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EFFECT OF ACU-TENS ON SNORING

MANDEEP BEDI[1] AND JASOBANTA SETHI*[2]

[1] Department of Physiotherapy, Lovely Professional University, Punjab
[2] Department of Physiotherapy, Lovely Professional University, Punjab

ABSTRACT

Improving sleep disturbances in patients with snoring are of primary importance. The purpose of this study was to examine the effect of TENS on acupoints (HT4, HT5, HT6) in patients with snoring. 60 subjects with 18-65 yrs of age, who had complains of snoring were assigned to 2 groups; Experimental group (treated with TENS, Diet and Deep Breathing Exercise) and Control group (treated with Placebo TENS, Diet and Deep Breathing Exercise) and were given treatment for 15 days. Pre and post test readings of snoring by using the Epworth Sleepiness Scale, Berlin Questionnaire of patients in both the groups were taken before and after intervention. ignificant difference was found within experimental group and between the groups in reduction of snoring.

KEY WORDS: Acu-TENS, Snoring, Acupoints

JASOBANTA SETHI
Professor & Head, Department of Physiotherapy,
Lovely Professional University, Punjab

***Corresponding author**

INTRODUCTION

Snoring is the hoarse or harsh sound that occurs when your breathing is partially obstructed in some way while you're sleeping. Snoring is the vibration of respiratory structures and the resulting sound due to obstructed air movement during breathing while sleeping. It's a respiratory sound (or noise) which originates during sleep and also can be nocturnal or diurnal. It is a typical inspiratory sound even though a small expiratory component can be heard or recorded (especially in OSAS patients) with different spectral features.[1] In our present study, we have examined the effect of transcutaneous electrical nerve stimulation on acupoints for reduction of snoring.

MATERIALS AND METHODS

60 patients with snoring between age group 18–65 years were included in the study, according to the specified inclusion and exclusion criteria and informed to sign the consent form by explaining the whole procedure of the study. They were divided into 2 groups with 30 patients each; Group A (TENS, breathing exercise, diet plan) and Group B (Placebo TENS, breathing exercise, diet plan). Pre test readings of snoring by using the Epworth Sleepiness Scale, Berlin Questionnaire of patients in both the groups were taken before the intervention. A pilot study was done on 10 patients by using TENS with 15Hz, Pulse width of 200µs and 10 mA intensity on acupoints with diet and breathing exercise.

Intervention Protocol

Group A received treatment of TENS on acupoints (HT4, HT5, HT6) bilaterally on the ulnar aspect of the forearm with frequency of 15Hz, Pulse width of 200µs and intensity of 10 mA for 10 minutes per day for 15 days, whereas Group B received placebo TENS. According to atlas of acupuncture, acupoints are located on the ulnar aspect of the forearm, HT4 Lingdao - With the palm facing up, the point is found 1.5 cm above the transverse crease of the wrist at HT7. HT5 Tongli - 1 cm above HT7 on a line connecting HT3 and HT7. HT6 Yinxi - 0.5 cm above HT7 on a line connecting HT3 and HT7. [2] Simple diet (usual diet, eliminating mucus-producing foods, such as bananas, taking low-fat dairy, low fatty diets, avoiding saturated fat like meats, butter, and processed foods) and deep breathing exercise (10s hold followed by 10s relax) for 10 minutes, 2 times a day (morning and night i.e. before going to bed) was advised to both the groups to follow strictly for 15days. TENS were given to both groups (experimental group and control group with the placebo effect along with measurement of pre and post reading. The data were collected and analyzed.

RESULTS

Table 1
Mean and SD of age of the subjects for the Group A and Group B

Age	Mean ± SD	t Value	Level of Significance
Group A	42.53 ± 11.00	1.301	0.198
Group B	38.60 ± 12.38		NS

Comparison of mean and standard deviation of subject's age (18- 65 years) between the groups A (Experimental) and group B (Control). The mean age of group A was 42.53 ± 11.00 and that of group B was 38.60 ± 12.38 respectively. The unpaired t test value was 1.301 ($p > 0.05$). There was no significant difference in the age group.

Table 2

Mean and SD of BMI of the subjects for the Group A and Group B

Age	Mean ± SD	t Value	Level of Significance
Group A	27.11 ± 3.68	1.815	0.074
Group B	25.55 ± 2.95		NS

Comparison of mean and standard deviation of subject's BMI between the groups A (Experimental) & group B (Control). The mean BMI of group A was 27.11 ± 3.68 and that of group B was 25.5 5 ± 2.95 respectively. The unpaired t test value was 1.815 ($p > 0.05$). There was no significant difference in the BMI.

Table 3

Paired t test for the variable Epworth Sleepiness Scale score within Group A

Epworth Sleepiness Scale score		Mean ± SD	t-value	Level of Significance.
Group A	Pre Value	7.57 ± 2.42	14.86	0.0001
	Post Value	3.13 ± 1.25		S

The mean and standard deviation of the variable Epworth Sleepiness Scale within the group A was 7.57 ± 2.42 and 3.13 ± 1.25 respectively. Paired t- test was done within group A for the variable Epworth Sleepiness Scale score to check the change s within the group. The t- value for Epworth Sleepiness Scale score was 14.86 ($p< 0.01$). The result showed that there were significant changes within the group.

Table 4

Paired t test for the variable Epworth Sleepiness Scale score within Group B

Epworth Sleepiness Scale score		Mean ± SD	t value	Level of Significance
Group B	Pre Value	7.60 ± 2.14	1	0.325
	Post Value	7.63 ± 2.13		NS

The mean and standard deviation of the variable Epworth Sleepiness Scale within the groups B was 7.60 ± 2.1 4 and 7.63 ± 2.13 respectively. Paired t- test was done within group B for the variable Epworth Sleepiness Scale score to check the changes within the group. The t- value for Epworth Sleepiness Scale score was 1 ($p > 0.05$). The result for the variable was not significant which showed that there were not significant changes within the group.

Table 5
Paired t test for the variable Berlin Questionnaire score within Group A

	Category	Mean ± SD	t value	Level of Significance
Group A	Pre Value	5.77 ± 1.72	16.97	0.0001 S
	Post Value	1.43 ± 1.14		

The mean and standard deviation of the variable Berlin Questionnaire score within the groups A was 5.77 ± 1.72 and 1.43 ± 1.14 respectively. Paired t- test was do ne within group A for the variable category to check the changes within the group. The t- value for Category was 16.97 ($p < 0.01$). The result for the variable was significant which showed that there were significant changes within the group.

Table 6
Paired t- test for the variable Berlin Questionnaire score within Group B

	Category	Mean ± SD	t-value	Level of Significance
Group B	Pre Value	5.63 ± 1.67	1.795	0.083 NS
	Post Value	5.73 ± 1.66		

The mean and standard deviation of the variable Berlin Questionnaire score within the groups B was 5.63 ± 1.67 and 5.73 ± 1.66 respectively. Paired t- test was done within group B for the variable category to check the changes within the group. The t- value for Category was 1.795 ($p > 0.05$). The result for the variable was not significant which showed that there were not significant changes within the group.

Table 7
Unpaired t test for the variable Epworth Sleepiness Scale scores between Group A and Group B

Epworth Sleepiness Scale score		Mean ± SD	t value	Level of Significance
Pre Test (0 Day)	Group A	7.57 ± 2.42	0.056	0.955 NS
	Group B	7.60. ± 2.14		
Post Test (15 Days)	Group A	3.13 ± 1.25	9.992	0.0001 S
	Group B	7.63 ± 2.13		

Unpaired t- test was done between the group A and group B to check the changes between the groups. The t-value for Epworth Sleepiness Scale score for pre test was 0.056 ($p > 0.05$) and post test 9.992 ($p < 0.01$). The results for the variables were significant which showed that there were significant changes between the groups.

Table 8
Unpaired t- test for the variable Berlin Questionnaire score between Group A and Group B

Berlin Questionnaire score		Mean ± SD	t-value	Level of Significance.
Pre Test (0 Day)	Group A	5.77 ± 1.72	0.304	0.761 NS
	Group B	5.63. ± 1.67		
Post Test (15 Days)	Group A	1.43 ± 1.14	11.71	0.0001 S
	Group B	5.73 ± 1.66		

Unpaired t test was done between the group A and Group B to check the changes between the groups. The t value for Berlin Questionnaire for pre test was 0.304 ($p> 0.05$) and post test 11.71 ($p< 0.01$). The results for the variables were significant which showed that there were significant changes between the groups.

DISCUSSION

This was the first study to use TENS on acupoints (HT4, HT5, HT6) to reduce snoring. Before starting the study, we did pilot study, which gave us an idea that TENS at frequency of 15 Hz and intensity of 10mA is effective for reducing snoring. In this study 60 patients were divided into two groups; Experimental group and Control group. 30 patients in the experimental group received TENS on acupoints bilaterally, deep breathing exercise, diet plan while the Control group was given placebo TENS, deep breathing, diet plan. Pre test readings were taken using Epworth sleepiness scale and Berlin Questionnaire. After giving intervention for fifteen days the post

readings were taken for analysis. Post test readings showed significant difference in Experimental group. The effect of TENS did not show any significant change in age group and BMI (table 1 & 2). Hence, there was no relationship of oropharyngeal muscle tone, tongue, soft palate with different BMI and age factor in snoring. Significant changes have been found within the experimental group A for sleepiness score as checked by Epworth Sleepiness Scale ($p< 0.01$) (table 3) and risk of apnea by Berlin Questionnaire score ($p< 0.01$) (table 5) and no changes was seen in Group B, this could be due to the effectiveness of TENS on acupoints. In pre and post test analysis, significant changes have been found between the groups in which experimental group A showed good prognosis in sleepiness score as checked by Epworth Sleepiness Scale ($p< 0.01$) (table 7) and risk of apnea by Berlin Questionnaire score ($p< 0.01$) (table 8). We found that TENS on bilateral HT4 HT5 HT6 acupoints is helpful to reduce snoring. This could be due to the mechanism by which acupressure works involve applying stimulation to certain meridian points on the body, including the fingers and hand to relieve pain, stimulate bodily functions and enable muscle fibers to elongate and relax. This invention is designed to create the correct bio-energetic effect on the meridian line directly affecting the nose and throat, thereby promoting noiseless quality sleep patterns, with no or reduced snoring. This study supports the mechanism as described by Carter–Smith et al. 2005.[3] TENS as peripheral stimulation on acupoints could be effective in maintaining tonicity of oropharyngeal muscles for airway clearance to reduce snoring. This study supports the report of F Chabolle et al on snoring and oropharyngeal muscular hypotonicity. Snoring demands a narrowing of upper aerial tracts, often associated to soft palate abnormally. During sleep, a loss of tonicity appears in the muscles of oro-pharaynx, beginning of soft palate tensor muscle, as evidenced by different electro-myographic tests. On the opposite, phrenic muscle conserves the same activity as when awake. An oropharyngeal muscular hypotonicity increase progressively during the four stages of R.E.M sleep and persists during non R.E.M sleep and its maximum in the last stage of R.E.M sleep.[4] A back drop of tongue and of soft palate occurs when a normal subject is in supine position, soft palate spreads itself on the posterior pharyngeal wall under the effect of gravity, explaining the efficacy of posture therapy of snoring. [4] Snoring is known to cause sleep deprivation to snorers and those around them, as well as daytime drowsiness, irritability, lack of focus and decreased libido [5]. It has also been suggested that it can cause significant psychological and social damage to sufferers[6]. Multiple studies reveal a positive correlation between loud snoring and risk of heart attack (about +34% chance) and stroke (about +67% chance) [7]. According to Fitzpatrick et al. [8] asthmatics under 40 yrs of age and "young wheezers" have a higher prevalence of "frequent snoring" than non asthmatic adults under 40 yrs of age. Studies associate loud snoring with the development of carotid artery atherosclerosis [9], the risk of brain damage and of stroke. [10] Meridians and collaterals are pathways through which Qi and blood circulate and where the exterior of the body connects with the inferior. When a disease occurs, the meridians and collaterals can be affected first, and then Zang Fu organs involved, or vice versa. [11] Zhu Bing et al who found, unblocking the meridians and collaterals is the main and most direct effect of acupuncture in the treatment of disease. Obstruction in the meridians and collaterals can be removed and circulation activated through the use of the appropriate acupuncture manipulation techniques. [11] TENS on the acupoints (HT4,HT5,HT6) could be effective by stimulating the hypoglossal nuclei to make the tongue not to fallback that extent to clear the airway during sleep. This study supports the reports of Xia et al. for acupuncture mechanism of action is based on the activation of the nerves being stimulated by the needles sending messages to CNS, especially to the reticular formation which is involved in the actions of sleep and wakefulness cycles, filtering of sensory stimuli, regulation of breathing, papillary opening, swallowing, and somatic motor activities.[12] The reticular formation nuclei

include the hypoglossal nuclei, whose fibers and neurons innervate the muscles that move the tongue. The neurochemicals released in the reticular formation include endorphins, serotonin, monoamines, or cotisol that would be responsible for clinical effects of acupuncture at both segmental and inter-segmental levels.[12] In this study, TENS on the acupoints (HT4,HT5,HT6) could be the effective afferent impulse from periphery to the higher center especially on reticular formation, tongue and soft palate in clearing the airway and reducing snoring. The study is also supported by the report of Chaitow LO stated that the segmental level known as dermatomes are symmetrically arranged in the human body and the cutaneous distribution territory for sensory and motor nerve roots that originate from a dorsal root ganglion.[12,13] These dermatomes have no specific limits and their neighboring roots overlap each other thereby it is possible to use distant points to treat certain disorders. Therefore, an afferent impulse caused by acupuncture stimulation travels from periphery to the spinal cord, ascends through the spinal cord to the reticular formation from which the effector impulses responsible for the therapeutic effects and considered as a reflex treatment called somatotrophic from a nociceptive stimulation to optimize the adaptive capacity of the body to stress. [12] As per Wang, J.Q et al. electrical currents can be applied either invasively or non invasively depending on the use of tools. The invasive method is called electroacupuncture, which stimulate the meridian point by an electric needle. Transcutaneous electrical nerve stimulation (TENS) is a non–invasive method, which stimulates the meridian point through a surface electrode. A trial studied the anti-nociceptive effects by TENS and electropuncture on rats and concluded that the electrical stimulation provided by surface electrodes is as effective as electropuncture. [14] Also, non invasive electrical stimulation does not damage the skin and thus the users to continue everyday if necessary. [15] Thus, the result of the study suggests that TENS as non–medication therapy can reduce therapeutic cost with its better and faster effect and we recommended the patients with snoring to go for the treatment with TENS. Commonly, people who are suffering from snoring buy anti snoring devices and go for several surgical techniques which has side effects. This new approach of reduced snoring gives a new treatment procedure which is free from any side effects.

CONCLUSION

It has been concluded that the transcutaneous nerve stimulation on acupoints of HT4, HT5, HT6 can be a safe and new method in decreasing snoring.

DECLARATION OF INTERESTS

Conflict of interest declared none.

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