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A comparative study to analyze the effect of tap water Faradism and tapwater Galvanism in treating palmar hyperhidrosis

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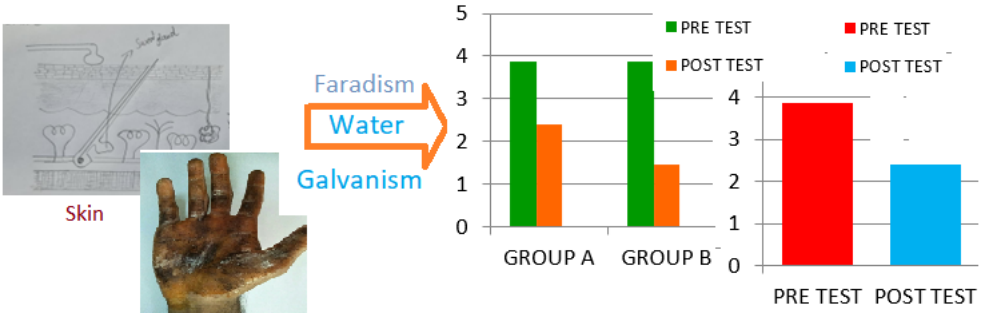
ABSTRACT



This current study is to analyze the effect of tap water faradism and tap water galvanism in treating Palmar Hyperhidrosis. Palmar Hyperhidrosis is a condition in Which a person sweats excessively and unpredictably from their hands. Hyperhidrosis Can have very significant effect on patient's lives, causing physical discomfort and social embarrassment and negatively impacting occupational and daily activities. This study is an experimental study of comparative type conducted in physiotherapy department from ACS medical college and Hospital. 30 subjects with palmar Hyperhidrosis were randomly selected. Both male and female subjects between 18-30 years were included in this study based on the inclusion and exclusion criteria. The subjects were randomly selected and divided into two groups Group A (n=15) received tap water Faradism, Group B(n=15) received tap water Galvanism. Modified Starch Iodine Test is used as outcome measure. Tap water Galvanism shows more significant improvement than the Tap water faradism in Palmar Hyperhidrosis.

Keywords: Hyperhidrosis, Tap water faradism, Tap water Galvanism, modified starch iodine test

INTRODUCTION

Hyperhidrosis causing physical discomfort social embarrassment, mental stress, and even economical loss is a distressing condition of affecting palms and soles.[1] Hyperhidrosis is a disorder which is common condition .It is characterized with excessive hand sweating beyond normal thermoregulatory needs.[1]

It is actually a prescription in excess of psychologic amount necessary to maintain thermal Haemostasis. Primary Hyperhidrosis incidence has been between 0.6%-2.8% in both genders.[2] It has negative effect on patients wellbeing that may become socially and professionally deblitating.[3,4] Hyperhidrosis classified as primary and secondary disease. Primary Hyperhidrosis incidence is unknown and also the causes not known accurately, but it may affect up to 1% of populations ,this type is commonly present in young adults. But, it is printed as early as childhood and persist throughout adult life, whereas secondary Hyperhidrosis can arise due to various number of medical conditions.[4] The symptoms may occur usually bilateral and symmetrical, for Palmar Hyperhidrosis a low grade of involvement could be moist palmar surface without visible droplets of persipiration. If the sweat drips off the palms reach all the fingertips it is severe Primary Hyperhidrosis.[5] However, if patient sweats only when sleep it is secondary hyperhidrosis. Cause of Hyperhidrosis, includes psychological, endocrine and metabolic drugs and substance abuse, neoplasia, cardiovascular and respiratory disorder, febrile illness and also idiopathic.[5]

The primary function of sweat secretion is always included with thermoregulation It also includes maintainence of health and texture of skin with moisture that lead to traction of skin surface. The rate and volume of sweat production is regulated and controlled normally by hypothalamus. The sympathetic signal lead to increase

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in sweat secretion is carried out by eccrine glands.[6] There is no evidence of histopathological event show in individual with palmar Hyperhidrosis. It was identified as complex disorder of autonomic nervous system involving the sympathetic and parasympathetic pathway. In order to maintain Haemostasis in the body the afferent and efferent pathway should be maintained in balance .However, in subjects with palmar Hyperhidrosis the afferent amd efferent pathways appears to be in focal imbalance which create negative feedback.[6]

The neurotransmitter involve is acetylcholine. Hyperhidrosis is according to the stimuli that initiates sweating response , stimuli is associated with sites within the nervous system where neuronal impulse for sweating originate, emotional sweating stimuli originate from cortical reflex, justatory sweating originate from medullary, thermoregulatory sweating from hypothalamus origin.[7]

Hyperhidrosis usually affects one or more than one area of the body predominantly seen in hand, armpit, feet, head and also inguinal region.[8]The nomenculature of palmar Hyperhidrosis is related to the anatomical location. Cranial Hyperhidrosis is termed when condition occurs in face and scalp, palmar hyperhidrosis in palmar region, axillary Hyperhidrosis in armpit, inguinal Hyperhidrosis in inguinal region, plantar Hyperhidrosis in plantar region. Palmar Hyperhidrosis as an natural history of onset with excessive sweating in childhood, for most of the individual. It is manifested itself more strongly in the ages of hormone and sexual mensuration during adolescent period. Even in cold temperature and even during rest the people with palmar Hyperhidrosis sweat because of the overactive sweat glands. Palmar Hyperhidrosis occur when the sweat glands are triggered by the nervous system. The degree of sweating usually varies and ranges from moderate moisture to the level of dripping . The hands often assume a bluish -reddish colouration.

Galvanic, or direct current, is a form of electrotherapy treatment. Galvanism is a direct current with a low voltage and amperage. The waveform is a continuous or pulsed flow of electrons. The flow of electrons in the direction of the negative pole results in electrochemical effects at the poles of the circuit. The electrochemical effect results in certain physiological alterations to the tissues at the site of application. The electrical current, rectified to a safe, low-voltage level is applied to the body via electrodes placed on the skin. The flow of current through an effected region may reduce pain by inhibiting pain receptors. As it is also thought to enhance the transport of ionized substances through the skin, it can also be used to promote the resorption.

Faradic current is a short duration interrupted direct current with a pulse duration ranging from 0.1 to 1 ms with a frequency of 50 to 100 Hz. Faradic current is surged to produce tetanic contraction and relaxation of the muscle.

Treatment with faradic current also known as faradism. Faradic currents are always surged for treatment purposes to produce a near normal tetanic-like contraction and relaxation of muscle. Current surging means the gradual increase and decrease of the peak intensity. The aim of the current study is to find the effect of faradic and galvanic current on subjects with palmar Hyperhidrosis.[15-22]

MATERIAL AND METHODS

Thirty Subjects participated in this study with mean value of age with maximum 30 years and minimum 18 years . Concern form was signed before the procedure the complete process of treatment intervention and outcome measure procedure also the possible side effects has been explained completely. The subjects were randomly selected based on the inclusion and exclusion criteria. The study was conducted in physiotherapy OP department, faculty of physiotherapy, ACS medical college and Hospital under the supervision of my guide . Both the genders of above mentioned age groups were included in the study,[10] subjects with visible and excessive sweating with minimum 6 month duration and bilateral and symmetrical sweating and who also complains sweating during sleep.[10] Subjects with Hyperthyroidism, Diabetes mellitus, spinal Cord injury, local wounds, burns, metal implants were excluded.[11] A detailed history and examination were carried out on each and every patient.[11] The 30 patients who are randomly selected were divided into two groups. Group A includes 15 subjects who were diagnosed with palmar Hyperhidrosis and Group B also included subjects with Palmar Hyperhidrosis who were also 15. Intervention will be done using tap water Galvanism for Group A and tap water Faradism for Group B. At the beginning and at the end of treatment duration the subjects will be tested using Modified starch Iondine test

INTERVENTION

Group A - Tapwater Faradism

Group-A will be treated using tap water faradism for about 20 minutes per session for 3 session a week, 6 weeks for this group .Faradic current was given with 900 ms pulse width 100 ms of rest period until the tolerance limit was reached. The patient is made to sit in a chair, the arm is slightly abducted and forearm pronated with palm facing downwards. Fill the tray with tap water at room temperature to the top of the electrodes. Place the hand in a bath containing enough water to cover the palms. Electrodes can be placed under the palm. Check the apparatus, turn on intensity knob at zero and gradually increase the intensity knob. Instructions were given to the subjects to inform if there is any burning sensation or if it becomes uncomfortable. After the treatment gets over the area has to be checked.

Figure 1 Tap water Faradism

Group B -Tapwater Galvanism

Group-A will be treated using tap water Galvanism for about 20 minutes per session for 3 session a week, 6 weeks for this group .Galvanic current was given with an intensity of minimum 15 mA maximum 20 mA until the tolerance limit was reached.[12] The patient is made to sit in a chair , the arm is slightly abducted and forearm pronated with palm facing downwards. Fill the tray with tap water at room temperature to the top of the electrodes. place the hand in a bath containing enough water to cover the palms. Electrodes can be placed under the palm. check the apparatus, turn on intensity knob at zero and gradually increase the intensity knob. Instructions were given to the subjects to inform if there is any burning sensation or if it becomes uncomfortable. After the treatment gets over the area has to be checked (Figure 2).

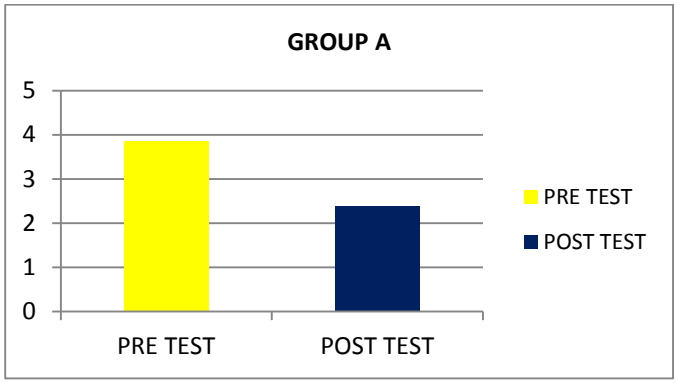
Figure 2 Tap water Galvanism

Outcome Measure

The pre-test and post-test were done by using Starch Iodine Test.[13] The subject skin should be cleaned and dried. The modified Starch iodine test utilizes Betadine Tm solution is applied over the field. After the solution is thoroughly dried, a starch power (cooking starch) is dusted on the skin area using a cotton ball / fine brush. The sweat moisture dissolves the iodine and starch which turns the light brown iodine color into a dark purple color.

Table 1. Comparison within group a (Tap-water Faradism) pre-test and post-test values using modified starch iodine test

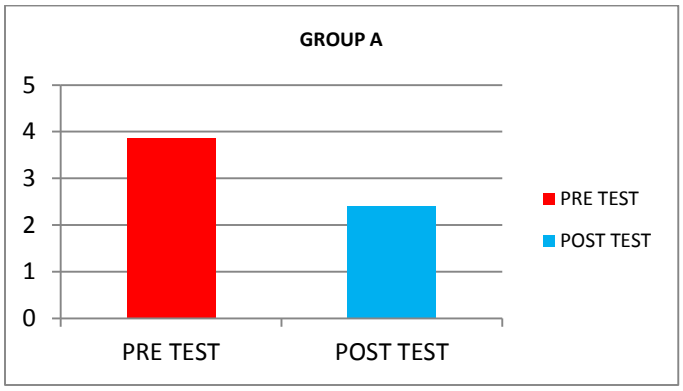
# TEST	PRE TEST	POST TEST	t - TEST	df	SIGNIFICANCE
	MEAN±S.D	MEAN±S.D			
GROUP A	3.93±0.88	2.40±0.88	11.50	14	.000***



Graph 1. Comparison within group a (tapwater faradism) pre-test & post-test values using modified starch iodine test

Table 2. Comparison within group b (tap water galvanism) pre-test & post-test values using modified starch iodine test

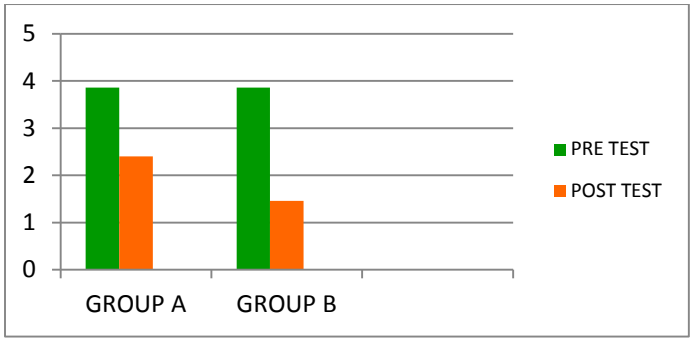
# TEST	PRE-TEST	POST-TEST	t - TEST	df	SIGNIFICANCE
	MEAN± S.D	MEAN± S.D			
GROUP B	3.86±1.06	1.46±1.06	11.22	14	.000***



Graph 2. Comparison within group b (tap water galvanism) pre & Post-test values using modified starch iodine test

Table 3. Comparison between Group – A ((tapwater faradism) and group - b(tap water galvanism) pre and post-test values

#DSS	GROUP A	GROUP B	t - TEST	df	SIGNIFICANCE
	MEAN± S.D	MEAN± S.D S.D			
PRE TEST	3.93±0.88	3.86±1.06	0.187	28	.426
POST TEST	2.40±1.05	1.46±0.63	2.928	28	.042**



Graph 3. Comparison between group – a((tapwater faradism) and group - b(tap water galvanism) pre and Post-test values

RESULTS

On comparing Pre-test **3.93** and Post-test **2.40** mean values within Group A (Tapwater Faradism) Using Modified Starch

Iodine Test shows highly significant difference between Pre-test and Post-test mean values at **P ≤ 0.001**. The Post-test values have shown improvement when compared with pre test. Hence the null hypothesis is rejected.

On comparing Pre-test **3.86**and Post-test **1.46** mean values within Group B (Tap Water Galvanism) Using Modified Starch Iodine Test shows highly significant difference between Pre-test and Post-test mean values at **P ≤ 0.001.** The Post-test values have shown improvement when compared with pre-test. Hence the null hypothesis is rejected.

On comparing Pre-test 3.93 and 3.86 mean values and Post-test 2.40 and 1.46 mean values between Group A and Group B shows significant difference between Pre-test and Post-test mean values ,however Group B shows highly significant difference than Group A at **P ≤ 0.05.** Hence the null hypothesis is rejected.

Hence the result proves that both the groups shows significant difference in mean values, however Group B treated using Tap Water Galvanism is highly significant than Group A treated using Tapwater Faradism.

DISCUSSION

This manuscript provides an efficiency of interventions for the treatment of palmar hyperhidrosis**.** Hyperhidrosis is excessive sweating in excess of the physiological need for thermoregulation, often resulting in social, emotional, and occupational impairment. This condition can be primary or secondary. Primary hyperhidrosis is idiopathic, symmetrical, excessive sweating in the axillae, palms, soles, face, and rarely in the creases of the scalp and groin. Secondary hyperhidrosis can be localized or generalized and is caused by an underlying disorder or drug use. Since 1952 Iontophoresis has been found effective in treating Palmer and plantar Hyperhidrosis. Therapeutic effect appears after 6-15 session of treatments. The lasting effect of Iontophoresis in decreasing sweat is controversial.[2]

Reinauer, et al. 1995 described normal sweat secretion of palm after the treatment session using pulsed direct current of frequency 4.3 or 10 kHZ with Palmer Hyperhidrosis on 30 patients.[23]

Dogruk, et al. 2014 has found and reported there was decrease in sweating at the end of tap water Iontophoresis treatment.[24]

Kreyden 2004 has described that Iontophoresis using tap water has proven controlling symptoms in 81% of patients.[25]

Sato, et al. reported in 1993 that strong acidity has been reduced in sweat duct because of the increase H+ ions by tap water Iontophoresis intervention mechanism of action remains unclear using Iontophoresis.[26]

Sato,et al. has been suggested in a study that PH in sweat glands pores increase the amount of Hydrogen ions that contributed to ecrine sweat glands dysfunction during tap water Iontophoresis.[26]

Palmar Hyperhidrosis has a very important impact on quality of life of an individual in the society. There are many treatment intervention available helping patient improve the quality of life.[14] Iontophoresis is an intervention procedure in which the ions are passed through the skin by application of current. Tap water Iontophoresis is an effective treatment method for plantar as well as Palmer Hyperhidrosis. Production of hand Hyperhidrosis is not completely understood. However, sweat duct obstruction is a possible cause.[14] The current study is to analyse the effect of tap water faradism and tap water galvanism in treating Palmer Hyperhidrosis.

The study sample were randomly selected and divided into Group A and Group B. Group A were treated using tap water Far as I am, far as I can current with 900ms pulse and 100 Ms of rest period was given for about 20 minutes per session. Group B was treated using tap water galvanism, with intensity of minimum 15mA to a maximum of about 20mA. Per and Post-test was taken in prior to the treatment and after the treatment protocol based on the previous and Post-test analysis was done. On comparing within Group A using tap water faradism there was significant difference between the mean values.

On comparing both group A and group B the analysis shows significant difference between their pre and post values .However , group B has shown highly significant difference in post values tan group A.

According to current study I recommend with certain limitations that we can use both tap water faradism and tap water galvanism for the treatment of palmar Hyperhidrosis, but tap water galvanism is more effective comparing the both.

CONCLUSION

Without treatment, palmar hyperhidrosis is often lifelong. The disease tends to improve after the age of 40 because the eccrine sweat glands become less active with age.

This six week study result showed that both Tap Water Faradism and Tap Water Galvanism were found improvement in modified starch Iodine test. Tap water Galvanism shows more significant improvement than the Tap water faradism in palmar Hyperhidrosis. This study proves that Tap water Galvanism can be given effectively to treat palmar hyperhidrosis. This treatment method was well tolerated without serious side effect. In futurelarge sample size can be analyzed,and the treatment timing also can be increased, other chemicals like aluminium chloride and be used to find the comparative efficacy.

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