

Biofeedback as an assessment tool in measuring effectiveness of alternate nostril breathing (Nadi Shodhana Pranayama) amongst medical students

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Abstract : A modern tool like biofeedback is less often tried as an assessment tool to measure the effectiveness of an age old technique like alternate nostril breathing (Nadi Shodhana Pranayama). Also there is a pressing need to address the stress among medical undergraduates through a feasible, effective and practicable relaxation technique which can be adopted into their current curriculum. This study set out with an objective to measure the effectiveness of alternate nostril breathing in reducing stress in medical students using Biofeedback parameters as assessment tool. 30 medical students belonging to various phases of MBBS were assessed through biofeedback instrument and baseline parameters like pulse rate, respiratory rate, EMG, EEG, GSR and temperature were recorded. The instrument had the compositing software to depict overall relaxation percentage based on these parameters in final report. The group was supervised to practice alternate nostril breathing 20 minutes each day for 3 months. The parameters were re-assessed and compared. Additionally, perceived stress scale was administered to the study subjects both pre and post intervention to note changes in the scores. There was significant relaxation achieved by the subjects following pranayama for 3 months as compared to baseline ($p < 0.005$). Perceived stress scores also reduced significantly after Pranayama ($p < 0.001$). This implied that alternate nostril breathing is an effective technique in reducing stress and Biofeedback is useful as an assessment tool apart from being a treatment modality in stress related conditions.

Keywords: Alternate nostril breathing, biofeedback, medical students, pranayama, stress.

I. Introduction

Biofeedback as a process and treatment enabling an individual to learn how to change physiological activity for the purposes of improving health and performance, is getting known to medical professionals and people in general nowadays. Biofeedback as a therapeutic modality are non-pharmacological treatments that use non-invasive electrical devices with bio-monitoring system [1]. The sensors used in them measure, amplify and feedback the information in real time primarily from nervous system processes such as respiration, heart rate, muscle tension, skin temperature, blood flow and blood pressure, to the individual being monitored. It thus promotes awareness of these physiological processes in an individual to assist with gaining voluntary control over them which were previously considered as automatic [2].

Alternate nostril breathing or Nadi shodhana pranayama has been practiced since ancient period in India [3]. This breathing technique which is one of the Yogic discipline, is well known to be beneficial on performing regularly either done singly [4] or in addition to other Yogasanas [5]. While there are various interventions being tried to address the widely accepted stress among medical students, meditation techniques have the upper hand in terms of effectiveness [6]. Also, there is a pressing need to address the stress in them through a feasible, effective and practicable relaxation technique which can be adopted into their current curriculum. In this regard alternate nostril breathing seems to serve these expectations though there is dearth in literature evidencing effectiveness of such a technique amongst the said population. The effectiveness of a stress management intervention is gauged by reduction in stress depicted through autonomic parameters and/or alteration in perceived stress. A modern tool like biofeedback which takes into account these parameters can be tried as an assessment tool to measure the effectiveness of age old technique like Nadi shodhana pranayama.

II. Objectives

To measure the effectiveness of alternate nostril breathing in reducing stress through the improvement in relaxation percentage using biofeedback parameters as assessment tools and to corroborate with reduction in perceived stress amongst medical students.

III. Materials and methods

This observational study on 30 medical students belonging to various phases of MBBS was conducted after obtaining institutional ethical committee clearance and taking informed consent from the participants. The undergraduate medical students without any medical illness or substance abuse and who were willing to participate were included in the study. Those who had prior history of practicing yoga or other relaxation techniques/regular physical exercises were excluded from the study. The study group comprised of 12 males and 18 female participants and were in the age range of 19-25 years.

The selected group of students through purposive sampling were assessed with biofeedback instrument [RELAX 701 by Recorders & Medicare Systems (RMS) Pvt Limited] recording parameters like pulse rate, respiratory rate, Electromyogram (EMG), Electroencephalogram (EEG), Galvanic Skin Resistance (GSR) and temperature. The instrument had compositing software to depict the overall relaxation percentage by analyzing the above inputs. These percentages were tabulated as baseline values before the intervention. In addition, the participants were assessed for perceived stress by giving a self-administered questionnaire, Perceived stress scale. This psychological instrument developed by Cohen et al [7] is widely used in studies assessing the effectiveness of stress reducing interventions [8,9 &10].

The study group was supervised to practice alternate nostril breathing 20 minutes each day for 3 months. At the end of intervention, the participants were re-assessed with biofeedback instrument to record the post intervention relaxation percentages. Perceived stress scale was also re-administered and scores recorded. Statistical analysis was done using Statistical Package for Social Sciences (SPSS) version 16.0. Inferential statistics were carried out with student's t test (two tailed).

IV. Results

The study yielded following results with respect to the relaxation percentages assessed pre and post intervention.

Table 1: Comparative assessment of overall relaxation percentage and perceived stress scores before & after intervention

Variables	Before intervention	After intervention	difference	t value	P value
Overall relaxation percentage	58.30±11.46	62.90±8.51	4.60	-3.800	<0.005
Perceived stress score	21.90±6.08	16.37±5.18	5.53	12.116	<0.001

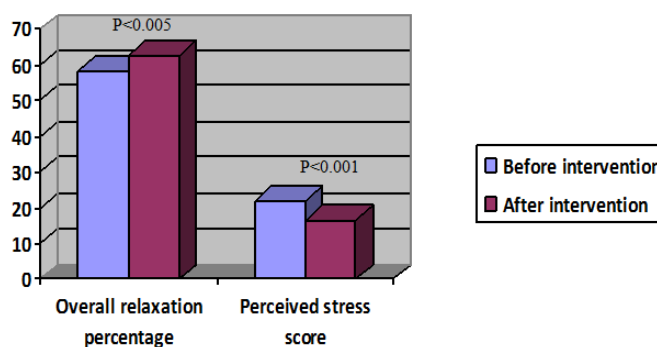


Figure 1. Comparative assessment of overall relaxation percentage and perceived stress scores before and after intervention

TABLE 1 shows the comparison of mean and standard deviation of study parameters pre and post intervention with further stating of statistical significance of the differences obtained. The same is graphically presented in Fig.1. It was observed that there was significant relaxation achieved by the participants following alternate nostril breathing for 3 months as compared to baseline ($p<0.005$) which was well corroborated by reduction in perceived stress scores significantly after the intervention ($p<0.001$).

V. Discussion

The results obtained in this study further intensifies the fact that regular practice of alternate nostril breathing, a form of slow and deep breathing is indeed beneficial in reducing the stress and providing relaxation

as seen in the many past studies done on population of varied age range, profession and culture [11,12 &13]. The relaxation achieved by the participants can be attributed to overall shift towards parasympathetic predominance due to involvement of peripheral stretch receptors and baroreceptors of lungs and heart synchronizing with central autonomic regulatory pathway which includes hypothalamus, limbic system and prefrontal cortex [14]. Biofeedback instrument which senses the autonomic parameters like pulse rate, respiratory rate, GSR, EEG, EMG and skin temperature is thus apt for assessing indirectly the relaxation obtained.

The biofeedback instrument though has provision to study changes in each of these parameters separately in detail for better accuracy and research exploration, our study restricted to the usage of advanced software which could summarize the overall result into single variable as percentage. In our study which can be regarded as pilot study exploring the issues concerned with setting standards for biofeedback as assessment tool, the default settings of the instrument were used for low pass filters (LPF), high pass filters (HPF) and sensitivity under channel settings. The overall relaxation percentages arrived at in the current study are dependent on these parameters as the thresholds beyond which interpretation of 'tense' or 'relaxed' state is made by the instrument through the designed software [15]. If similar studies can be undertaken with strict adherence to the research guidelines in this regard, we can expect evidence based standardization of technical specifications of the instrument to be used as assessment tool in near future [16]. However, as far as our current study goes, the instrument proves and promises to be a reliable and still easy to use tool for assessing effectiveness of interventions in stress related conditions.

VI. Conclusion

It can be concluded that the alternate nostril breathing, a form of pranayama is a simple, practicable and effective as well in reducing the stress levels among medical students if practiced regularly. Further, biofeedback which has a definitive role beyond doubt in treatment of stress related conditions, proved to be an assessment tool also to measure the effectiveness of other stress management interventions like alternate nostril breathing.

Acknowledgements

All the participants in the study are duly acknowledged for their cooperation and contribution towards a research cause.

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