

Skin Temperature Changes to Strong Low Rate Acupuncture -Like TENS in Raynaud's Disease.

Z. Mowafy Emam Mowafy* and Akef A Khowailed**

* Physical Therapy Department for Surgery , Faculty of Physical Therapy, Cairo University, Egypt.

** Physiology Department Faculty of Medicine , Cairo University, Egypt.

Abstract

The purpose of this study was to determine the effect of the strong low rate (SLR) acupuncture -like TENS on the skin temperature in Raynaud's disease. Forty patients (30 females and 10 males) suffering from Raynaud's disease with no other systemic or metabolic disorders, participated in this study. Their age ranged from 20 to 40 years ($X=27.35 \pm 4.41$). They were divided randomly into two groups of equal number and consented to receive SLR, Acupuncture-like TENS for the first study group and placebo TENS for the second control group, on the thoraco-lumber region from a dual -channel TENS unit. Assessment of the skin temperature from the big toe and little finger was carried out before and after treatment (session for 20 minutes) at the same times on 3 consecutive days, in an air conditioned room, with the ambient room temperature was adjusted between 24°C to 28°C. Before starting the treatment program results showed no significant difference in the toe skin temperature (TST), in °C between the study and control groups as it was 29.91 ± 2.44 and 28.7 ± 1.23 for the study and control groups respectively. Also no significant difference was recorded in the finger skin temperature (FST), as it was 28.85 ± 2.36 and 27.45 ± 1.17 for the study and control groups respectively. Data collected at the end of the treatment program showed that averages of the (TST) in °C were 31.44 ± 2.57 and 28.85 ± 1.237 in the study and control groups respectively. While averages of (FST) in °C were 30.75 ± 2.51 and 27.66 ± 1.186 in the study and control groups respectively. Results showed a significant increase in TST and FST at the end of the treatment program in the experimental group only, which suggested that SLR acupuncture -like TENS could be fruitful in Raynaud's disease.

Introduction

Raynaud's disease is an idiopathic trophoneurosis that is characterized by paroxysmal spasm of the digital arterioles, producing pallor or cyanosis of fingers or toes with numbness and occasionally resulting in gangrene,^{3,7,10}.

It is a disease of young women described by a French physician called Raynaud,^{2,5,13}.

Spasm of the digital arterioles causes capillary flow to cease, so that fingers or toes go white and numb. As

the spasm disappears there is a reactive hyperaemia, the color of fingers or toes changes from blue to red, they throb, and patient experiences pins and needles,^{11,14,22}.

In some patients as the disease advances, the spasm fails to relax completely and in the course of time actual necrosis of fingers or toes tips may develop,^{8,15,26}.

Electrical eels were known to the Ancient Egyptians and to Hippocrates,

for the treatment of gout and headache,^{1,4,6,12}.

William Gilbert was the first to classify and generalize the phenomenon of electricity and the efficacy of TENS as a modality in the treatment of pain which has now been well established,^{23,25,30}.

There is a strong indication that TENS influences the autonomic nervous system dramatically, and may affect changes of neurohumoral mechanisms within the central nervous system, but investigation and further research in this area is still needed,^{9,18,20,28}.

Material and methods

Subjects:-

Forty patients (30 females, and 10 males) ranging in age from 20 to 40 years, selected from the out patient - clinics of Kasr-El-Aini (Cairo University Hospitals). They were divided randomly into two groups of equal number. The first (study) group received low TENS and the second (control) group received placebo TENS. All patients received the same physiotherapeutical program and the same medical and nursing care.

Instrumentation:-

The treatment equipment was a dual channel TENS stimulator, model DH- 808, made by DAE HAN in Korea. The stimulation parameters and the principal characteristics of the low TENS were, 10 Hz for the frequency, 400 µsec for the pulse width, 80mA for the intensity (strong to the level of tolerance with rhythmic visible muscle contractions),^{16,19,27}.

The measuring equipment in this study was, an electronic thermometer (Badr Telecom) number 6728085, model (RKIII) made in Japan.

Procedure:-

Evaluation

Recording the (TST) and the (FST), was conducted before and after the treatment program. The evaluation and treatment were conducted in an air conditioned room, where a thermometer was available to maintain the ambient room temperature between 24°C to 28°C by setting the thermostat of the air condition,^{17,24,29}.

Treatment:-

According to the aforementioned stimulation parameters and principal characteristics of the SLR, acupuncture –like TENS, the dual channel TENS stimulator was used to administer the SLR, acupuncture–like TENS via 4 self–adhesive electrodes, that were placed over the thoraco-lumber junction paravertebrally (2 electrodes over the thoraco lumber junction and the other two electrodes below the thoraco-lumber junction), with the patient sitting on a stool,^{5,10,18}.

Data Analysis:-

One session for 20 minutes daily, conducted at the same time on 3 consecutive days was administered via the TENS stimulator. The TST and FST were recorded before and after treatment program. The collected data were fed into a computer for statistical analysis, the descriptive statistics as mean, standard deviation, minimum and maximum, were calculated for each group. The t –Test was done to compare between the mean differences of the two groups and within each group. Alpha point of 0.05 was used as a level of significance,²¹.

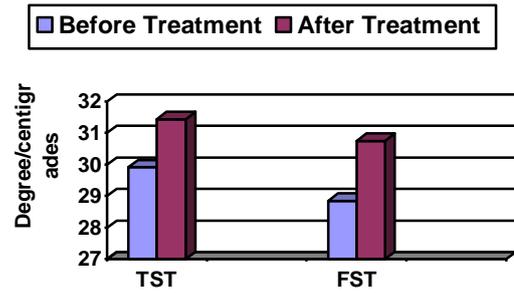
Results:-

In the present study, the effect of the SLR acupuncture –like TENS on

TST and FST in Raynaud's disease was investigated. As shown in table (1) and demonstrated in Figure (1), the mean values of the TST before treatment in the study group was $(29.91 \pm 2.44)^\circ\text{C}$, while after treatment was $(31.44 \pm 2.57)^\circ\text{C}$. These results revealed a significant increase in TST ($P < 0.05$). Also the mean values of the FST in the experimental group before treatment was $(28.85 \pm 2.36)^\circ\text{C}$, while after treatment was $(30.75 \pm 2.51)^\circ\text{C}$. Also these results revealed a significant increase in the FST ($P < 0.05$). But in the control group as shown in table (2), and demonstrated in figure(2), the mean values of the TST before treatment was $(28.7 \pm 1.230)^\circ\text{C}$ while after treatment was $(28.85 \pm 1.237)^\circ\text{C}$. These results revealed a non-significant increase in TST ($P > 0.05$). Also the mean values of the FST in the control group before treatment was $(27.45 \pm 1.17)^\circ\text{C}$, while after treatment was $(27.66 \pm 1.18)^\circ\text{C}$, also these results revealed a non-significant increase in the FST ($P > 0.05$).

Table (1): Comparison of the mean values of TST, and FST in °C before and after treatment in the study group.

	Before Treatment		After Treatment		P. Value
	X	SD	X	SD	
TST	29.91	2.44	31.44	2.57	<0.05
FST	28.85	2.36	30.75	2.51	<0.05

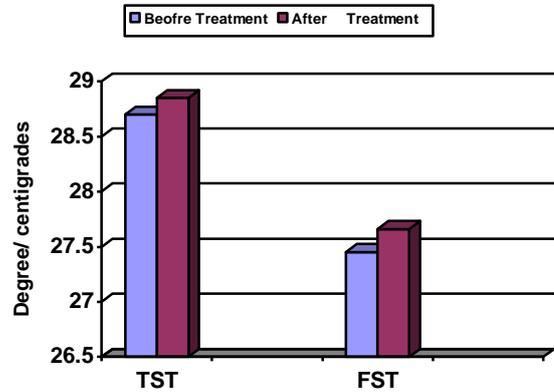


Evaluation Parameters

Fig. (1): mean values of TST and FST before and after treatment in the study group.

Table (2): Comparison of the mean values of TST, and FST in C° before and after treatment in the control group.

	Before Treatment		After Treatment		P. Value
	X	SD	X	SD	
TST	28.7	1.23	28.85	1.23	>0.05
FST	27.45	1.17	27.66	1.18	>0.05



Evaluation Parameters

Fig.(2) : mean values of TST and FST before and after treatment in the control group.

Discussion:-

In the course of the nineteenth century, electrical and mechanical stimulation were employed as a therapy

for many diseases by a large number of practising physicians. But in the twentieth century, with the increased number of efficient analgesics, turned interest away from peripheral stimulation as a pain relieving mode until Melzak and Wall(1965), published their gate control theory of pain, then conventional TENS was introduced as a test for the gate control theory of pain by WALL and Sweet in 1967,^{8,13,19.}

Raynaud's disease is a functional arterial disease caused by vasospasm, most often affecting arteries of fingers, characterized by an abnormality in the sympathetic nervous system, sensitivity to cold, blanching and cyanosis of the finger tips and nail beds, severe pain, sensory loss (tingling or numbness) and decreased hand function,^{15,26,30.}

The findings of the present study showed no significant difference in the pre-treatment records of the TST and FST, between the mean values of the first (study) and the second (control) groups. Results of control group were compared with each other and showed a non significant difference in both TST and FST before and after treatment ($P>0.05$). But results a of the experimental group revealed a significant increase in both TST and FST after the application of the SLR acupuncture –like TENS, where TST (2) compared with mean value of TST (1) as well as FST(2) compared with the mean value of FST (1), the significant increase in both TST and FST in the experimental group was consistent with those observed and recorded by Kaada et al, 1991; Rang and Dale ,1991; Skodler et al., 1987: Gersh and Wolf 1984, and Fischbach et al., 1979.

Results of this study supports the expectation that SLR, acupuncture - Like-TENS was significantly effective in producing prolonged and widespread sympathetic inhibition resulting in

improved skin micro-circulation, increased skin temperature, promoted tissue perfusion, decreased arterial level of catecholamines and decreased sympathetic tone.

Conclusion:-

The SLR, acupuncture –like TENS application was effective in increasing skin temperature via sympathetic inhibition, ameliorating the cutaneous blood flow and improving the Raynaud's phenomenon.

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تغيرات درجة حرارة الجلد الناتجة عن التنبيه العصبى الكهربى ذو الترددات المنخفضة و المماثل للوخز بالابر الصينية عبر الجلد لداء رينو.

*** زكريا موافى إمام موافى ، عاكف خويلد ****

* قسم العلاج الطبيعى للجراحة – كلية العلاج الطبيعى – جامعة القاهرة

** قسم الفسيولوجى – كلية الطب – جامعة القاهرة

انجزت هذه الدراسة لتحديد مدى تأثير التنبيه العصبى الكهربى ذو الترددات المنخفضة و المماثل للوخز بالابر الصينية عبر الجلد على درجة حرارة الجلد فى حالات داء رينو. اشترك فى هذه الدراسة اربعون مريضاً (عشرة من الرجال و ثلاثون من النساء). يعانون من داء رينو وبدون مشاكل ايضية او جهازية. وكانت اعمارهم تتراوح من 20 الى 40 سنة، و لقد تم تقسيمهم الى مجموعتين متساويتين فى العدد، و اخذت موافقتهم على تلقى التنبيه العصبى الكهربى ذو الترددات المنخفضة و المماثل للوخز بالابر الصينية عبر الجلد للمجموعة الاولى (دراسة) و التنبيه العصبى الكهربى الكاذب و الغير مؤذى للمجموعة الثانية (الضابطة) من وحدة جهاز مزدوج القناة على المنطقة الصدرية القطنية من الظهر. ولقد تم تقييم درجة حرارة الجلد لكلا من الاصبع الكبير للقدم و الخنصر بواسطة مقياس الحرارة الالكترونى ، قبل وبعد العلاج (جلسة واحدة لمدة عشرين دقيقة) فى نفس الاوقات لمدة ثلاثة ايام متتالية فى حجرة مكيفة درجة حرارتها مضبوطة بين 24، 28 درجة مئوية . و لقد اظهر البحث انه كان هناك زيادة ذات دلالة منعوية فى متوسط درجة حرارة جلد كلا من اصبع القدم الكبير و الخنصر بالمجموعة الاولى (دراسة) فقط. ولذا كان التنبيه العصبى الكهربى ذو الترددات المنخفضة و المماثل للوخز بالابر الصينية مثير و فعال فى حالات داء رينو.