis in terms of the patient's perception of the treatment and sweat production rates in order to describe the therapeutic properties of Pilocarpus Jaborandi and to propose a mechanism of action of this Homoeopathic Drug.

1.2 SUB-PROBLEMS

1.2.1 The first sub-problem is to evaluate the efficacy of the homoeopathic drug Pilocarpus Jaborandi in the management of localized palmar hyperhidrosis, in terms of the patient's perception of the treatment, in order to describe patient's experience of the homoeopathic treatment.

1.2.2 The second sub-problem is to evaluate the efficacy of the homoeopathic drug Pilocarpus Jaborandi in the management of localized palmar

hyperhidrosis in terms of sweat production rates in order to quantify the palmar sweat production rates.

1.2.3 The third sub-problem is to integrate the patient's experience of the homoeopathic treatment with the sweat collection rates so as to describe the therapeutic properties of *Pilocarpus Jaborandi* and to propose a mechanism of action of this homoeopathic drug.

1.3 HYPOTHESES

1.3.1 It is hypothesized that the patient will report a considerable decrease in the sweatiness of the palms and as a consequence, a degree of relief from this malady.

1.3.2 It is hypothesized that there will be a significant reduction in the sweat production rates of patients with treatment.

1.3.3 It is hypothesized that after observing the physical therapeutic effects of *Pilocarpus Jaborandi* as experienced by the patient, it will

be possible to propose a mechanism of action of this homoeopathic drug.

1.4 DELIMITATIONS

1.4.1 The study will only include emotional hyperhidrosis localized to the palmar surface of the hands and will not include emotional hyperhidrosis localized to any other part of the body.

1.4.2 This study will not investigate localized hyperhidrosis of the palms secondary to any other pathology.

1.4.3 This study will not investigate gustatory hyperhidrosis, generalized hyperhidrosis or palmar hyperhidrosis of any aetiology other than emotional factors.

1.4.4 Subjects will not be included in the study if they are incapable of solving simple arithmetic problems.

1.5 ASSUMPTIONS

1.5.1 It is assumed that the subject describes the circumstances inducing the hyperhidrosis accurately so that the type of hyperhidrosis can be classified as being either emotional, generalized or gustatory.

1.5.2 It is assumed that the patient is not utilizing any other substance that is either the cause of the hyperhidrosis or any other substance which diminishes the sweat production, thus giving an incorrect perception of the condition.

1.5.3 Patients will comply with the instructions pertaining to the taking of homoeopathic medicines used in the research and also to instructions concerning the storage of the medication so as to ensure the maximum effectiveness of the medication.

1.6 DEFINITIONS OF TERMS

HOMOEOPATHIC DRUG:

Weak and infinitesimal doses of a substance which in greater concentration produces certain symptoms in a healthy person but which will cure those same symptoms when given to a sick person.

LOCALIZED PALMER HYPERHIDROSIS:

Hyperhidrosis occurs when sweating is clinically noticeable under conditions where it would not normally be expected and is restricted to the palms of the hand.

THERAPEUTIC PROPERTIES:

The properties of a substance which contribute to the cure of disease.

MECHANISM OF ACTION:

It is the manner in which the drug interacts with the body so as to produce its effect.

EFFICACY:

The ability to act effectively.

SWEAT PRODUCTION RATES:

The amount of sweat released onto the surface of the skin within a specified period of time.

EMOTIONAL HYPERHIDROSIS

Sweating which is excessive in response to emotional stimulation and is most abundant on the palms of the hands, soles of the feet and sometimes the axilla.

GENERALIZED HYPERHIDROSIS:

Hyperhidrosis which is not restricted to any part of the body but which occurs throughout the entire body.

GUSTATORY HYPERHIDROSIS:

Physiological response of the body which causes excessive sweating on the lips, forehead and nose after eating hot spicy foods.

PLACEBO

An inert preparation usually of sugar or milk given to a patient while watching a case for the development of symptoms or while permitting a previously administered drug to act undisturbed.

CHAPTER TWO - REVIEW OF RELATED LITERATURE

2.1. INTRODUCTION TO HYPERHIDROSIS

Hyperhidrosis can be defined as an increase above normal in sweat production. It occurs when sweating is clinically noticeable under conditions where it would not normally be expected or is excessive in response to heat or emotional stimuli. (Fitzpatrick 1983: 1167.) In most cases the diagnosis of hyperhidrosis is a subjective impression made on the basis of family history and the physical examination of the patient. This examination is done in the presence of severe sweating localized to the palms of the hands in the absence of any underlying pathology (Damankos 1971: 964 - 967). Shen et al. (1990) indicates a system of grading the severity of sweating based on quantitative tests using the starch-iodine paper method.

The majority of cases of hyperhidrosis fall into the group termed idiopathic hyperhidrosis and can be classified into two categories according to the stimuli provoking them:

A. THERMAL HYPERHIDROSIS

B. EMOTIONAL HYPERHIDROSIS

This study will involve emotional hyperhidrosis. This disorder is particularly common in the second and third decade, which was the motivation for me selecting in the majority of the subjects teenagers and adolescents. The sweating is often episodic. It is worse in the summer months and in warm environments because it has been suggested that the threshold to emotional sweating is affected by the thermoregulatory centre in the brain. (Scott 1973: 1246.)

The features of emotional sweating differs considerably from those of thermal sweating. Emotional sweating has no latent period for its onset. It immediately attains a certain rate of secretion which corresponds to the intensity of the stimulation, remains as long as the stimulation lasts and subsides after the stimulation ends. This is probably so because the centres for this sweating are contrary to the centres for thermal sweating.

(Kuno 1956: 54.)

Epidemiology

An epidemiological study of young Israeli people, indicates an incidence of 0,6 - 1 % of hyperhidrosis of all severities and locations (Adar 1977). It has been suggested by Adar (1977) that 25 % of these, have severe palmar hyperhidrosis. Adar (1977) found that a specific ethnic predisposition existed, with a higher than average prevalence in Jews originating in North Africa, Yemen and the Balkan and, a lower than prevalence in Jews originating from Persia and Iraq.

Observations made by Kuno (1956) on Japanese students show that one in three hundred students suffered from hyperhidrosis of the palms and feet (Kuno 1956: 56). Cloward (1969) also reported that palmar hyperhidrosis is a "racial disease" afflicting those of Japanese ancestry 20 times more frequently than those of other oriental or caucasian races.

2.2. ANATOMY AND PHYSIOLOGY OF SWEAT GLANDS

The existence of numberless pores in the skin was first noticed by Malpighi as early as 1687, but it was only in 1833 that sweat glands were discovered by Purkinjie (Kuno 1956: 113).

Sweat glands are of two main types ie. eccrine and apocrine. Apocrine glands develop in association with hair follicles and play no part in thermoregulation.

Eccrine glands are situated deep in the dermis and secrete a dilute solution containing varying amounts of urea, lactic acid and sodium chloride. Eccrine glands are found throughout the body but are dense on the palms of the hands and the soles of the feet. (Greenhalgh et al. 1971.)

Sweat glands of the palms and soles respond mostly to emotion, but those of the axilla respond to both heat and emotion.

According to Kuno (1956:114) sweat glands are tubular and secrete a watery secretion. The secretions of the sweat glands are manufactured in the secretory cells called merocrine glands. In 1917, Schiefferdecker made the classification of merocrine glands into two sub-classes ie. apocrine and eccrine glands (cited in Kuno, 1956).

a. Innervation Of Sweat Glands

Langley in 1911 suggested that sweat glands were innervated by the sympathetic nervous system (cited by Kuno 1956: 114). Kuno (1956: 114), also concluded that the secretory cells of the sweat glands are provided with a receptor mechanism not only for the parasympathetic but also for sympathetic agents. Eccrine sweat glands are supplied by cholinergic fibres present in sympathetic nerves (Greenhalgh et al. 1971).

The spinal centres of the sympathetic nervous system to the upper limb lie chiefly in the fifth and sixth thoracic segments of the cord (Greenhalgh et al. 1971).

Kuno (1956:115) found that as many as seven spinal segments may contribute to the innervation of sweat glands of one finger. The pre-ganglionic fibres pass via white rami communicantes to the lateral sympathetic chain, then cranially to end in the first or second thoracic and inferior and middle cervical ganglia. The post ganglionic fibre arise here and join the nerves of the brachial plexus constituting sympathetic roots.

They reach the limb via the spinal nerves and are distributed to the arteries, skin, eccrine glands and skeletal muscle vessels (Greenhalgh et al. 1971).

b. Sweat Gland Activity Relative To Temperature

Randall (1946) suggested the idea of spontaneous cycles of sweat gland activity. At room temperature of between 20 - 27 degrees celsius, the sweat glands are not continuously emptying onto the surface but

tend to show periods of relatively great activity alternating with periods of little or no activity. These periodic phases of sweating show considerable variation in different individuals as well as in the same person at different times and at different temperatures (Randall 1946).

As the environmental temperature is elevated the interval between the periods of activity decrease and the basal number of active glands tends to rise (Randall 1946).

The periodicity of active and inactive phases has not proved to be uniform but is influenced by such factors as environmental temperature, strong peripheral stimulation and psychic or emotional excitement (Randall 1946).

2.3 ALLOPATHIC MANAGEMENT OF PALMAR HYPERHIDROSIS AND SOME ASSOCIATED COMPLICATIONS

A vast array of different techniques, each attempting to be the most successful have been suggested. The treatment of hyperhidrosis is divided into four categories according to the nature of these treatments.

GENERAL MANAGEMENT

It has been suggested that in many patients all that is necessary is simple re-assurance and an explanation of the nature of the disorder and that it is likely to improve spontaneously perhaps in a several years (Rook et al. 1992: 1888).

TOPICAL TREATMENT

Atropine like drugs applied to the area produces local relief without producing symptomatic side-effects but none of the drugs at present can be relied upon (Rook et al. 1992: 1888).

Poldine methosulphate 1-4% in alcohol suppresses sweating experimentally but is less valuable on the palms and soles of the feet and axillae (Rook et al. 1992:1887). Bettley and Grice (1966) also found a relative ineffectiveness of Poldine at these sites. The decreased effectiveness of Poldine at these sites is probably due to the increased activity of the sweat glands at this site or a decreased percutaneous absorption of Poldine from these surfaces (Bettley & Grice 1966). Other drugs act by impeding the delivery of sweat to the surface. Formalin 1% soaks have been used but are not useful for hands and axillae (Damankos 1971:965).

Glutaraldehyde 10% in a buffered solution of pH 7,5 on the feet, but this causes allergic

sensitization and stains the skin (Fitzpatrick 1983: 696).

In a study done by Goh (1990), the use of Aluminium Chloride Hexahydrate (ACH) proved to be useful in the treatment of palmar hyperhidrosis, as was reported by patients in the study and skin water-vapour loss (SVL) tests. SVL causes the occlusion of the sweat ducts by causing necrosis of the outer portion of the duct and contraction of the duct keratin. ACH has a very short duration of action which is about forty-eight hours. (Goh 1990) Side-effects of the use of ACH include skin irritation (Damankos 1971:965).

Electrical treatment for hyperhidrosis was used in the 1930's and recently a revival of this technique has occurred. This technique, named iontophoresis, is the process of penetration of drugs into the surface tissues by the application of an electric current (Sloan and Soltani 1986). It has been said, however, by Levit (1968) that "text - book" indications for the use of iontophoresis diminished from a

twelve in 1946 to none in 1968. This entails the placing of one electrode in the area to be treated and the other electrode in a bath of tap water together with induction of anticholinergic agents which provides freedom from sweating for 4-6 weeks after a few exposures (Simpson 1988). Although, Kuno (1956:212) found it beneficial to use 10% formalin solution, Levit (1968) says that the exact electrolyte content of the water does not matter and that tap-water works well. The mechanism of action for the production of anhidrosis iontophoresis, seems to be a creation of an "obstruction high in the sweat glands" (Dobson and Lobitz 1957). It has also been demonstrated that absorption of water by the stratum corneum would cause anidrosis so long as the horny tissue remained swollen (Papa and Kligman 1966). In a study undertaken by Shuster et al. (1965), it was shown that even during periods of prolonged sweating there is occlusion of the sweat duct as a result of the hydration and subsequent swelling of the keratin which causes and occlusion of the duct. This occlusive state is temporary and reversible. Minor systemic side-

effects are not uncommon ie. dry mouth and eyes (Rook et al. 1992: 1887 - 1889). Complete anhidrosis and bulla formation have also been noted (Levit 1968). Abell and Morgan (1974) also using direct current iontophoresis, but in addition using Glycopyrronium bromide, produced prolonged periods of relief from plantar and palmar hyperhidrosis with relatively few side-effects. It has been claimed after a study undertaken by Shrivastava and Singh (1977), that tap-water iontophoresis produces no side-effects.

It was also demonstrated that the duration of effective treatment is inversely proportional to the amount of current (Shrivastava and Singh 1977).

Percutaneous phenol injections and percutaneous radiofrequency ablation guided by computed tomography have provided safer alternatives to surgery (Quraishy and Giddings 1993).

MEDICAL

Most commonly used drugs are Atropine, but the side-effects are disastrous and are sometimes more troublesome than the hyperhidrosis itself. The side-effects are: excessive dryness of the mouth, failure of accommodation and the more serious side-effects are glaucoma, hyperthermia and convulsions. Atropine like drugs can be used to block the effect of Acetylcholine on the sweat glands (Keaveny et al. 1977).

In the cases of emotional hyperhidrosis tranquillizing or sedative drugs are often helpful but psychiatric treatment might be necessary (Rook et al. 1992: 1887).

SURGICAL MANAGEMENT

The most frequently used surgical approach is that of dorsal sympathectomy. This is concerned with the resection of the second, third and fourth thoracic ganglia. Recently coagulation instead of resection has been used with good results and an average increase in palmer temperature of 1,6 degrees has been achieved (Hashmonai et al. 1992). It has been shown that

dorsal sympathectomy is an effective treatment for palmar hyperhidrosis in more than 90 - 95 % of the cases reported in literature (Goulueke et al. 1988). But these statistics do not take into account the inconvenience of the side-effects as the result of this surgical procedure. Some of the most frequent complications include, Horner's Syndrome, pneumothorax, dyspnoea, pleural effusion, wound infection, and a host of other complications (Hashmonai et al. 1992).

2.4 HOMOEOPATHIC DRUG PILOCARPUS JABORANDI

Pilocarpus microphyllus is a liquid alkaloid obtained from the leaves (Jaborandi) of various species of *Pilocarpus*, a genus of trees and shrubs found in South and Central America and the West Indies. This alkaloid is a tertiary amine.

The Structure of *Pilocarpus Jaborandi* is as follows:

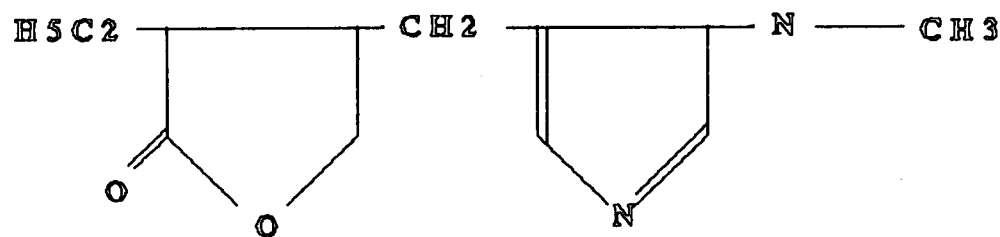


Figure 2.1 : The Structure of Pilocarpus Jaborandi

Homoeopathically Pilocarpus is said to act as a "powerful glandular stimulant" (Boericke 1990: 517). Within a few minutes after a dose of Jaborandi mother tincture, the face and ear become deeply flushed and drops of perspiration break out all over the body whilst at the same time the mouth waters and saliva pours out in an almost continuous stream.

Other secretions, lachrymal, nasal, bronchial, and intestinal secretions also increase but to a lesser extent (Boericke 1990: 517).

It is homoeopathically used for any abnormal sweats. It is also indicated in people who have chilliness with sweat (Boericke 1990 :517).

When looking at the pathogenetic cure of hyperhidrosis, Jaborandi has been indicated by some eg. Allen (1972) and Boericke (1990).

The natives of south and central America and the West Indies chewed the leaves to increase the flow of saliva (Crossland 1980: 204). This substance acts selectively on receptors at all

the sites in the body where acetylcholine is the neuro transmitter. Acetylcholine is the chemical transmitter of the nerve impulse at all the sites acting on a post-synaptic receptor (Laurence and Bennett 1987: 462).

Pilocarpine falls under the category of being a cholinergic drug, of which there are three types: Choline esters

Alkaloids

Cholinesterase inhibitors

Pilocarpine acts directly on the peripheral blood vessels to dilate them. Pilocarpine also produces a change in the blood pressure and the pulse rates (Meyers et al. 1980: 68).

Pilocarpus Jaborandi has a marked action on the sweat glands and other exocrine glands and smooth muscles. Its effect on the sweat gland is that of producing a marked increased in sweat production (Laurence and Bennett 1987: 462).

In an experiment by Albert and Palmes (1951), Pilocarpine was administered to patients in a study by means of iontophoresis to an area of the forehead of these patients. This resulted in beading of sweat in that area.

2.5 MECHANISM OF ACTION OF JABORANDI

It is a good starting point to understand the mechanism of action of homoeopathic drugs would be to define a few terms: like, Homoeopathy, and also to explain how homoeopathy works which is the basis of action of these drugs. Also to be able to treat a disease condition, it is imperative that we understand the impact of disease on the body.

From this point on it will be easier to understand the mechanism of action of these drugs.

One of the definitions of homoeopathy that was found to be most logical and understandable is as follows: " A practical rational approach to medical problems which follows the principles of cure as formulated by its founder Samuel Hahnemann, 200 years ago, whilst acknowledging and using the scientific and technological advances of recent decades." (Frazer 1992).

Homoeopathy is made up of two Greek words

"Homoe" meaning like

"Pathos" meaning suffering

The principle of Homoeopathy is to let likes be treated by likes. The purpose of the defence mechanism is to overcome any morbidic stimulus. Disease therefore in reality is the defence mechanisms attempt to overcome this morbidic stimulus (Frazer 1992).

It is said in the Organon (Tafel 1917: 68) that " ... diseases are produced only by the morbidly disturbed vital force."

Homoeopathic drugs restore health by virtue of their dynamic action on the vital force. But the question still remains and that is, by what means do they affect the vital force?

It is said that the healing power of drugs rests in their ability to produce symptoms similar to the disease when administered to a healthy individual but which will remove those symptoms in a diseased patient (Tafel 1917: 70).

The Arndt Schultz Law states ".... the force which perturbs is that which eventually restores" (Frazer 1992). This forms the basis of homoeopathy which is "Similia Similibus Curentur" - "Like cures Like" (Tafel 1917: 76).

When relating this to the topic of research - Pilocarpus which when given to a healthy individual will stimulate the sweat glands to increase the production of sweat, based on the principles of homoeopathy, it is hypothesized that treatment with Pilocarpus Jaborandi will produce a reduction in sweat production rates.

A certain remedy, when administered to a healthy individual produces certain symptoms, and according to the law of similars, will cure those same symptoms if administered to a sick person. Hahnemann found that the patient was so sensitive to the correct remedy that physiological doses upset them. He then made dilutions of these remedies and those attenuations he called "Potencies" (Shepherd 1972: 9).

Hahnemann found that these attenuations acted more powerfully than substances not prepared with such mathematical precision (Tafel 1917: 78). It has been said that by trituration and succussion the remedies are rendered more potent because of the breaking up or disintegration of thin atomic relationships that place them in a form where they can act directly upon the vital force of the individual. Disintegration is thought to release some radioactive power (Tafel 1917: 72).

Each drug contains a level of resonance which if matched correctly according to the symptoms, matches the resonance of the disturbed vital force (Frazer 1992).

There is often the question of the availability of active ingredients in these substances but the most delicate instrument for checking the availability of active ingredient in potency is man.

To this end, the effectiveness of Pilocarpine in potency will be the subjects participating in the research.

2.6 SWEAT PRODUCTION RATES

It has been said before that the eccrine sweat glands of the palms and the soles of the feet respond to emotional stimuli to the largest extent (Kuno 1956: 113). Despite this assumption, tests have been carried out by numerous experimenters who used various forms of thermal stimulation. Most commonly the patient was placed in a bath of temperature 44-48 degrees with their hands and feet out of the bath (Ponten 1960; McGregor 1952). Other experimenters used a heat cradle or a heat chamber where the temperature can be regulated (Munro et al. 1974). In most of these experiments it was found that thermal stimulation enhanced palmer and plantar sweating. In one test apart from those undertaken by Kuno (1956:52) , which will be explained later, thermal stimulation did not produce excessive sweating in the hyperhidrotic patients.

Kuno (1956:53) found it imperative to make a distinction between thermal and emotional sweating as concerns the palms and the soles of the feet. To this end Ikeuchi (1920) (cited by Kuno 1956:53) found a lack of response of the sweat glands of the palms to a rise in room temperature.

Minor (1927) (cited by Kuno 1956:53) and Jurgensen (1924) (cited by Kuno 1956:53) observed increased sweating in the palms when exposed to mental arithmetic, reading a book, pricking with a needle.

Kosaka (1929) (cited by Kuno 1956:53) investigated particularly the sweating due to mental arithmetic and discovered that it appeared restrictedly on the palms and soles of the feet and not on the general body.

Kuno (1956:55) did experiments using mental arithmetic to provoke mental sweating. The subject had to answer simple addition. The perspiration of both palms suddenly increased and remained at the same height during the test.

In numerous other experiments, sweating appeared regularly on both palms, soles of feet and axillae and at the same time was never restricted to a single one of them.

In one test however, Allen (1974) concluded that sweat responses to emotional stimuli is generalized and hands and feet behave no differently to emotional stimuli than any other part of the body. The skin temperature was also found to be decreased in this experiment. Kuno (1956:37), on the contrary, confirmed with experiments done on the forehead that mental arithmetic does not cause sweating in other parts of the body.

Besides mental arithmetic to induce sweating, other means were also used. A student had a discussion with his Professor on his progress (Munro et al. 1974) or being exposed to an oral examinations (McGregor 1952).

Kuno (1956:37) found that temperature also affected the effect of mental arithmetic and that at very high temperatures mental arithmetic

exerts a very pronounced inhibitory effect on sweating of the general body surface and palmar perspiration remains the same. Mental arithmetic besides producing an increase in palmar or plantar sweating also produces a change in blood flow in the hand (Allwood 1959). In experiments done by Allwood et al. (1959), visible sweating occurred in some hyperhidrotic subjects during the test; the average change in the hand blood flow in this group during the ten minutes was two hundred. Emotional sweating causes vasodilatation in the hyperhidrotic patient and which is probably as a result of sympathetic sudomotor fibres and the formation of bradykinin in the subcutaneous tissue (McGregor 1952).

Because of the overwhelming evidence in support of Mental Arithmetic as a tool towards emotional sweat induction, as cited above, it was decided that it would be the most suitable means of inducing sweat production for purposes of quantification. In support of mental arithmetic as an emotional stimulant is the fact that this emotional stimulus can be standardized for each member of the study group on every occasion of sweat induction. This method would therefore ensure uniformity in testing.

Various techniques have been used for the quantification and enumeration of sweat glands. The most commonly used techniques are as follows:

1. THE USE OF STARCH AND IODINE WITH MANY VARIATIONS

In some cases iodine is painted on the hand and blotted with starch paper. Or iodinated starch is sprayed on the palms. This allows for the direct visualization of those areas with excessive sweating (Randall 1946; Sarkany and Gaylarde 1968; Sato et al. 1988).

An alternative and perhaps a variation of the starch iodine test, although still maintaining the principles was presented by Papa (1963). In this technique a starch-castor oil suspension is painted over the skin. Paper towelling is smoothed over the site and then peeled off. The paper towelling is then exposed to fumes of iodine which then show up the active sweat glands. This method is very suitable for dark

skinned people as opposed to most of the other tests also using starch and iodine. It is can also be use over areas of serum exudation because it does not contain any alcohol. It also does not promote anidrosis (Papa 1963).

2. THE USE OF THE NINHYDRIN TEST

The hands are blotted on paper: the liquid content of the sweat dries but the amino acids remain on the paper. These amino acids undergo a change using ninhydrin (Ponten 1959).

3. THE USE OF MASS REDUCTION

The subject can be placed on a scale and mass reduction is recorded as he perspires and the perspiration evaporates (Allen et al. 1973).

4. THE USE OF INFRA RED ANALYSIS

An infra red analyzer was also used in one of the experiments to measure sweat collection rates (Albert and Palmes 1951).

5. THE USE OF COTTON-WOOL

In an experiment to mass the amount of axillary sweat produced, swabs of cotton-wool were placed in the armpit. The mass of the cotton-wool was taken before the experiment. The difference gives the amount of sweat produced (Munro et al. 1974). In order to mass the sweat produced from the arm and fore-arm strips of paper 5 cm x 5 cm were applied to the area being tested which were then weighed in order to determine the amount of sweat produced. The sweat produced was recorded in milligrams (Gibinski et al. 1973).

6. THE USE OF GALVANIC SKIN RESISTANCE

The resistance of the skin was measured in a non-sweating stage, and it was found that the resistance of the skin sharply drops when sweating commences (Bettley & Grice 1965).

An adaptation of the use of cottonwool to mass axillary perspiration was adopted for use in this experiment, where the subjects were required to wipe of the palmar sweat on a pre-massed piece of absorbent paper. The reason for the selection of this method in preference over the other methods is that this method does not involve the use of expensive equipment, it is practical and not time consuming.

CHAPTER THREE - MATERIALS AND METHODS

3.1 THE DATA

The data will be of two types:

PRIMARY DATA

SECONDARY DATA

the details of which will be given below.

3.1.1 PRIMARY DATA

Three types of primary data will be required:

1. A complete medical case history will be required for the purposes of making a diagnosis and categorizing the sweat production as emotional hyperhidrosis based on clinical evidence of the condition.

It is also necessary to exclude the secondary causes of hyperhidrosis as outlined in the delimitations.

2. Sweat collection tests were carried out to quantify the sweat by means of sweat collection rates, so as to make a comparison of the status of the condition before, during and after the treatment.

3. A questionnaire was given to the subjects so as to obtain the patients perception of the treatment.

3.1.2 THE SECONDARY DATA

The secondary data is that which was obtained from textbooks, journal articles and materia medicas. The data obtained from these sources and the topics discussed are outlined in the literature review.

3.2 THE CRITERIA GOVERNING THE ADMISSIBILITY OF THE DATA

The subjects were chosen for participation in the research based on physical evidence of the condition provided the necessary information.

The delimitations of the study was considered.

The data obtained from the questionnaires:

Patients were advised to enquire about anything that they might not understand when completing the questionnaire.

The results of the questionnaires were collected, compiled and statistically evaluated.

The results of sweat quantification tests undertaken by myself provided the sweat production rates. Tests were carried out in a manner so as to obtain the most accurate results.

3.3 THE RESEARCH METHODOLOGY

Patients were recruited from advertisements and some of the patients were from government schools. Patients were obtained by means of convenience sampling. No specified age or sex was used. People were interviewed and on the basis of case-history and physical evidence of the condition, subjects were chosen to participate in the study. The study group consisted of 30 people. The group was randomly divided into a treated group and a placebo group each of which consisted of 15 subjects. The separation of the subjects into a treated and placebo group was done by a person independent of the research and it was a double blinded study.

Each subject was required to take five pills of the medication given to them on waking each day so as to ensure a sufficient amount of medication. The treated group received Pilocarpus Jaborandi 9CH and the control group received a placebo. A 9CH dilution was used because of the physical nature of the condition.

The placebo was not coated with alcohol as the vehicle used for the impregnation of the medicated pills. The treatment continued for 90 days. The patients were instructed to count out the pills in the lid of the vial and to place them under the tongue and to allow them to dissolve.

Instructions on the storage of the medicine were given to the patients.

In order to assess the progress of the treatment and the final result, data was obtained from two sources: i) Sweat collection tests

ii) Questionnaire

i) Method of sweat collection

Sweat collection tests were undertaken on the first day treatment, on the forty-fifth day and on the ninetieth day of treatment. Each sweat collection test consists of two parts:

a) Sweat to be collected after ten minutes of relaxation

b) Sweat collection after emotional stimulation to induce sweating

Petri dishes containing filter paper which was massed, was used to collect the sweat. After the patient relaxes for ten minutes the patient is required to place both palms on the pre-massed filter paper which is then replaced into the petri dish. The mass of the filter paper after the sweat collection minus the mass of the paper before the sweat collection gives the amount of sweat produced.

The idea of using pre-massed paper and comparing it to the mass of after the test comes from a study undertaken by Munro et al. (1974), in which axillary sweat collection was achieved using pre-massed pieces of cotton-wool. A similar study was undertaken by Gibinski et al. (1973), in which he used strips of paper 5 cm x 5 cm which was applied to the area being tested.

The second part of the sweat collection tests involves emotional induction of sweating. This is achieved by engaging the subject in mental arithmetic for ten minutes. The participants were required to calculate simple mathematical problems posed to them by the tester. Each test

consisted of a different set of mathematical problems. The assumption is that the mental activity required to solve the problems and the stress of obtaining the correct response is sufficient enough to induce sweating. The assumption was generated and utilized by Kuno (1956:113), in his numerous studies on sweat physiology. Allwood et al. (1959) and Allen et al. (1973) also used mental arithmetic to induce emotional sweating.

After ten minutes the patient places his palms on the pre-massed piece of filter paper. The filter paper is then massed and the new mass of the filter paper is obtained. From these two masses the amount of sweat produced is calculated.

The sweat collected is measured in milligrams which appears to be the most convenient unit of measure relative to the amount of sweat produced. Gibinski (1973) also states that he massed sweat produced in milligrams.

A Sartorius MP 1212 Scale was used to do the massing. This scale masses up to three decimal places. Ideally an analytical balance should be utilized for this purpose.

The feature lacking in the balance used compared to an analytical balance are the shutters that isolate the actual balance from outside disturbances such as drafts. The shutter was simulated using a glass lid which covered the balance acting as a shutter.

On the last day of the treatment subjects completed a questionnaire consisting of eleven questions. One of the discrepancies of the questionnaire was that although people who reported in the same questionnaire, no change in their condition, still rated the treatment as being good.

Each person that participated in the research was assigned a number and no names were used. The number represented the identity of the person and the codes of the numbers were only available to the researcher.

Although the study group consisted of thirty persons, thirty - two people were interviewed and accepted to make provisions for drop-outs from the research. One subject was lost due to the subject being unavailable for further tests.

Each participant underwent three tests consisting of two sweat collection procedures for each test. Results were recorded accordingly. The results were split to group placebo and treated subjects separately.

The average of the sweat production rates for each test was calculated as well as the standard deviation. The minimum and maximum values were also computed. The range was calculated.

For each test the difference between the amount of sweat produced after mental arithmetic and that before mental arithmetic was calculated. The average of these differences was also calculated for both the treated and placebo groups.

The next step was to calculate in terms of percentage the change in sweat production rates between test one, two and three. For this purpose only sweat production after mental arithmetic was used as a variable.

Comparisons were made between:

- i) Test two and test one
- ii) Test three and test two
- iii) Test three and test one

The formula used for the calculation of the percentage is as follows:

$$\frac{\text{TEST XA} - \text{TEST YA}}{\text{TEST YA}} \times \frac{100}{1}$$

where A = sweat production after mental arithmetic.

The average of the total percentage for each comparison was calculated.

Using the same comparisons as those used to calculate the percentage, one sample analysis of

the results were done using unpaired t tests at the 95 percent confidence interval.

The two sample analysis of the treated and the placebo groups were calculated using paired t tests at the 95 percent confidence interval.

A graphical representation of the composite responses to each question of the questionnaire was compiled. A separate graph for the treated and placebo groups are illustrated. Question ten of the questionnaire did not require a graphical representation since patients had to explain any new symptoms that might have appeared since the start of the treatment. Responses to each question were presented in terms of percentage, separately for the treated group and for the placebo group.

The computer programme "Statgraphics Plus Version 6" was used to statistically analyze the data of the sweat collection tests. "Lotus 123" was used to arrange the data for "Statgraphics". The written aspect of the dissertation was done using "Word Perfect 5.1".

3.4 THE TREATMENT OF THE DATA OF EACH SUBPROBLEM

3.4.1 SUB-PROBLEM ONE

The first sub-problem is to evaluate the efficacy of the Homoeopathic Drug *Pilocarpus Jaborandi* in the management of localized palmar hyperhidrosis in terms of the patients perception of the treatment in order to describe patient's experience of the homoeopathic treatment.

a. Data needed

The data that was required was the patients perception of the treatment. Patients perception of the treatment was assessed on the basis of whether the patient experienced relief from hyperhidrosis and other experiences with the homoeopathic treatment.

b. The Location of the Data

The responses of the patients participating in the research was used.

c. The Means of obtaining the Data

The data was obtained by means of a questionnaire. The questionnaire was given to the participants of the research, after the completion of the duration of the treatment.

3.4.2 SUB-PROBLEM TWO

The second sub-problem is to evaluate the efficacy of the homoeopathic drug *Pilocarpus Jaborandi* in the management of localized palmar hyperhidrosis in terms of sweat production rates in order to quantify the sweat production.

a. Data needed

The data that was needed was the sweat production rates of the patients so as to quantify the amount of sweat produced by each patient.

b. Location of the Data

Each of the thirty subjects that participated in the research had to undergo sweat collection tests. Patients were obtained from adverts in the newspaper and were selected by myself.

c. The Means of obtaining the Data

The sweat collection tests were undertaken by the researcher. The sweat collection tests were carried out as specified under the section "Research Methodology". The patients underwent sweat collection tests before the start of the treatment, on the 45th day of treatment and on the 90th day of treatment.

3.4.3 SUB-PROBLEM THREE

The third sub-problem is to integrate the patient's experience of the homoeopathic treatment with the sweat collection tests so as to describe the therapeutic properties of the drug *Pilocarpus Jaborandi* and to propose a mechanism of action of this homoeopathic drug.

a. Data needed

It was necessary for me to be able to describe the therapeutic effects of *Pilocarpus Jaborandi* after having assessed its effect on the subjects, and based on its effect I needed to propose a mechanism of action.

b. The Location of the Data

By assessing the effect of Pilocarpus Jaborandi on the subjects a mechanism of action might be proposed.

c. The Means of obtaining the Data

By looking at the interpretation of the data obtained for sub-problem one and two, an assessment of the effects of Jaborandi on the patient was possible. Also by assessing the course of progress or decline in the patient, a mechanism of action will be proposed.

CHAPTER FOUR - RESULTS

In this chapter all the data that was collected will be presented after it has undergone statistical analysis and comment. The actual results from which the following information has been processed is available in Appendix B.

Presented in this Chapter will be data of two origins ie.

- a) Sweat collection tests
- b) Questionnaire

TABLE 4.1.: The average of the sweat collection rates for each test (in milligrams), the minimum and maximum values, Sweat production rates, the standard deviation and range for the treated group.

V	TEST 1B	TEST 1A	TEST 2B	TEST 2A	TEST 3B	TEST 3A
AV.	171,1	276,4	98,0	215,1	97,93	155,8
ST. DEV.	152,1	247,9	71,4	177.0	113,9	107,5
MIN.	26	48	19	51	7	38
MAX.	532	813	261	661	404	403
RAN.	506	765	242	610	397	365

V = Variable; AV. = Average; ST. DEV. = Standard deviation; RAN. = Range

TABLE 4.2: The average of the sweat collection rates (in milligrams) for each test, the minimum and maximum values, sweat production rates, the standard deviation and range for the placebo group.

V	TEST 1B	TEST 1A	TEST 2B	TEST 2A	TEST 3B	TEST 3A
AVERAGE	125,4	213.8	89,6	220,1	73.27	178,3
ST.DEV.	83,75	145,0	101,2	207,6	38,08	162,5
MIN.	10	29	7	24	13	23
MAX.	261	610	376	712	149	646
RANGE	251	581	369	688	136	623

Upon analysis of the minimum and maximum figures of sweat production in tables 4.1 and 4.2, for both the treated and the placebo groups, it is evident that there is a significant difference between these two figures for each test. This is confirmed by the standard deviation.

TABLE 4.3: The difference in the sweat production rates (in milligrams) after ten minutes of mental arithmetic and the sweat production rate after ten minutes of relaxation, for each of the three tests, and the average of the difference for each test for the treated group.

PATIENT NUMBER	TEST ONE DIFFERENCE	TEST TWO DIFFERENCE	TEST THREE DIFFERENCE
1	54	170	42
4	120	9	22
6	564	566	544
8	64	93	118
9	1	33	29
13	65	68	21
14	43	293	297
15	24	290	52
18	110	38	41
19	2	21	-68
20	12	-14	-8
23	42	58	184
25	165	108	74
28	50	49	164
30	10	176	64
AVERAGE OF THE DIFF.	88.40	130.53	105.07

TABLE 4.4: The difference in the sweat production rates (in milligrams) after ten minutes of mental arithmetic and the sweat production rate after ten minutes of relaxation, for each of the three tests, and the average of the difference for each test for the placebo group.

PATIENT NUMBER	TEST ONE DIFFERENCE	TEST TWO DIFFERENCE	TEST THREE DIFFERENCE
2	28	21	65
3	369	89	101
5	273	452	189
7	45	93	23
10	2	16	6
11	5	252	-28
12	116	74	-99
16	4	62	7
17	81	57	81
21	89	43	143
22	443	361	97
24	11	59	273
26	58	35	9
27	76	38	29
29	-20	104	-54
AVERAGE OF THE DIFF.	105.33	117.07	56.13

In tables 4.3 and 4.4, the average of the differences in the sweat production for each test, between the ten minutes of relaxation and ten minutes of mental arithmetic, shows that a significant increase in sweat production occurs following the ten minute period of mental arithmetic. It is however noted that, in the treated group of table 4.3, one patient in test two and two patients in test three, produced less sweat after mental arithmetic than during the ten minute minute period of relaxation. The same occurred in the placebo group, in table 4.4, with one patient in test one and three patients in test three producing less sweat after mental arithmetic.

TABLE 4.5: The percentage of the difference between the respective tests and the average of the percentages for each comparison for the treated group.

Pt No	TEST 2 - TEST 1 (mg)	%	TEST 3 - TEST 2 (mg)	%	TEST 3 - TEST 1 (mg)	%
1	115	105.50	-135	-60.27	-20	-18.35
4	-154	-85.56	42	161.54	-112	-62.22
6	102	16.72	-66	-9.27	36	5.90
8	-20	-7.41	-90	-36.00	-110	-40.74
9	-36	-47.37	2	5.00	-34	-44.74
13	-25	-13.51	-28	-17.50	-53	-28.65
14	114	58.16	66	21.29	180	91.84
15	273	237.39	-283	-72.94	-10	-8.70
18	-22	-18.33	-12	-12.24	-34	-28.33
19	-102	-75.56	48	145.45	-54	-40.00
20	-5	-17.24	-1	-4.17	-6	-20.69
23	-179	-63.48	187	181.55	8	2.84
25	-75	-18.70	-188	-57.67	-263	-65.59
28	-172	-75.44	216	385.71	44	19.30
30	281	103.69	-385	-69.75	-104	-38.38
AV	6.33	6.59	-41.8	37.38	-35.5	-18.43

N.B. The positive figures indicate an increase in sweat production whilst the negative figures indicate a decrease in sweat production rates.

Table 4.5 shows that in the treated group there was an increase in the average rates of sweat production in test 2 compared to test 1 and in test three when compared to test 2. There was however, a decrease in the average sweat production rate in test three when compared to test 1.

TABLE 4.6: The percentage of the difference between the respective tests and the average of the percentage for each comparison for the placebo group.

Pt No	TEST 2 - TEST 1 (mg)	%	TEST 3 - TEST 2 (mg)	%	TEST 3 - TEST 1 (mg)	%
2	12	22.22	68	103.03	80	148.15
3	-62	-15.05	53	15.14	-9	-2.18
5	-144	-17.89	-465	-70.35	-609	-75.65
7	8	4.26	-155	-79.08	-147	-78.19
10	3	6.25	4	7.84	7	14.58
11	242	232.69	-205	-59.25	37	35.58
12	-271	-57.29	103	50.99	-168	-35.52
16	-159	-63.60	-51	-56.04	-210	-84.00
17	-14	-12.07	9	8.82	-5	-4.31
21	-110	-56.70	122	145.24	12	6.19
22	-338	-41.57	-225	-53.68	-593	-72.94
24	4	5.41	212	271.79	216	291.89
26	-35	-25.55	-64	-62.75	-99	-72.26
27	-82	-36.94	-13	-9.29	-95	-42.79
29	26	10.16	-278	-98.58	-252	-98.44
AV	-61.3	-3.05	-61.0	7.59	-122	-4.66

N.B. Positive percentages indicate an increase in the sweat production rates between the tests and negative percentages indicate a reduction in sweat production rates.

It is seen in table 4.6, that there was a slight increase in the sweat production rate in test 3 when compared to test 2. There was a very slight decrease in the average sweat production rates in test two compared to test 1 and in test three when compared to test 1.

In order to analyze the effect that the medication has had on the patients in subsequent tests and so as to evaluate the changes between the tests, in the treated and the placebo groups separately, paired t tests were undertaken. The data used for these tests is only the sweat produced after ten minutes of mental arithmetic.

TABLE 4.7: At the 95% confidence interval the level of significance $\alpha = 0,05$ and H_0 : Mean = 0, the confidence intervals and the significance levels were computed and the test result was obtained for the treated group.

VARIABLE	CONFIDENCE INTERVAL	SIGNI. LEVEL	TEST RESULT
TEST 2 MINUS TEST 1	-73.893 to 86.57	0.868	accept H_0
TEST 3 MINUS TEST 2	-130.52 to 46.92	0.329	accept H_0
TEST 3 MINUS TEST 1	-88.85 to 17.912	0.176	accept H_0

SIGNI. LEVEL = SIGNIFICANCE LEVEL

It can be concluded that at the 95% confidence interval there was no statistically significant reduction in sweat production, in comparisons made in all three tests.

TABLE 4.8: At the 95% confidence interval the level of significance $\alpha = 0,05$ and H_0 : Mean = 0, the confidence intervals and the significance levels were computed and the test result was obtained for the placebo group.

VARIABLE	CONFIDENCE INTERVAL	SIGNI. LEVEL	TEST RESULT
TEST 2 MINUS TEST 1	-14.28 to 136.94	0.104	accept H_0
TEST 3 MINUS TEST 2	-26.57 to 144.97	0.161	accept H_0
TEST 3 MINUS TEST 1	-3.54 to 237.62	0.04	reject H_0

SIGNI. LEVEL = SIGNIFICANCE LEVEL

At the 95% confidence interval, no statistically significant reduction in sweat production occurred between test 2 and test 1, test 3 and test 2. There was however a significant reduction in sweat production when test 3 is compared to test 1.

In order to compare the difference in the change between the placebo and treated group, a two sample analysis was done using unpaired t tests. A comparison was made between each of the three tests using the amount of sweat produced after ten minutes of mental arithmetic.

TABLE 4.9: The t Statistic was calculated at the 95% confidence interval where the level of significance = 0.05 and H_0 : Diff. = 0. The significance level and the confidence intervals were also computed.

VARIABLE	CONFIDENCE INTERVALS	SIGNI. LEVELS	TEST RESULT
TEST 1	125,53 to 80,60	0,844	accept H_0
TEST 2	149,37 to 139,24	0,072	accept H_0
TEST 3	89,35 to 214,55	0,447	accept H_0

SIGNI. LEVEL = SIGNIFICANCE LEVEL

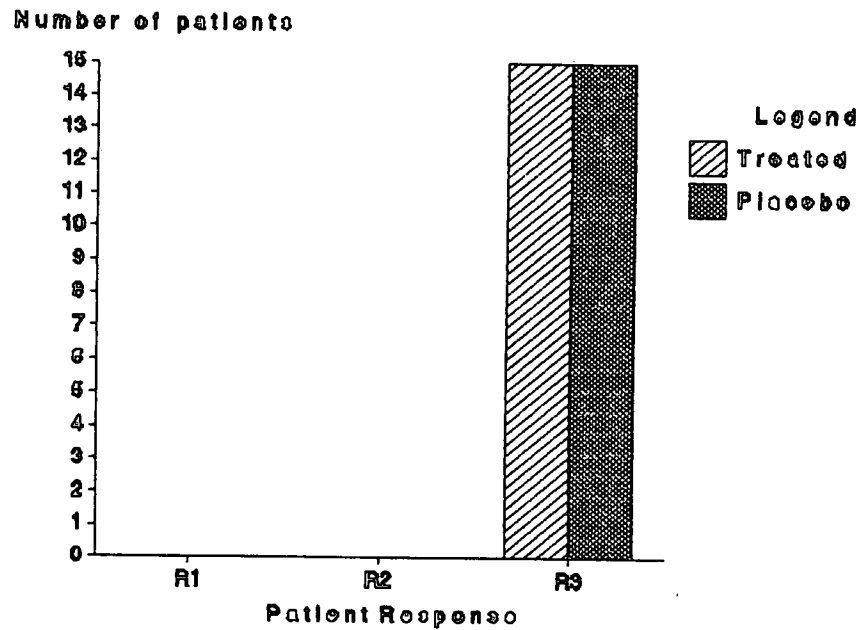
As seen in table 4.9, there is no statistically significant difference in sweat production rates between the treated and the placebo groups.

All the data from the questionnaire has been processed and is graphically presented in this chapter. A graph for each question of the questionnaire has been prepared separately for the treated and placebo groups as well the responses in the form of a percentage for each question, separately for the treated and placebo groups. The questionnaire appears in appendix A. In question ten of the questionnaire no graphical representation was necessary since it concerns new symptoms that might have been experienced by the patient since the start of the medication.

A description of the symptoms experienced appears below:

- a) One patient complained of mild headaches.
- b) Another patient complained of the yellow staining of clothing from axillary perspiration which did not occur before.

The purpose of the questionnaire was to evaluate the patients perception of the treatment. In question eleven of the questionnaire patients are asked to give their opinion of the treatment.



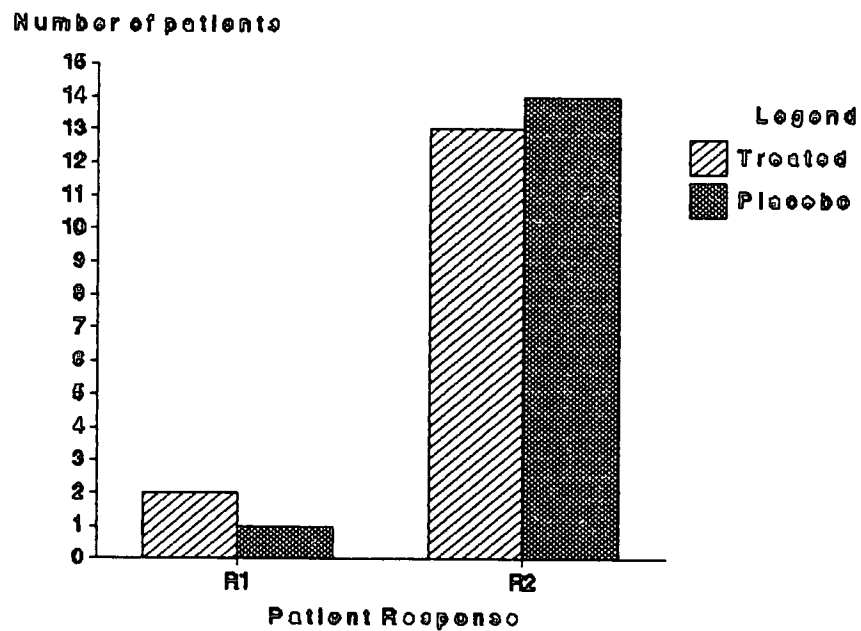
R 1 - right palmar surface

R 2 - left palmar surface

R 3 - right and left palmar surfaces

Figure 4.1: Question 1 - referring to the areas of the body that are/were affected by the condition

All the patients of the treated (100%) and placebo (100%) groups suffered from emotional palmar hyperhidrosis affecting both the right and left palmar surfaces.



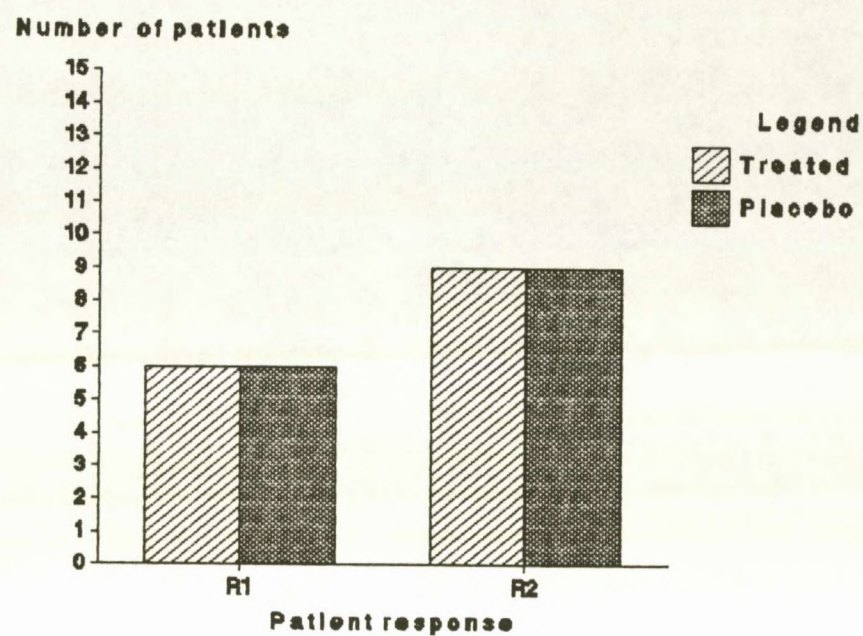
R 1 - heat

R 2 - mental activity and stress

Figure 4.2: Question 2 - referring to the circumstances under which excessive sweating occurs

Two patients of the treated group (13%) and one patient of the placebo group (7%) reported heat as being the precipitating factor of the sweating, although emotional stress was also a factor in exacerbation of sweating.

Thirteen patients of the treated group (87%) and fourteen patients of the placebo group (93%) reported mental activity and stress as being the precipitating factors in sweat induction.



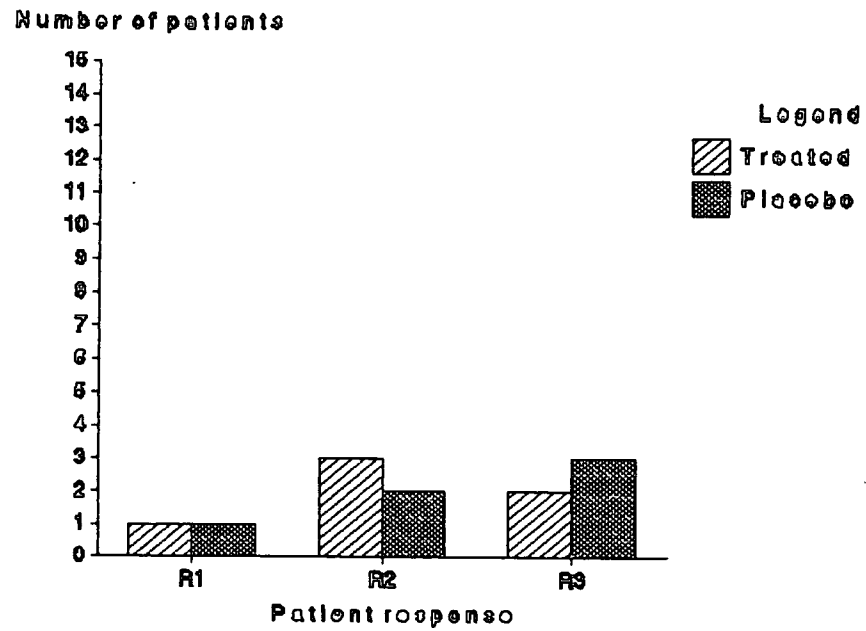
R 1 - Yes

R 2 - No

Figure 4.3: Question 3 - referring to the tendency of their family members to suffer from the same condition

Six patients in both the treated (40%) and placebo (40%) groups identified other family members as having palmar hyperhidrosis.

Nine patients in both the treated (60%) and placebo (60%) groups responded negatively to any other family member having a similar condition.



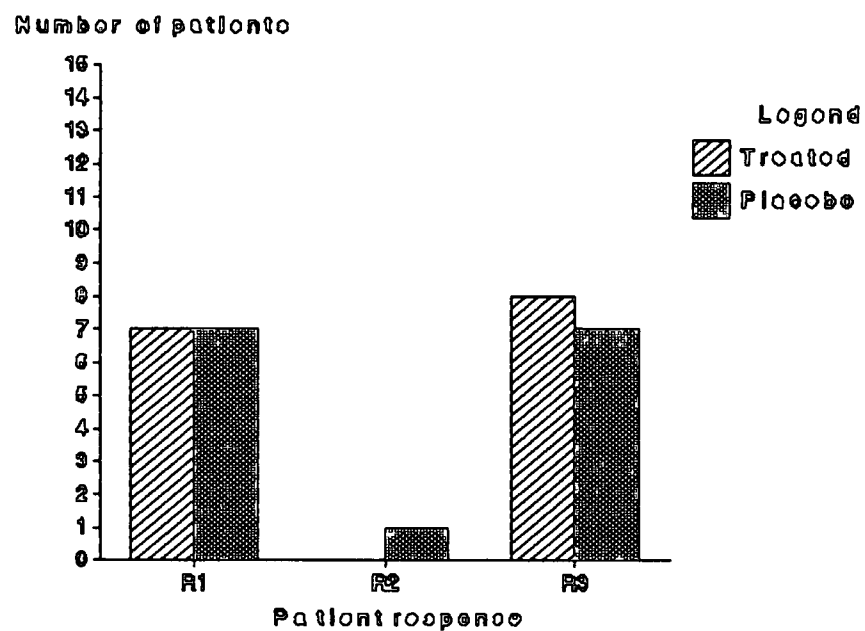
R 1 - Mother
 R 2 - Father
 R 3 - Siblings

Figure 4.4: Question 4 - referring to exact relationship of members of the family suffering from hyperhidrosis

One patient in both the treated and the placebo groups (7%) had mothers who suffer from this condition.

Three patients of the treated group (20%) and two patients of the placebo group (13%) had fathers who suffer from this condition.

Three patients of the treated group (20%) and two patients of the placebo group (13%) had siblings who suffer from this condition.



R 1 - stayed the same

R 2 - became worse

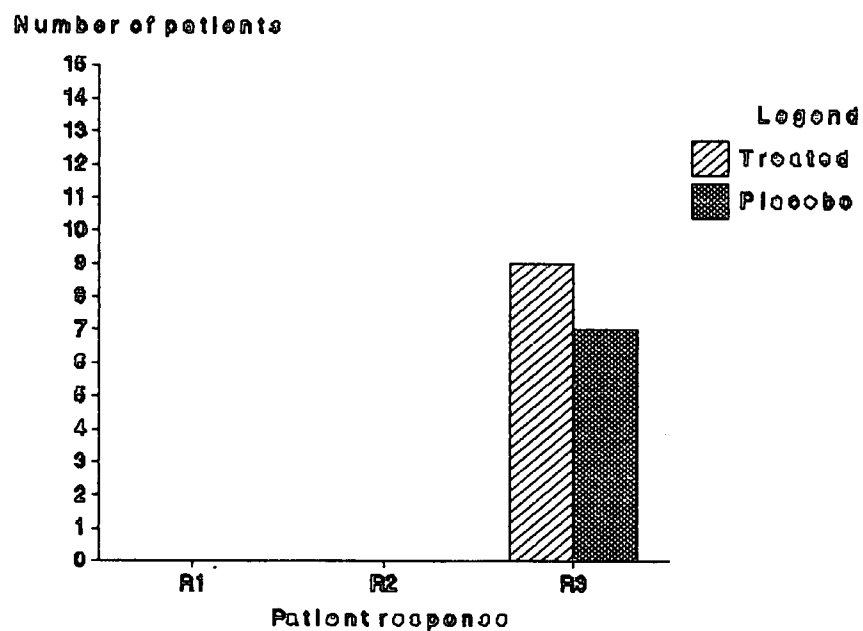
R 3 - improved

Figure 4.5: Question 5 - referring to whether the patient experienced any change in palmar sweatiness

Seven patients in the treated (47%) and placebo (47%) groups reported that their condition remained the same.

One person of the placebo group (7%) reported a deterioration in the condition.

Eight patients of the treated group (53%) and seven patients of the placebo group (47%) reported an improvement in the condition.



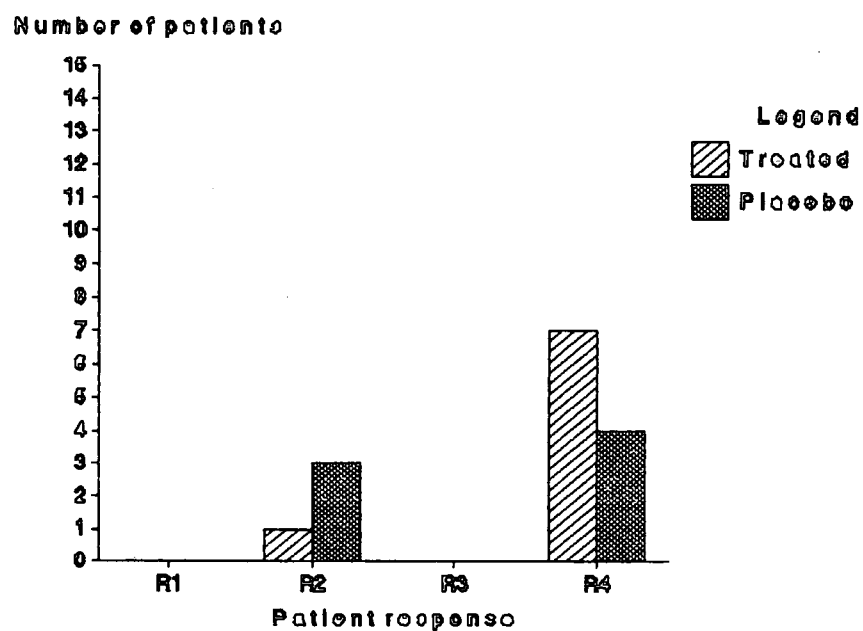
R 1 - right palm

R 2 - left palm

R 3 - right and left palm

Figure 4.6: Question 6 - referring to the specific area in which change has occurred

Nine patients of the treated group (60%) and seven patients of the placebo group (47%) experienced changes on the right and left palmar surfaces.



R 1 - become worse, then better

R 2 - become better, then worse

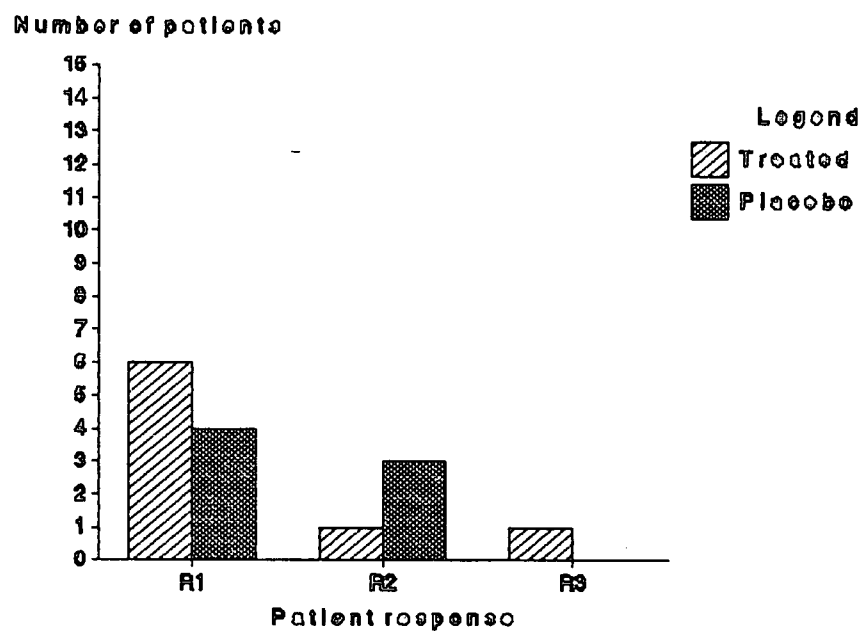
R 3 - become worse and stayed that way

R 4 - become better and stayed that way

Figure 4.7: Question 7 - referring to how the condition has changed

One patient in the treated group (7%) and three patients in the placebo group (20%) reported their condition as having become better and then worse.

Seven patients of the treated group (47%) and four patients of the placebo group (27%) reported their condition as becoming better and then staying that way.



R 1 - slightly improved

R 2 - very much improved

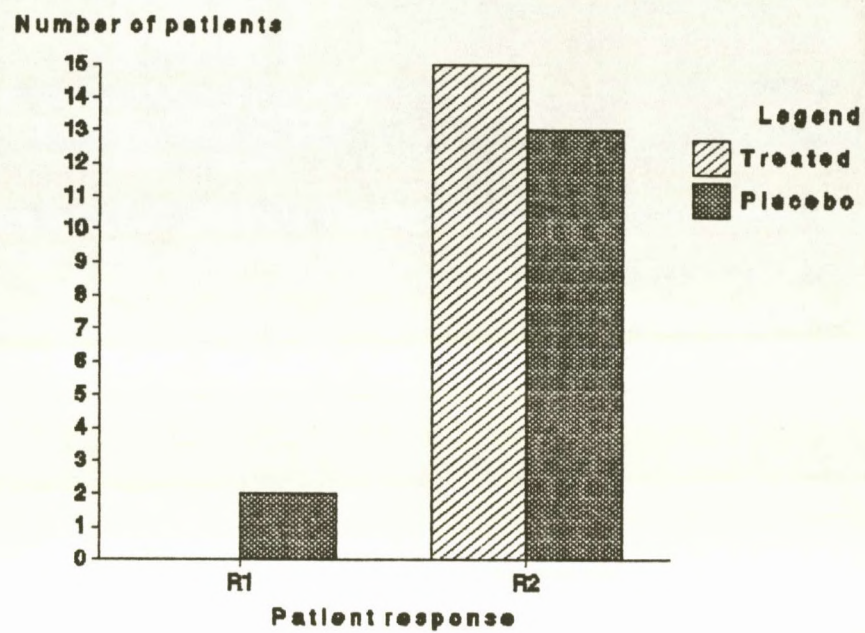
R 3 - completely better

Figure 4.8: Question 8 - referring to the extent of improvement

Six patients of the treated group (40%) and four patients of the placebo group (27%) said that the condition improved slightly.

One patient of the treated group (7%) and three patients of the placebo group (20%) said that their condition had very much improved.

Only one patient in the treated group (7%) reported that his condition was completely better.

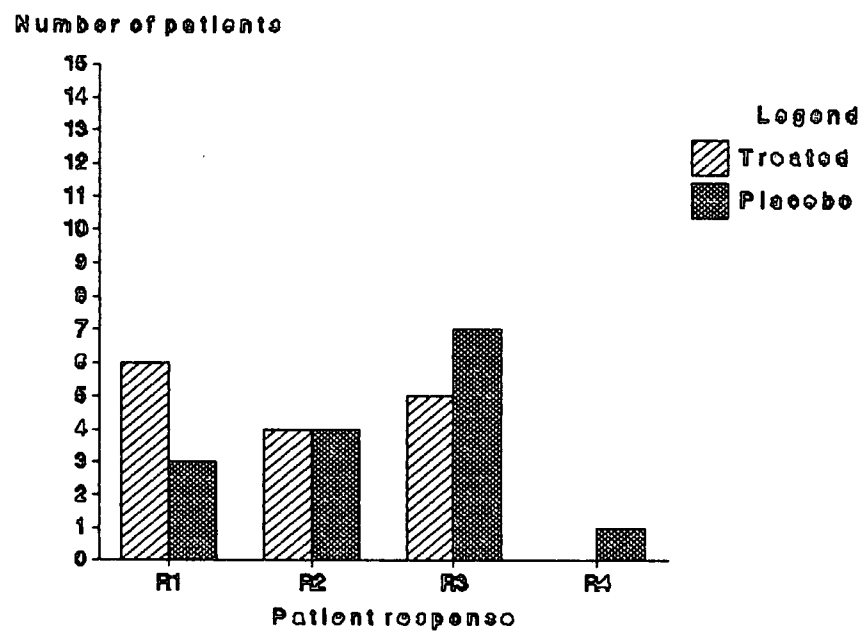


R 1 - Yes

R 2 - No

Figure 4.9: Question 9 - referring to whether any new symptoms have appeared since treatment commenced

Only two patients, both belonging to the placebo group (13%), reported new symptoms.



R 1 - satisfactory

R 2 - dissatisfactory

R 3 - good

R 4 - excellent

Figure 4.10: Question 11 - referring to the patient's evaluation of the treatment

Six patients of the treated group (40%) and three patients of the placebo group (20%) reported the treatment as being satisfactory.

Four patients in both the treated (27%) and placebo (27%) groups reported the treatment as being dissatisfactory.

Five patients in the treated group (33%) and seven patients in the placebo group (47%) reported the treatment to be good.

One patient in the placebo group (7%) reported the treatment as being excellent.

CHAPTER FIVE

5.1 DISCUSSION

Statistical evaluation of the results were achieved primarily by undertaking paired and unpaired t tests and an analysis of their outcome. In addition to the above means of testing, other tools were implemented so as to assess information gathered. A compilation of these results are presented in Chapter four in the form of tables and figures.

Mental arithmetic was used to induce emotional sweating. This was based on research works undertaken by Kuno (1956), Allwood et al. (1959) and Allen et al. (1973).

In tables 4.3 and 4.4. the average of the difference between the ten minute period of relaxation and ten minutes of mental arithmetic, gives a clear indication of the fact that there was an increase in sweat production following the ten minute period of mental arithmetic. It can therefore be concluded that mental arithmetic does increase sweat production and

therefore is a valuable tool in emotional sweat induction.

It is interesting to note that a total of five patients in test three, which was the last test in a series of three tests, were seemingly unaffected by mental arithmetic as an emotional stimulant.

One of the limitations of the researcher conducting the sweat induction — by mental arithmetic at every test, is that the patient inevitably develops a relationship with the researcher, and the patient might find the mental arithmetic to be less intimidating and the effect of the emotional stimulation in my opinion, is reduced or less effective in successive tests. It would therefore be proposed that different testers be involved in sweat induction by emotional stimulation for each test.

A change in sweat production between the respective tests were assessed in terms of

percentage. For the treated group it is evident in table 4.5 that an average decrease in sweat production occurred when test 3 is compared to test 1.

In the placebo group however (Table 4.6), an average decrease in sweat production occurred when the sweat production rates of test 2 are compared to test 1 and when test 3 are compared to test 1.

In both the treated and the placebo groups there was an average decrease in sweat production when test 3 is compared to test 1.

So as to assess the significance of the changes in sweat production rates, the paired t tests were performed.

In table 4.7 it is noted that the test result of the treated group shows that for each of the variables, the change was not statistically significant and the null hypothesis was accepted.

When assessing the lower confidence limits, there was a progressive trend towards a significant change in sweat production rates between the respective tests. This is also evident in the significance levels where $P = 0.868$ when test 2 is compared to test 1, $P = 0.329$ when test 3 is compared to test 2 and $P = 0.176$ when test 3 is compared to test 1.

One cannot help but wonder whether continuation of the treatment might have resulted in a significant change.

In table 4.8, which are the results of the placebo group, when comparing test 2 with test 1 there was no significant change ($P = 0.104$) and the null hypothesis was accepted. When test 3 was compared to test 2 there was no significant change ($P = 0.161$) and the null hypothesis was accepted.

When the lower confidence limits are assessed for these two comparisons ie.

test 2 - test 1: -14.28

test 3 - test 2: -26.57

there was an increase in these values for the second variable (test 3 - test 2) when compared to the first variable (test 2 - test 1). This shows a trend towards there being less of a significant change in progressive tests. However, when test 3 is compared to test 1, the significance levels ($P = 0.04$) indicate that there was a significant change. The null hypothesis was consequently rejected.

The next question to answer was whether there was a significant difference in response to the treatment between the placebo and treated groups. To this end unpaired t tests were carried out.

In table 4.9, it is seen that in each of the three tests there was no significant difference in the sweat production rates between the treated and the placebo groups (Test 1 $P = 0.406$; Test 2 $P = 0.943$; Test 3 $P = 0.659$). In each case the null hypothesis was accepted.

The second aspect toward the analysis and interpretation of the results is to evaluate the

patients perception of the treatment which was achieved by means of a questionnaire.

Each question of the questionnaire has a corresponding graphical representation, except for question ten, which expresses new symptoms experienced by the patient since the start of the treatment.

In figure 4.8, only two patients, both belonging to the placebo group, noted new symptoms since the start of the treatment. One patient reported mild headaches whilst the other complained of yellow staining of clothing from axillary perspiration. A positive correlation between these symptoms and use of the medication is not possible since both these patients received only the placebo.

As regards patients' perception of treatment, 30% of the total group were satisfied, whilst 27% were dissatisfied. 40% of the entire group reported the treatment as being good, whilst 3% reported the treatment to be excellent.

One of the discrepancies of the questionnaire is that although 14 patients of the total group (47%), reported that the condition had remained unchanged, with one other patient (3%) becoming worse, as in figure 4.5, only 8 patients (27%) reported the treatment as being dissatisfactory. This implies that although some patients did not improve from the treatment ie. 15 patients(50%), they still did not report the treatment as being dissatisfactory. This can be observed in table 4.10.

5.2 CONCLUSION

Upon analysis and interpretation of the results obtained from the questionnaire and sweat collection tests, it is concluded that *Pilocarpus Jaborandi* is not effective in the treatment of emotional palmar hyperhidrosis.

Hahnemann the founder of Homoeopathy says that he places little emphasis on the scientific mode of action of the drugs, but "slight value" at an attempt of explanation (Tafel 1917:74).

Disease results from a morbidly deranged vital force. A correctly chosen homoeopathic potency would match the manifestations of the deranged vital force with the symptoms that this substance produces in healthy individuals.

By administering this Homoeopathic potency, a stronger but similar morbid affection is imposed upon the vital force, which now has a greater strength to, first, overcome the natural

disease, and then the substituted or imposed "drug" disease, resulting in the health of the organism (Tafel 1917: 74). From the above explanation, the importance of correctly choosing or matching a disease state with a homoeopathic remedy becomes evident.

Filocarpus Jaborandi when administered to healthy individuals causes physiological diffuse or generalized perspiration. The disease of the research viz. emotional palmar hyperhidrosis involves sweating which is not physiological but emotionally induced, and is also restricted to the palmar surface of the hand and sometimes the feet. It is obvious then that the disease manifestation in this pathological condition does not coincide with the symptoms of the homoeopathic drug. It is then not incorrect to assume that the failure of *Filocarpus Jaborandi* in the treatment of emotional palmar hyperhidrosis was due perhaps to the fact that the disease picture of the remedy, (ie. symptoms produced by the substance when administered to healthy individuals) did not correlate with the aetiology or symptoms of the disease state. It

still remains to be proven scientifically, by other researchers whether the theory proposed by Hahnemann could still hold true for the treatment of emotional palmar hyperhidrosis with a more precisely chosen homoeopathic remedy.

Hahnemann says succinctly in the Organon "Neither the spirit - like power concealed in drugs, and shown by their ability of altering the health of man, nor their power of curing diseases, can be comprehended by a mere effort of reason, it is only through manifestation of their effect upon the state of health that this power of drugs is experienced and distinctly observed" (Tafel 1917: 71).

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APPENDICES

APPENDIX A - QUESTIONNAIRE

RESEARCH - HYPERHIDROSIS QUESTIONNAIRE

NAME: No.

INSTRUCTIONS

1. Please place a tick in the box alongside the most appropriate response.

QUESTION ONE

Which are the areas of your body that are/were affected by the condition ?

RIGHT PALMAR SURFACE	1
LEFT PALMAR SURFACE	2
RIGHT AND LEFT PALMAR SURFACE	3

QUESTION TWO

Please indicate the circumstances under which excessive sweating occurs.

HEAT	1
MENTAL ACTIVITY AND STRESS	2

QUESTION THREE

Are there any other members of your immediate family that suffer with hyperhidrosis ?

YES	1
NO	2

QUESTION FOUR

If your answer to the above question is "yes" then please indicate the relationship.

MOTHER	1
FATHER	2
SIBLINGS	3

QUESTION FIVE

How has your excessive sweatiness changed ?

STAYED THE SAME	1
BECAME WORSE	2
IMPROVED	3

QUESTION SIX

If there has been any improvement, which has improved ?

RIGHT PALM	1
LEFT PALM	2
RIGHT AND LEFT PALM	3

QUESTION SEVEN

Did the condition

BECOME WORSE, THEN BETTER	1
BECOME BETTER, THEN WORSE	2
BECAME WORSE AND STAYED THAT WAY	3
BECAME BETTER AND THEN STAYED THAT WAY	4

QUESTION EIGHT

If your condition has improved, then has it been ...

SLIGHTLY IMPROVED	1
VERY MUCH IMPROVED	2
COMPLETELY BETTER	3

QUESTION NINE

Have any new symptoms appeared ?

YES	1
NO	2

QUESTION TEN

Please state the new symptoms that you have experienced.

QUESTION ELEVEN

Have you found the treatment to be ...

SATISFACTORY	1
DIS-SATISFACTORY	2
GOOD	3
EXCELLENT	4

APPENDIX B - RESULTS - SWEAT COLLECTION: TREATED

PATIENT NUMBER	TEST 1B	TEST 1A	TEST 2B	TEST 2A	TEST 3B	TEST 3A
TREATED	mg	mg	mg	mg	mg	mg
1	55	109	54	224	47	89
4	60	180	17	26	46	68
6	46	610	146	712	102	646
8	206	270	157	250	42	160
9	75	76	7	40	13	42
13	120	185	92	160	111	132
14	153	196	17	310	79	376
15	91	115	98	388	53	105
18	10	120	60	98	45	86
19	133	135	12	33	149	81
20	17	29	38	24	31	23
23	240	282	45	103	106	290
25	236	401	218	326	64	138
28	178	228	7	56	108	272
30	261	271	376	552	103	167

RESULTS OF SWEAT COLLECTION TESTS FOR PLACEBO

PATIENT NUMBER	TEST 1B	TEST 1A	TEST 2B	TEST 2A	TEST 3B	TEST 3A
PLACEBO	mg	mg	mg	mg	mg	mg
2	26	54	45	66	69	134
3	43	412	261	350	302	403
5	532	805	209	661	7	196
7	143	188	103	196	18	41
10	46	48	35	51	49	55
11	99	104	94	346	169	141
12	357	473	128	202	404	305
16	246	250	29	91	33	40
17	35	116	45	102	30	111
21	105	194	41	84	63	206
22	370	813	114	475	123	220
24	63	74	19	78	17	290
26	79	137	67	102	29	38
27	146	222	102	140	98	127
29	276	256	178	282	58	4