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Original Research Article

Effects of relaxation technique along with aerobic training and aerobic training alone on quality of life in asthmatic children: a comparative study

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ABSTRACT

Background: The current study focuses on the comparative effects of 12 weeks Jacobson's progressive muscle relaxation technique as an intervention along with aerobic training and aerobic training alone on quality of life in asthmatic children.
Methods: For this, 60 the asthmatic children were screened based on the inclusion criteria and were divided into two groups (30 each). Group A included Jacobson's relaxation along with aerobic training and Group B included aerobic training alone. Conventional physiotherapy treatment was given to both the groups. Quality of life was assessed using Paediatric asthma quality of life questionnaire. Exercise capacity was measured using six minute walk test distance, peak expiratory flow rate by the mini wright peak flow meter and rate of perceived exertion by Borg's scale.
Results: Data analysis revealed that there was a statistical and clinical significant improvement in all the three domains of QOL in Group A when compared to Group B. However, Relaxation along with aerobic training and aerobic training alone both had equal effects in improving six minute walk test distance, peak expiratory flow rate and rate of perceived exertion in Group B.
Conclusions: Thus it can be concluded that in asthmatic children with mild to moderate severity, a 12 week protocol of Jacobson's relaxation along with aerobic training should be in cooperated for better results.

Keywords: Asthmatic children, Aerobic training, Jacobson's relaxation, Quality of life, Rate of perceived exertion, Peak expiratory flow rate

INTRODUCTION

Asthma is one of the most common chronic conditions seen in children throughout the world.[1] Asthma is defined as a chronic inflammatory disorder of airways characterized by reversible airflow obstruction causing cough, wheeze, chest tightness and shortness of breath by stimuli such as cold air, exercise, dust mites, air pollutants, stress, and anxiety. Bronchial asthma is a multifactorial disease in which environmental, infectious, allergic, and psychological elements all play an important part.[2,3] A recent Indian Study on Epidemiology of Asthma, Respiratory Symptoms and Chronic Bronchitis (INSEARCH) done with 85,105 men and 84,470 women from 12 urban and 11 rural sites in India estimated the prevalence of asthma in India to be 2.05% among those aged more than 15 years, with an estimated national burden of 18 million asthmatics.[4] Paediatric asthma accounts for a large proportion of childhood hospitalizations, healthcare visits, absenteeism from

school.[5] Quality of life for a child with asthma has been defined as the measure of emotions, asthma severity/symptoms, missed school days, activity limitations and visits to the emergency department.[6] Inability in performing physical functions at optimal level subsequently lead to anxiety, depression and sadness. Overall it can be said that asthma influences various aspects of the child's life and limits his/her physical, mental and social activity and thus reduces their life quality.[7]

Apart from the lower exercise capacity and symptoms such as shortness of breath, cough and wheeze, these children are also have physical, social, educational and emotional impairments.[8] Stress can also exacerbate airway hyperactivity and airway inflammation in bronchial asthma.[9] It has been reported that asthmatic children have significantly poorer health related quality of life than other children.[10] Physical training programs in asthma have been designed to enhance aerobic power, neuromuscular coordination, and self-confidence.

Pulmonary rehabilitation programs have been proven to increase functional capacity, decrease symptoms, especially dyspnoea, reduce utilization of healthcare resources and, finally improve Quality of life (QOL). Both the American college of sports medicine (ACSM) and the American thoracic society (ATS) guidelines recommend exercise for patients with asthma. The recommended mode of aerobic exercise is walking or any mode of aerobic exercise with large muscles.[11]

Several randomized controlled trials have searched the effects of physical training methods in children with asthma on their respiratory function and symptom improvement, but very few studies have concentrated on Quality of life.[12] Recently, Basaran et al. suggested that eight weeks of basketball training had beneficial effects on quality of life and exercise capacity in children with asthma.

The elevated perceived stress prevalent in patients with asthma negatively affects their quality of life and is strongly associated with worse asthma control and with over-perceiving dyspnoea and respiratory symptoms.[13] The rationale for studying relaxation exercises as an adjunctive treatment for asthma could be related to the fact that it would reduce emotional/physical arousal and also reduce the fear/panic responses that interfere with the timely performance of coping skills during an asthma episode.[14]

In a study by Holloway et al, they found that relaxation training, minimization of inappropriate use of accessory muscles, diaphragmatic breathing, nasal breathing, and integration of these techniques into activities of daily living ameliorates respiratory symptoms, reduces ventilation rate and improves quality of life in a general practice population of adults diagnosed with asthma.[15] Studies concerning effects of relaxation on quality of life of asthmatic children are sparse. Therefore, current study focuses on the comparative effects of 12 weeks Jacobson's progressive muscle relaxation technique as an intervention along with aerobic training and aerobic training alone on quality of life in asthmatic children.

METHODS

This prospective comparative study was conducted at Department of Physiotherapy, Lokmanya Tilak Municipal Medical College and General Hospital, Sion, Mumbai, Maharahtra, India. The study duration was October 2014 to September 2015. The sampling method was random sampling which included 60 subjects (two groups with 30 in each group).

The study was approved by the ethical committee of our institution. Children aged 7-12 years of both gender with mild to moderate asthma according to (GINA guidelines 2015), who are under medical treatment for at least 6 months before the study, who are not participating in any form of physical training or yoga therapy in past 6 months and able to understand English and Hindi were included. Children with any associated neuromuscular disease, congenital cardiopulmonary musculoskeletal disorders and any other respiratory disease apart from asthma were excluded.

Methodology

Consent was taken on basis of inclusion and exclusion criteria (n=60).

Pre-treatment outcome measures (0weeks) were: PAQLQ, 6MWD, PEFR, rate of pereceived exertion

Outcome measures

PAQLQ (29)

Paediatric asthma quality of life questionnaire with standardized activities has been validated for use in both clinical practice and clinical trials. It consisted of total 23 questions and 3 domains.

Domains Number of questions

Activity limitation 5 (generic)

Symptoms 10

Emotional function 8

We used the English and Hindi versions of the questionnaire for India. Parents were not present during the interview. They were interviewed in a quiet room with no distractions.

The child was handed over the appropriate colored card for each question and the card was taken away when it was no longer required. The blue and green response cards were shown to the child and the options were explained.

For children who could read, we asked them to read aloud each of the response options. For younger children (7-8 years), all the responses were read through with them.

Scoring the (PAQLQ(S)) - The overall PAQLQ(S) was the mean of the responses of all 23 questions. The resultant score was between 1.0 and 7.0.

Interpretation of 7-point scale. Once the score began to drop below 7.0 it meant that the child has some degree of impairment even if mild 1.0 meant severe impairment and 4.0 indicated moderate impairment.

6MWT distance

Sub maximal exercise capacity was evaluated through the 6MWT, according to ATS standards 2002, in a level corridor 30 meters long. After resting for some time, the children were instructed to walk as far as possible for six minutes without running, knowing that they could interrupt the test at any time. They were verbally encouraged at every minute, according to the standardization, and at the end of the six minutes, they were asked to stop where they were and the total distance in meters was recorded. The criteria for test interruption were: severe dyspnoea or fatigue expressed by the patient, SpO2 <85%, or refusal to continue the test.[31]

Peak expiratory flow rate

PEFR measurement it was done with the help of a mini-wright peak flow meter. The procedure was practiced by children and they were asked to take full inspiration and blow into mouthpiece as quickly, powerfully, and fully as possible. It was checked that a tight closure was sustained between the lips and the mouth piece of the flow meter. Each subject was given three trials, and the best of three was taken for the study in standing position.[34]

Rate of perceived exertion

The rate of perceived exertion was evaluated using Borg's 6-20 scale to measure dyspnoea intensity.[33]

Samples were divided into 2 groups: Group A and Group B.

Group A (aerobic training and relaxation)

Jacobson's relaxation included applying tension to certain muscle groups, and then relaxing the muscle group. The sequence was as followed starting from lower limb toe to head. They were asked to hold the contraction for about 8 sec, and relax the muscle group for about 30 sec 27.

Group B (aerobic training alone)

Exercise heart rate was calculated from maximal heart rate (HR max) HR max=208-0.7(age).[34]

Exercise heart rate was calculated using the Karvonen's Formula.

Exercise HR= HR rest + 50-70% (HR max- HR rest)

Intensity was set based on this exercise heart rate.

Group aerobic training was conducted with 4-5 children in a group.

Aerobic training included: Warm up- 5-10 minutes, total body movements in standing position Aerobics-30 minutes of activity phase which included the rhythmic steps with more of footwork and walking. Cool down-5-10 minutes, slow spot marching in standing, slow relaxed movements.

Post treatment outcome measures (12 weeks): PAQLQ, 6MWD, PEFR, rate of perceived exertion.

Conventional chest physiotherapy included: nebulization with the prescribed bronchodilator and saline for 5-7 minutes, pursed lip breathing, active cycle of breathing technique.

Statistical analysis

All data analysis was performed considering 95% confidence intervals and significance at 0.05.

PAQLQ(S) was analyzed within the group using Wilcoxon's Signed Rank Test and between two groups using the Mann Whitney Test.

Six minute walk test distance, peak expiratory flow rate, rate of perceived exertion was analyzed within the group using Paired t Test and between groups using the unpaired t test.

Effect size measure for change in six minute walk test distance, peak expiratory flow rate, rate of perceived exertion CV angle was analyzed within and between the group using Cohen's delta.

For Cohen's delta value d: small effect size- 0.2, moderate effect size- 0.5, large effect size- 0.8

RESULTS

Table 1 and Figure 1, shows a statistical increase in activity domain score indicative of improvement in activity domain within both the groups with p=0.000. Group A shows a greater statistical improvement as compared to Group B with p=0.000 (p<0.001).

Both groups demonstrate a large effect size, which implies that the change is clinically significant. Group A, when compared to Group B, showed a large effect size, which implies that the change is clinically significant.

Table 2 and Figure 2, shows a statistical increase in symptom domain score indicative of improvement in symptom domain within both the groups with p=0.000. Group A shows a greater statistical improvement as compared to Group B with p=0.000 (p<0.001).

Both groups demonstrate a large effect size, which implies that the change is clinically significant. Group A, when compared to Group B, showed a large effect size, which implies that the change is clinically significant.

Table 3 and Figure 3, shows a statistical increase in emotion domain score indicative of improvement in emotion domain within both the groups with p=0.000.

Group A shows a greater statistical improvement as compared to Group B with p=0.000 (p<0.001).

Both groups demonstrate a large effect size, which implies that the change is clinically significant. Group A, when compared to Group B, showed a large effect size, which implies that the change is clinically significant.

Table 5 and Figure 5, shows a statistical increase in the six minute walk distance within both the groups with p=0.000.

Both groups demonstrate a large effect size, which implies that the change is clinically significant. Group A, when compared to Group B, showed a small effect size, which implies that the change is minimally clinically significant.

Table 7 and Figure7, shows a statistical decrease in the rate of perceived exertion within both the groups with p=0.000.

Both groups demonstrate a large effect size, which implies that the change is clinically significant. Group A, when compared to Group B, showed a small effect size, which implies that it is minimally clinically significant.

Table 1: Comparison of the effect of relaxation therapy along with aerobic training (group A) and aerobic training (group B) alone on activity domain of QOL.

Baseline Characteristics	Group a Mean (SD)	Group b Mean (SD)
Age (years)	10.2 (1.46)	10.3 (1.46)
Male/female	19/11	19/11
Height (cm)	136.9 (6.78)	137.6 (6.79)
BMI (kg/sq.m)	16.13(1.27)	16.36 (1.23)

Table 2: Comparison of the effect of relaxation therapy along with aerobic training (Group A) and aerobic training (Group B) alone on activity domain of QOL.

Activity Domain score	Group A (relaxation and aerobic training)			Group B (aerobic training)		
	Pre	**Post**	**Diff**	**Pre**	**Post**	**Diff**
Median	4.8	6.6	1.8	4.8	6.2	1.4
Statistical significance (Intra-group)		p=0.000			p=0.000	
Clinical significance (Intra-group)	dcliff = 0.876 Large Effect Size			dcliff = 0.880 Large Effect Size		
Statistical significance (Inter–group)			Z= -5.6 P=.000 U=85.0			
Clinical significance (Inter-group)			dcliff = 0.73 Large Effect Size			

Table 3: Comparison of the effect of relaxation therapy along with aerobic training (Group A) and Aerobic training (Group B) alone on symptom domain of QOL.

Symptom Domain score	Group A (relaxation and aerobic training)			Group B (aerobic training)		
	Pre	**Post**	**Diff**	**Pre**	**Post**	**Diff**
Median	5.10	7.00	1.9	5.10	6.30	1.2

Continued.

Symptom Domain score	Group A (relaxation and aerobic training)			Group B (aerobic training)		
	Pre	Post	Diff	Pre	Post	Diff
Statistical significance (intra-group)		p=0.000			p=0.000	
Clinical significance (intra-group)		dcliff = 0.876			dcliff = 0.881	
	Large effect size			Large effect size		
Statistical significance (inter-group)			Z=–6.8 P=0.000 U=0.000			
Clinical significance (inter-group)			dcliff =0.88 Large effect size			

Table 4: Comparison of the effect of relaxation therapy along with aerobic training (Group A) and aerobic training (Group B) alone on emotion domain of QOL.

Emotion	Group A (relaxation and aerobic training)			Group B (aerobic training)		
Domain score	Pre	Post	Diff	Pre	Post	Diff
Median	5.25	6.75	1.5	5.12	6.25	1.13
Statistical significance (Intra-group)		p=0.000			p=0.000	
Clinical significance (intra-group)	dcliff=0.881 Large effect size			dcliff=0.882 Large effect size		
Statistical significance (Inter–group)			Z=–7.1 P=0.000 U=0.000			
Clinical significance (Inter-group)			dcliff=0.92 Large effect size			

Table 5: Comparison of the effect of relaxation therapy along with aerobic training (Group A) and aerobic training (Group B) alone on total PAQLQ score.

Total PAQLQ score	Group A (relaxation and aerobic training)			Group B (aerobic training)		
	Pre	Post	Diff	Pre	Post	Diff
Median	5.08	6.82	1.74	5.08	6.26	1.18
Statistical significance (Intra-group)		p=0.000			p=0.000	
Clinical significance (Intra-group)	dcliff = 0.879 Large Effect Size			dcliff = 0.877 Large Effect Size		
Statistical significance (inter-group)			Z=–6.9 P=0.000 U=0.000			
Clinical significance (inter-group)			dcliff=0.893 Large effect size			

Table 6: Comparison of the effect of relaxation therapy along with aerobic training (Group A) and aerobic training (Group B) alone on 6 minute walk distance.

6MWD	Group A (relaxation and aerobic training)			Group B (aerobic training)		
	Pre	Post	Diff	Pre	Post	Diff
Mean±SD	520±25.32	558.26±23.14	38.26±8.58	522.50±26.44	550.33±27.81	27.83±7.53

Continued.

6MWD	Group A (relaxation and aerobic training)	Group B (aerobic training)
Statistical significance (inter-group)	p=0.000	p=0.000
Clinical Significance (intra-group)	dcohen's =1.577 Large effect size	dcohen's =1.02 Large effect size
Statistical significance (inter-group)		p=0.235
Clincal significance (Inter-Group)	Dcohen's =0.309 Small effect size	

Table 7: Comparison of the effect of relaxation therapy along with aerobic training (Group A) and aerobic training (Group B) alone on peak expiratory flow rate.

PEFR	Group A (relaxation and aerobic training)			Group B (aerobic training)		
	Pre	**Post**	**Diff**	**Pre**	**Post**	**Diff**
Mean±SD	206±23.13	234.66±22.55	28.66±4.34	208.66±23.30	231±24.68	22.34±5.04
Statistical significance (Intra-group)		p=0.000			p=0.000	
Clinical significance (Intra-group)	dcohen's =1.25 Large effect size			dcohen's =0.93 Large effect size		
Statistical significance (Inter–group)	P=0.550					
Clinical significance (inter-group)	dcohen's =0.154 Trivial effect size					

Table 8: Comparison of the effect of relaxation therapy along with aerobic training (Group A) and aerobic training (Group B) alone on rate of perceived exertion.

RPE	Group A (Relaxation and aerobic training)			Group B (Aerobic training)		
	Pre	**Post**	**Diff**	**Pre**	**Post**	**Diff**
Mean±SD	10.83±1.17	6.23±0.50	4.6±1.0	10.73±1.14	6.40±0.56	4.33±0.95
Statistical significance (Intra-group)		p=0.000			p=0.000	
Clinical significance (Intra-group)		dcohen's=5.11			dcohen's=4.82	
	Large effect size			Large effect size		
Statistical significance (Inter-group) Clinical	p=0.232					
	dcohen's=0.32					
Significance (Inter-group)	Small effect size					

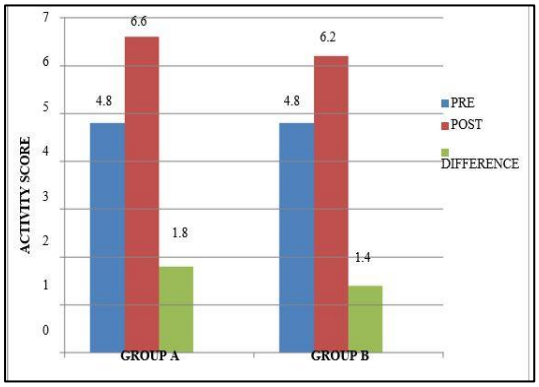

Figure 1: Comparison of activity domain score using PAQLQ(S) between both the groups.

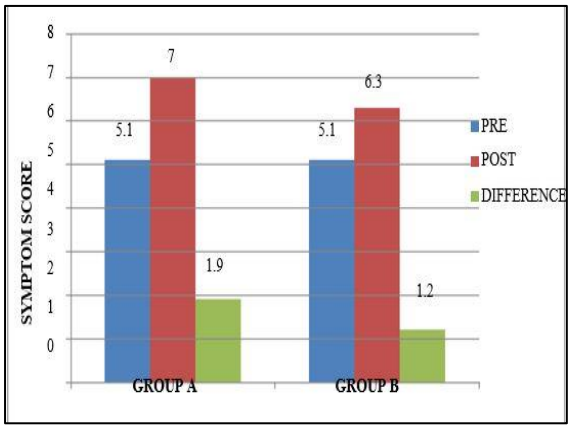

Figure 2: Comparison of symptomdomain score using PAQLQ(S) between both the groups.

Table 6 and figure 6, shows a statistical increase in the peak expiratory flow rate within both the groups with p=0.000.

Both groups demonstrate a large effect size, which implies that the change is clinically significant. Group A, when compared to Group B, showed a trivial effect size, which implies that it is not clinically significant.

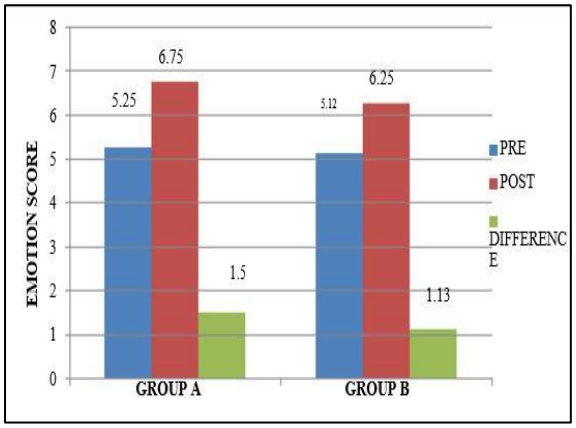

Figure 3: Comparison of emotion domain score using PAQLQ(S) between both the groups.

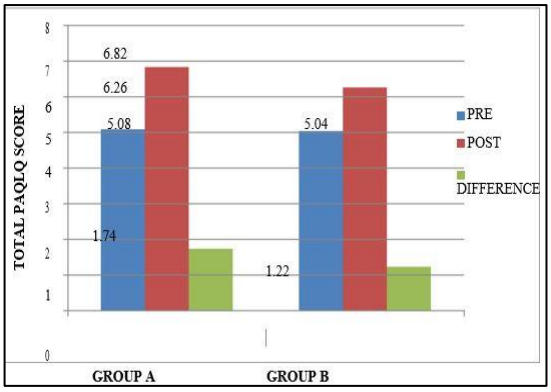

Figure 4: Comparison of Total PAQLQ score using PAQLQ(S) between both the groups.

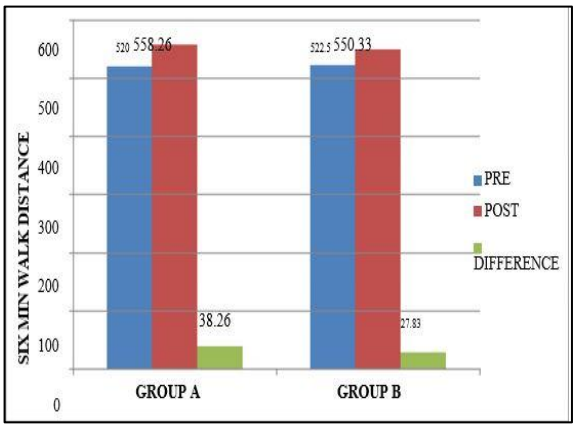

Figure 5: Comparison of six minute walk distance between both the groups.

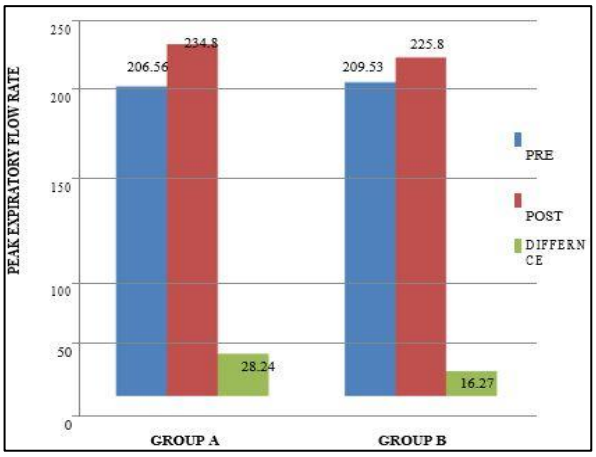

Figure 6: Comparison of peak expiratory flow rate between both the groups.

DISCUSSION

Health-related quality of life focuses on various aspects of an individual's subjective experience that relates both directly and indirectly to health, disease, disability, and impairment.[35] Asthma in a growing children affects their emotional, intellectual and physical development.[36]

Psychological distress could be a risk factor for asthma-related morbidity and mortality. Jacobson's Relaxation is one of the psychological treatments studied to be of empirical use in the paediatric population.[37]

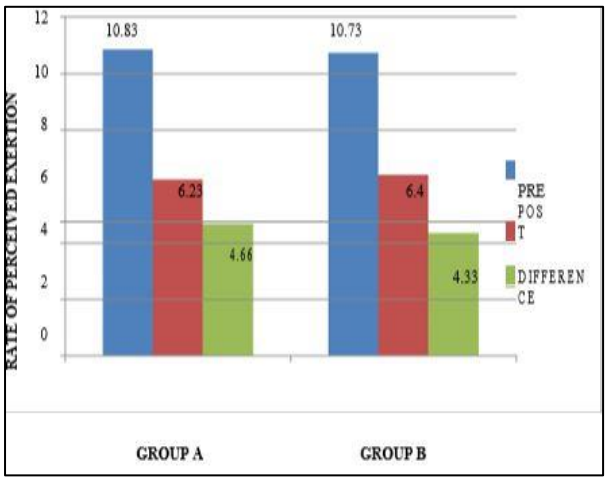

Figure 7: Comparison of rate of perceived exertion between both the groups.

Effect on quality of life (activity domain)

From Table 1 and Figure 1 both groups showed statistically ($p<0.001$) and clinically significant improvement in the activity domain with large effect size. Group A demonstrated greater statistical ($p<0.001$) and clinical significance with a large effect size, when compared to Group B. The possible reasons for aerobic training to improve the activity domain could be as follows. The main physical activity usually limited due to asthmatic disease is running. Being able to run fast influences success in many games and activities 38. In a study by Basran et al, 62 children with mild to /moderate asthma underwent a moderate intensity basketball training program for 8 weeks. PAQLQ was used for the evaluation of activity limitation, symptoms and emotional functions. Although significant effects of the interventions were found on the overall PAQLQ scores and on each domain scores, the degree of improvement in Experimental group was significantly higher than in Control group ($p<0.001$). The reasons attributed by them were psychosocial benefits of participating in an exercise program of team sport and sharing with other asthmatic children which would have had an additional effect on QOL besides the training program itself.[11]

Our study results are consistent with the results of published literature for the activity domain of QOL. Aerobic training improves activity participation possibly because it reduces the symptoms, increases aerobic fitness and this would raise the ventilator threshold, thereby lowering the minute ventilation during mild and moderate exercise.[39,40]

Relaxation achieved through Jacobson's method is supposed to be because of the peripheral mechanism which is hypothesized to be that there is a reduction in physiological reactivity probably through reduction in proprioceptive feedback from the muscles to the reticular system.[19]

Symptom domain

Table 2 and Figure 2 relaxation which was given along with aerobic training in group A had a statistical significance over Group B with respect to symptom domain. The possible reasons could be; the reason it helped was attributed to the fact that asthma symptoms are associated with increased autonomic arousal and increased emotional distress.[43]

Our finding are similar to a study by Hasan et al, they evaluated the effects of regular exercise on asthma symptom score, quality of life and pulmonary function in asthmatic children. Thirty children with newly diagnosed mild-moderate asthma were randomly allocated into exercise group (group 1) and control group (group 2).The possible mechanism attributed to the result was that an increase in regular physical activity of sufficient intensity would increase aerobic fitness and this would raise the ventilator threshold, thereby lowering the minute ventilation during mild and moderate exercise.

Thus improvement in the symptom domain with aerobic training could be possibly either because of the accumulative desensitization on fear of dyspnoea.[42] Improvement in the maximum voluntary ventilation which could be because of increased respiratory muscle strength.[37]

Emotion domain

Table 3 and Figure 3, relaxation which was given along with aerobic training in group A had a statistical significance over Group B with respect to emotion domain.

The possible reasons for aerobic training to improve the emotion domain could be as follows:

studies by Basaran et al, Fanelli et al, Andrarde as described earlier have all seen the effects of aerobic training on QOL with an improvement in the emotional domain ($p<0.001$, $p<0.03$, $p<0.001$ respectively).[11,22,31] Relaxation creates a pleasant mental state, reduces anticipatory anxiety, reduces anxiety as a response to stress and improves concentration. It increases the feeling of control, energizes and improves sleep, helps in the establishment of peer relationships. It may enhance their resistance through behavioural antibodies (conditioning) and expose them to stimulants that empower them to tolerate stress.[44]

From Table 4 and Figure 4 both groups showed statistically ($p<0.001$) and clinically significant improvement with a large effect size in the total PAQOL score. Group A demonstrated greater statistical significance ($p<0.001$) and clinical significance with a large effect size when compared to Group B. All the above domains together led to an overall improvement in total PAQLQ(S) score in both the groups. Relaxation along with aerobic training seems to have led to a reduction in the symptoms which must have led to a better activity participation in children thereby improving their self confidence and making them independent. Young asthmatics performing relaxation exercises reduces emotional/physical arousal to facilitate bronchodilation and also reduces the fear that interferes with the timely performance of coping skills during an asthma episode.

Table 5 and Figure 5, both groups showed statistically significant improvement in the 6MWT Distance ($p=0.000$) and also showed a clinical significance with a large effect size. Although Group A had a greater mean difference than Group B.

Andrarde et al conducted a 6-week randomized trial of 33 moderately asthmatic children (6-17 years). The intervention consisted of supervised aerobic training performed for six weeks on an electric treadmill. In conclusion, six weeks of aerobic exercise improved the distance covered in the 6MWT by a mean of 99.7 m between baselines. There were no statistically significant differences between the groups. The results of the study showed a mean difference in the distance covered in the 6MWT of 87.7 m between the exercise group and the control group; however, it was unclear whether this gain was clinically relevant.[31]

Our study shows a mean difference of 11 m between Group A and B which is not statistical significant, which infers that both groups were equally effective in improving exercise capacity. Relaxation has an effect on the autonomic nervous system. As it does not put a stress on cardiovascular system, we did not find significant improvement between Group A and Group B on comparison. Since emotions don't play a major role on affecting the exercise capacity, Group A had equal statistically significant effects as compared to Group B.

Table 6 and Figure 6 both groups showed statistically significant improvement in the PEFR ($p=0.000$) although Group A had an increased value at the end of 12 weeks than Group B, the results were not statistically significant ($p=0.235$) with a trivial effect size and no clinical significance.

In a study by Zaky N, effects of a rowing exercise regimen in comparison to chest physical therapy program on pulmonary functions in children with bronchial asthma was tested. The results showed significant improvement in PEFR in both groups ($p=0.00$). The reasons attributed were that, aerobic training strengthens the respiratory muscles (diaphragm and intercostals) which may help in better chest expansion which could have led to more air being inspired, therefore increasing the vital capacity and enabling more capillaries to be formed around the alveoli so that more gaseous exchange can take place.[39]

Table 7 and Figure 7, both groups showed statistically significant improvement in the RPE ($p=0.000$) along with clinical significance with a large effect size. On comparison Group A did not have statistically significant difference ($p=0.232$) when compared to group B with a minimal clinical significance. Aerobic conditioning reduces air trapping, placing the diaphragm in a mechanical advantageous position thus reducing the effort needed to breathe thereby reducing the difficulty in breathing which they tend to have. Also perception of breathlessness could be reduced because of a decrease in the inspiratory effort, end-expiratory lung volume, and thus reduction in respiratory rate.[47] RPE is a measure of perceived strain, thus RPE targets a cognitive subsystem that is more sensitive to the cognitive component of relaxation than the subsystem targeted by relaxation, which is somatic in nature.[48]

Hence, our study thus concludes that 12 weeks of Jacobson's relaxation along with aerobic training led to a greater improvement in the quality of life with increase in activity, emotion and symptom domain scores when compared to aerobic training alone. However, relaxation along with aerobic training and aerobic training alone both had equal effects in improving six minute walk test distance, peak expiratory flow rate and rate of perceived exertion.

Limitations

The child's psychological and socio-economic factors were not assessed.

CONCLUSION

From the study we conclude that, in asthmatic children with mild to moderate severity, a 12 week protocol of Jacobson's relaxation along with aerobic training showed statistically and clinically significant results in improving quality of life when compared to those children who received aerobic training alone and should in cooperated in rehabilitation programs.

Recommendations

Children's socio economic history and background could be taken and psychological measures could be assessed by using various stress and anxiety related questionnaires.

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Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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