



EFFECT OF BREATHING RETRAINING PROGRAM ON FUNCTIONAL MOVEMENT IN ADULTS WITH DYSFUNCTIONAL BREATHING

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KEYWORDS :

INTRODUCTION

Breathing is a fundamental physiological process essential for life, involving coordinated interaction between the respiratory muscles, thoracic cage, neural control systems, and musculoskeletal structures. Diaphragm, the primary respiratory muscle which plays vital role in respiration and has multiple physiological roles. During breathing, the movement of diaphragm influence the motor neuron activities along with sympathetic and parasympathetic affects. It also contributes to the postural stability by increasing the intra-abdominal pressure during the inspiration.¹

In contrast, altered or inefficient breathing patterns may lead to a condition termed dysfunctional breathing (DB). Dysfunctional breathing is described as a group of breathing disorders in which chronic changes in breathing pattern result in dyspnea and various non-respiratory symptoms, either in the absence or presence of organic respiratory disease.

In dysfunctional breathing greater upper ribcage movement alters the respiratory muscle activity and leads to asynchronous motion of abdomen and ribcage. It reduces the abdominal dimensions during inspiration leads to diaphragm dysfunction and weakness.^{2,3}

Hi-Lo breathing is a manual assessment to determine if a subject is a normal diaphragmatic breathing pattern or if they are in an abnormal pattern. It determines the movement of upper ribcage, lower thorax and abdomen during breathing and also determines breathing rate, rhythm and motion of ribcage.

The previous study has reported breathing pattern disorder is associated with functional movement dysfunctions.³ Further studies are needed to measure the effectiveness of breathing re-education programmes in reducing injury (such as musculoskeletal injuries)³ and improving movement patterns. They experienced fewer respiratory issues in everyday life as well as when exercising.¹⁶

Further research is needed to validate breathing re-education programs and the role they have in injury prevention and improving movement patterns. Hence, the present study was undertaken to evaluate the effect of a breathing retraining program on functional movement in adults with dysfunctional breathing using the FMS and Breathing Questionnaire as outcome measures.

Objective of the Study

- To determine the effect of breathing pattern retraining on functional movement in adults with dysfunctional breathing of non-organic cause, using Functional Movement Screen Tool & self-evaluation of breathing questionnaire (SEBQ).

METHODOLOGY

Ethical Clearance: Ethical clearance for the current study was obtained from the Review Board on Ethics for Research from Florence College of physiotherapy, Bangalore.

Source of Data: Students from Degree College in Bangalore

Study Type: Comparative study

Sampling Method: Convenience sampling

Study Duration: 4-6 months

Sample Size: 30

Selection Criteria

Inclusion Criteria

- Age between 18-25
- Respiratory rate > 16 bpm¹⁰
- Subjects with breathing pattern dysfunction (assessed by Hi-Lo assessment)¹⁰
- Subjects with < 20 sec breath hold time assessed by breath hold test⁶

Exclusion Criteria

- Asthma or any other previous or current history of respiratory disease
- Vascular disorder.
- Musculoskeletal disorder.
- Cognitive impairment

Procedure

Subjects were screened based on the inclusion and exclusion criteria. Group A (diaphragmatic breathing) and group B (relaxation exercise). Participants in both groups were taught an exercise program. Outcome measures was taken at baseline and 5th week after the intervention using SEBQ and FMS. Participants were given with the intervention for 3 days a week for four weeks.

Group A: Diaphragmatic Breathing Exercises

Group B: Jacobson's Relaxation Technique

Group A: Diaphragmatic Breathing Exercises

The participants of this group will be given with diaphragmatic breathing training.

- Exercise were taught in
 - Supine position
 - Sitting position
 - Side lying
 - Standing.

Also advised the patient to incorporate it with functional activities also.

The patients were trained for 45 minutes weekly thrice for four weeks, so total of 12 sessions. The physiotherapist was continuously supervising the session.

In each session subjects performed 10 repetition of diaphragmatic breathing exercise of 3 sets in each position. Patients were asked to relax for 1 minute after each set.³⁷

Group B: Jacobson's Relaxation Technique

A systematic technique developed by Dr. Edmund Jacobson is (1938) used, for achieving a deep state of relaxation is given to group B subjects. Jacobson's relaxation technique has been to control given to control group subjects. Exercise was performed in supine position with comfortable loose clothing. The subjects were instructed to contract and relax various group of muscles distally to proximally. And the also subjects were instructed to coordinate their breathing with each contraction and relaxation. Each session was performed for 45 minutes thrice weekly for 4 weeks.^{39,40}

➤ HI-LO Breathing Assessment

- It was performed in the sitting position with the tester standing or kneeling at the front and slightly to the side of the subject. The tester placed one hand on the subject sternum and one hand on their upper abdomen to determine whether thoracic or abdominal motion is dominant during breathing.
- The scoring process was as follows: Is the upper chest dominant? If yes scores as dysfunctional and stop, if no continue. Is the pattern paradoxical? If yes score as dysfunctional and stop, if no continue. Is diaphragm dominant? (Greater volume and diaphragmatic movement is first), if yes score as functional, if no score as dysfunctional.⁵

Data Analysis

The collected data were tabulated and analyzed using both descriptive and inferential statistics. All the parameters were assessed using statistical package for social science (SPSS) version 24, with a significance level of p value less than 0.05 and a 95% confidence interval set for all analysis.

Table 3: Comparison of SEBQ Score within Group – A and Group - B Between Pre Test and Post Test

Groups	Pre Test		Post Test		t - test	Significance
	Mean	S.D	Mean	S.D		
Group- A	28.00	2.13	11.00	2.64	24.15	.001**
Group- B	28.80	4.41	23.86	3.71	10.66	.001**

The above table reveals the Mean, Standard Deviation (S.D), t-value and p-value between pre-test and post-test within Group – A & Group – B. There is a statistically significant difference between the pre test and post test values within Group A and Group B at $P \leq 0.05$.

Table 4: Comparison of FMS Score within Group – A and Group - B Between Pre Test and Post Test

Groups	Pre Test		Post Test		t - test	Significance
	Mean	S.D	Mean	S.D		
Group- A	11.20	.941	16.06	.883	53.56	.001**
Group- B	11.53	.990	13.46	.991	12.61	.001**

The above table reveals the Mean, Standard Deviation (S.D), t-value and p-value between pre-test and post-test within Group – A & Group – B. There is a statistically significant difference between the pre test and post test values within Group A and Group B at $P \leq 0.05$.

Interpretation

- On comparing the Mean Values of Group A & Group B on SEBQ Score, it shows a significant decrease in the post test mean values in both groups, but (Group A) shows 11.00 ± 2.64 which has the lower mean value is more effective than (Group B) 23.86 ± 3.71 at $P \leq 0.05$. Hence the null hypothesis is rejected.
- On comparing the Mean Values of Group A & Group B on FMS Score, it shows a significant increase in the post test mean values in both groups, but (Group A) shows 16.06 ± 0.883 which has the higher mean value is more effective than (Group B) 13.46 ± 0.991 at $P \leq 0.05$. Hence the null hypothesis is rejected.

- On comparing Pre test and Post test within Group A & Group B on SEBQ Score & FMS Score shows significant difference in the mean values at $P \leq 0.05$.

DISCUSSION

"Dysfunctional breathing is a group of breathing disorders where chronic changes in breathing patterns result in dyspnea and non-respiratory symptoms in the absence of, or in the presence of, organic respiratory disease".² It commonly occurs in general population without an underlying pathological process and has a prevalence of 8-10%. This inappropriate breathing pattern can interrupt the daily life activities by producing symptoms and affects the specific task.² Studies has showed the relation of breathing pattern disorder and functional movement as it showed less score on Functional movement screen tool and hence increased risk of injury.^{2,3}

The diaphragmatic breathing maneuvers comprises the co-activation of diaphragm, pelvic floor muscles, abdominals and lower thoracic and lumbar spinal extensors which is the part of spinal stabilization system. The concentric contraction of diaphragm during inspiration results in its caudal descend and promotes intra-abdominal pressure, which engages deep pelvic floor muscles at the same time, offering inferior stability. Thus action of diaphragmatic breathing maneuvers improves the overall postural stability.¹

In the present study, Group A received breathing retraining which includes of diaphragmatic breathing training for 45 minute weekly sessions for 4 weeks, while group B received Jacobson's Relaxation technique.

Previous article by Helen Bradley and Joseph Esformes in 2014 proved the relation between breathing pattern disorder and functional movement. They assessed breathing functionality measures of 34 healthy adults and correlated with movement using Functional movement screen tool.

Limitations of the study includes smaller sample size were used, not measured the long term benefits of the intervention & only qualitative outcome measures used in the study. The study concluded that diaphragmatic breathing training in adults with dysfunctional breathing of non-organic cause will improve functional movement.

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