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Original Article

Determining the effect of laser acupuncture in treating stutterers in comparison with speech therapy

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Abstract

Background: Investigation of strategies and methods of therapy in stutterers regarding to its characteristics, length of treatment, and relapse of stuttering is very important. Acupuncture has been introduced as a therapeutic method for the treatment of stuttering. The aim of the present research was the identification of the results of intervention of laser acupuncture in comparison with speech therapy in stutterers.

Materials and Methods: This clinical — trial and case control research was conducted on 20 stutterers and 20 non-stutterers. In the present study, speech therapy and laser acupuncture were used on 10 persons who had developmental stuttering from childhood.

Results: The results were compared with the data of speech therapy and placebo laser in 10 control subjects. All of the subjects were followed up for 12 weeks after the intervention. The obtained data showed that accompanying of speech therapy with laser acupuncture resulted the increasing of maintenance and therapeutic effects of stuttering treatment and decreasing of relapsing. The speech rate and percent of stuttered words before and after the intervention in both groups (A and B) were decreased. Following the results after 12 weeks showed that the results were stable in laser group more than the other group and there was a significant difference between the two groups.

Conclusion: The results of the present study showed that using of laser acupuncture therapy accompanying by speech therapy has many effects on the treatment of stuttering and prevents the relapsing of stuttering that is very common.

Key Words: Acupuncture, laser, outcome, stuttering, treatment

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INTRODUCTION

Stuttering is caused by the occurrence of interruptions in speech motion behaviors, which prevents the fluency of speech (due to repeated sounds and syllables, stretching the sounds, locking and broken words).[1] The cause of stuttering is not known[2] and therefore, it has not been determined the proper treatment of this disorder yet. In general, for all of PWS, if it is only considered to reduce the non-fluent speech, it seems

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that the airflow technique is a very useful intervention for stuttering therapy.[3,4] However, the recurrence of stuttering is also a major factor.[5,6] Obviously, the treatment of stuttering is still needed for improvement and further development. In recent years, by using the tools and equipment and new technologies, ambiguous points have been cleared about stuttering, especially in the field of neurological differences related to the cerebral hemispheres of stutterers and non-stutterers, which represent the functional and structural differences between stutterers and non-stutterers. These findings are often obtained by using fMRI and PET scan. The assumptions about the causes of developmental stuttering have focused on functional disorder of speech motor control, unusual distinction of speech and language processing,[7-10] defects of language production system,[11] and sensory deficits in certain parts of auditory[12] or a complex combination of motor and language deficits.[13,14] These findings show that the involved brain areas in the process of speech and the tongue of stutterers during stuttering and during fluent speech are different. These differences exist during non-fluent speech between stuttering and non-stuttering subjects as well. These results have been mostly achieved in the European countries, the USA and Australia.[15] People who suffer from diseases or disorders and are not easily treated by conventional medical methods are desired to the interventions, which have not been studied systematically and scientifically. For example, in the United States in 1990, 425 million people were examined by alternative medicine healers with a cost of about $12 billion for health interventions that have not been critically evaluated.[16] Acupuncture has been raised for many years as an alternative or complementary medicine. Many people believe that the method is effective in reducing disorders such as back pain, headaches, and drug addiction. Researches on the effectiveness of this method have been conducted on some problems such as pain[17] and addiction to drugs such as heroin.[18] However, there were low standards for the control of scientific data.[17] Anyhow, the use of acupuncture was considered positive in problems such as pain and drug addiction. Recent studies on the use of acupuncture have been reported about the bronchial asthma in 50 children during 10 days.[19] Amirov[20] in a received report about 142 patients with pneumonia who were divided into two groups (one group just the drug therapy and one group drug therapy and laser therapy) concluded that the laser therapy was an effective treatment. This idea has been proposed recently that diseases and disorders are determined by individual factors. Recently, many disorders (such as coronary artery disease) have been identified as the result of a combination of several factors.[21] The purpose of acupuncture is leading each of these factors to determine the tissue itself associated with the disease or the disorder. In this viewpoint, it is believed that the disorder is due to the obstruction or malfunction in vital energy pathways. The primary documents in connection with the existing energy pathways in the Chinese traditional theory have been presented in western science.[22] The desired spots in the acupuncture can be stimulated in two ways, using needle (needle-based) and laser (laser-based). In the viewpoint of needle-based, the needle is inserted into the selected spots. Meanwhile, in the viewpoint of laser-based, selected spots are stimulated by laser technology. In Chinese traditional medicine resources, the application of acupuncture for the treatment of stuttering is introduced with emphasis on enhancing the energy pathways toward the heart and tongue.[23] Recently, only one scientific report has been reported about the effect of Chinese traditional acupuncture on the treatment of stuttering.[15] This research has been conducted based on classical Chinese medical theory. This theory states that stuttering is caused by a specific imbalance in energy pathways between the heart and the tongue. In this theory, the Heart-5 spot is introduced as a spot for the treatment of stuttering and related speech disorders. In this study, the stimulation by a needle prick was used as the main spot. It is believed that the impact on the energy path, emanating from the arm through the heart to tongue, affects the muscles of speech.[24] In this study is based on the introduced spots by classical Chinese medical theory, which knows the cause of stuttering due to certain imbalance in the energy pathways between the heart and tongue, and presented significant relationship between anxiety and stuttering; those spots are considered that either help to balance the energy or reduce the person's anxiety. Thus, it leads to a decrease in stuttering. Since the stimulation by the needle causes stress in the samples and reduce their motivation to participate in the study, and on the other hand, for the decrease of the needles' sterilization and pain resulting from them, it was decided to use the method of stimulation with laser technology (Laser-based) in this study. The purpose of this study was the evaluation of effectiveness of traditional acupuncture laser (laser-based) on the treatment of stuttering in 20 stutterers.

MATERIALS AND METHODS

The present study was a single-blind clinical trial by using the control and treatment groups in Isfahan University of Medical Sciences from October 2008 until November 2009. Ethical approval for this study was obtained from the Medical Research Ethics Committee of Isfahan University of Medical Sciences. Referred interested patients were selected through a notice

in speech therapy clinics of Isfahan. In this study, at first, 35 male and female stutterers were registered and declared their readiness. Finally, 15 patients were excluded from the study due to the unwillingness to proceed and 20 PWS with the age range of 15-35 years old remained in the study until the end. All samples had a developmental stuttering from the childhood (between 2-5 years of age and at least for 10 years). There were 13 patients with a history of stuttering therapy, seven patients had no such history, and 15 subjects had a family history of stuttering. All samples were divided randomly into two groups of 10. Therapeutic intervention was carried out in two ways in the present study, one group (case group) with speech therapy and real laser treatment and the other group (control group) with speech therapy and placebo laser therapy. In the real laser treatment, the laser light was applied to each spot vertically by using Endolaser 476 (Enrat-Nonius) instrument made in Denmark and from the laser type of Gallium-Arsenide-Aluminum with a maximum power output of 39 m w/cm^2 J to the selected spots with 1/3 J(13 J / cm^2) in 30 seconds. In placebo laser treatment, a typical red light was emitted with the power of zero at the same time on the selected spots. Both groups received a conventional and similar speech therapy during the study. Laser treatment was carried out as single blind and neither the therapists nor the patients were unaware of the real nature of laser light. Random grouping of samples and adjustment of the laser instrument was performed by a third expert (who did not participate in the study) with coding. The obtained results from the evaluation were recorded with no names and only registered by a proprietary code in a table. The main inclusion criteria of the samples to the study were having stuttered protests including retention (block) and repetition. None of the subjects had received any treatment plans from three months before the study (speech therapy, drug therapy, etc). Before the intervention, acupuncture techniques and laser treatment were described for all of the samples. They were told that the subjects would be divided randomly into two groups (one group with real laser treatment and speech therapy [control group] and the other group the placebo laser therapy along with speech therapy). Given these circumstances including replication of signals, family history, stuttering, and development of stuttering in early childhood (2-5 years), it seems reasonable to assume that the origin of their disorder could be idiopathic.[2] All participated subjects in the study signed a written consent and they allowed the laser excitation. The simulated spots for this study were selected by using acupuncture reliable sources.[22,24-27] The areas included were H5, LI4, P6, SI17, St9, CV23, CV24, and EX5. In order to evaluate the impact of interventions on the stuttering samples, evaluation of the stutters by the percentage of stuttered syllables (% SS) and the speech rate based on the number of syllables per minute (SPM), it was performed in three time phases including pre-intervention (A), immediately after the intervention (B), and three months after the intervention (C). The results were compared with each other and the analyses of results are presented in Table 1. The samples in the first group had a weekly 30-minute speech therapy session and one real session of laser therapy stimulation. The second group had a weekly 30-minute speech therapy session and one placebo session of laser therapy stimulation. Data were entered by using SPSS software version 18 and in order to investigate the effect of laser therapy at different times in each group, the analysis of variance test with repeated observations (repeated measure ANOVA) was performed. Independent T-test was used for the comparison of the mean of SS% between the two groups.

RESULTS

In the study, 20 subjects with stutter were enrolled and all of the samples were randomly placed into two groups of 10 subjects (mean age of 23.7 years) who stayed until the end of study. ANOVA test results showed that in case group (real laser treatment), the comparison of the mean of SS% was not the same in the mentioned three times ($P < 0.001$). Meanwhile, T-paired test showed that in the case group, the mean of SS% after the treatment was significantly reduced ($P < 0.001$). Comparison of the results from three months after treatment in the case group and immediately after the treatment was slightly reduced. However, this decrease was not significant ($P = 0.43$) [Table 1]. Test of R. M. ANOVA indicated that in the control group (placebo), the mean of SS% was not the same in the mentioned three times ($P < 0.001$). T-paired test showed that the mean of SS% immediately after the treatment was significantly reduced ($P < 0.001$)

Table 1: Comparison of the mean of SS% in both case and control groups at the three times of investigation

Group	Before the treatment		After the treatment		Three months after the treatment		*P* value
	Mean	± SD	Mean	± SD	Mean	± SD	
Case (Real)	20.1	2.3	5.4	1.6	5.1	1.6	<0.001
Control (Placebo)	17.7	4.6	7.0	1.6	8.7	2.0	<0.001
P-value	0.16		0.04		<0.001		<0.005

than before the treatment. However, there was a significant increase ($P < 0.001$) in the mean of SS% three months after the treatment and immediately after the treatment. Although this mean compared with before the treatment was significantly decreased. The independent T-test showed that there was no significant difference in the mean of SS% before the intervention in the two groups ($P = 0.16$). However, the mean of SS% immediately after the treatment and three months after the treatment in case group (real laser treatment) was significantly lower than the control group ($P < 0.001$). In the case group, the SPM after the treatment was significantly higher than before the treatment ($P < 0.001$) and three months after the treatment was significantly higher than the time after treatment ($P < 0.04$). In control group (placebo), immediately after the treatment, the mean of SPM was significantly higher compared with the time before treatment ($P < 0.001$). The means were not significantly different three months after the treatment with the time immediately after the treatment ($P = 0.82$). Table 1 shows the mean of SS% in both case and control groups at the three times of investigation.

Table 2 shows the mean speed of expressed syllabus per minutes (speed of speech) in both case and control groups at the three times of investigation.

DISCUSSION

The subject of evaluation effectiveness in using the complementary and alternative therapies for treating diseases and disorders is very important. Acupuncture is one of these important cases in the treatment of diseases and disorders. There is a question in this regard that "can acupuncture just as affected on the treatment of diseases such as asthma[28,29] and respiratory problems[30] effects on the stutter?" In the present study, laser acupuncture was performed on 10 adults stutterers and showed that the use of these methods can be effective significantly in reducing the rate of speech (SPM) and reducing the incidence of stuttering in spoken syllables (SS%). Chinese medical resources have reported that non-fluent speech could be decreased by using of acupuncture. The present study, despite previous report (there was only one study in this field), indicated that Chinese acupuncture had no effect on reducing the stuttering.[15] This study showed that using laser acupuncture could reduce the amount of stuttering in the studied individuals and this decrease in the percentage of stuttered syllables (SS%) in both groups showed significant difference. In reducing the rate of speech (SPM) in both case and control groups, it indicated that using laser acupuncture in the follow-up process (three months after the treatment) showed significant differences and has helped the treatment maintenance in PWS. For considering laser acupuncture as an effective clinical method, the reduction in stuttering must have at least 70% decreases in stuttering compared with before the treatment.[15] In this study, the mean of reducing the stuttering by the application of laser acupuncture during 12 weeks was about 73.2%. The results showed that applying this method could be a significant positive effect in the results of stutterers' treatment. It could reduce the amount of treatment time, treatment costs, and created problems along with the prolongation of treatment, which would reduce the treatment incentive and forego treatment in patients and increase the impact of the therapy. The results of the present study were consistent with previous studies in other cases such as asthma,[20] respiratory,[30] and pneumonia.[20] This study showed that laser acupuncture may be helpful to increase treatment efficiency. In justification of this approach in the treatment of stuttering, by the use of resources, it can be concluded that probably laser acupuncture, by stimulating the flow of electrical energy in channels and pathways of the body, will balance the energy in the body and thereby can reduce stress and anxiety.[18] Since the stuttering is associated with stress and anxiety, therefore by reducing anxiety, it decreases the rate of stuttering.[2]

CONCLUSION

The results of the present study showed that speech therapy along with the use of laser acupuncture could be useful in shortening of the treatment period, the reliability of treatment results, and prevention of recurrences of stuttering. As an overall result, it seems that using laser acupuncture therapy along with speech therapy, substantially and significantly can reduce stuttering consistently and effectively.

Table 2: Mean of SPM in the two groups at the three times of investigation

Group	Before the treatment		After the treatment		Three months after the treatment		*P* value
	Mean	± SD	Mean	± SD	Mean	± SD	
Case (Real)	148.0	7.40	177.0	11.7	183.0	6.7	<0.001
Control (Placebo)	148.9	10.08	172.1	5.38	171.5	7.21	<0.001
P value	0.82		0.18		< 0.001		p<0.05

In order to provide more definitive results, it is recommended to use this method on a larger number of people with stuttering and with lower intervals.

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