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Effect of tai chi exercise on exertional dyspnea in obese females

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Abstract
Aim and Objective: To study the effect of Tai Chi exercise on exertional dyspnoea by STEP TEST in obese females.
Design: Interventional study
Methods: 56 female participants with age group: 18-45 years and with obesity grades ranging from over-weight and obesity grade 1 were enrolled in the study. Their pre and post exertional dyspnoea was calculated with step test and Tai-chi exercise were given for 4 weeks/5days.
Results: Comparing the pre and post values of dyspnoea by using paired t-test (p<0.0001, t=12.921) showed a extremely statistically significant result.
Conclusion: There is significant effect of Tai chi exercise to reduce dyspnoea in obese females so Tai chi appears to be possible intervention to reduce dyspnoea in obese females.

Keywords: Obese females, exertional dyspnoea, step test, tai-chi exercise

Introduction
Obesity is defined as abnormal accumulation of fat, usually 20% or more over an individual's ideal body weight and it is a heterogenous disorder in which energy intake chronically exceeds energy expenditure [1]. It is a type of malnutrition in which there is abnormal growth of adipose tissue & this can occur due to increase in size and number of fat cells [2]. According to body fat distribution, obesity is of 2 types:
1. Central (Abdominal, Android or Apple shaped)
2. Generalized (Gynacoid or Pear shaped) [1].

Age group of 25-44 years is dangerous time for development of excessive fat in adults [1]. Despite obvious limitations in lung function, metabolic disease and/or cardiovascular dysfunction, obesity may be the most likely reason for exertional dyspnoea.

Body Mass Index
It is the ratio of body weight in Kgs to the height in mt [2].
Body mass index (BMI) is a simple index of weight-for-height that is commonly used to Classify. Overweight and obesity in adults. It is defined as a person's weight in kilograms divided by the Square of his height in meters (kg/m^2) [10].

Body Mass Index (kg/m^2) Category
- <18.5 kg/m^2 UNDERWEIGHT
- 18.5-24.9 kg/m^2 HEALTHY
- 25-29.9 kg/m^2 OVERWEIGHT
- 30-34.9 kg/m^2 GRADE 1 OBESE
- 35.39-39.9 kg/m^2 GRADE 2 OBESE
- >40 kg/m^2 GRADE 3 OBESE

Above classification of overweight is given by WHO Expert committee [14].

Dyspnea: Is a term generally applied to the sensation experience by individual complaining of unpleasant or uncomfortable respiration [3].

Exertion: Is defined as physical or mental effort, or to the use of force or influence [3].

Tai Chi Chuan (also written as Taijiquan) is an ancient Chinese form of exercise originally created as a fighting art has beneficial effects on patients with heart disease, and on reduction of blood. Tai chi is a therapeutic exercise based on Chinese medicine and the practice involves the recognition, development. Tai chi pressure, cardiopulmonary benefits of Tai chi may be partially explained as a response to aerobic exercise [15]. Tai Chi Chuan was created by applying the concept of Tai Chi to very natural movements using relaxation and breathing to generate health, longevity and internal strength and power. The philosophy of Tai Chi is simple yet profound, in short, the idea that everything consists of two opposing forces that harmonize with each other to create a whole. Tai Chi was originally a Martial Art it is mainly practiced today as an excellent form of exercise with many health benefits. The Tai Chi Classics say "If one part of the body moves, the entire body moves". Tai Chi exercise consists of a series of graceful movements with deep and slow diaphragmatic breathings performed while standing. Tai Chi exercise has been shown to have both physical and psychosocial benefits for the different population [5].

Power principle

1. **Breathing:** Deep breathing is used, in through the nose, out through the mouth. I use a forced exhalation technique so the air takes longer to go out than in. That way I get all the oxygen out of the air into blood supply
2. **Relaxation:** Relaxed when you exercise and allow the flow of energy through your system.
3. **Focus:** Focus on your breathing and how your body feels
4. **Intent:** It is having a positive mind set toward better a greater way of BEING.

Obesity is very common in young age which affects many aspects of life. Exertional dyspnea mainly seen in obese females. That's why I conducted this study because many studies have been done with different interventions to reduce the effect of obesity in daily ADL's of obese population but there are very limited studies which show impact of TAI CHI exercise in exertional dyspnea in obese females.

Procedure

Ethical approval was taken from ethical committee. The subjects were selected according to the inclusion and exclusion criteria. The study was explained to the subjects in detail and informed consent was obtained from each subject. Total 82 subjects were screened out of that 60 subjects were included as per inclusion criteria in the study. The assesment was done including demographic data and the procedure was explained to the subjects then relaxation was given for five minutes, pre-exertion level were obtained by performing step test and the levels were noted on borg –rate of percieved exertion scale. Tai-chi exercise was taught to subjects and were asked to perform for 30 mins and for 5 days/ week. Again step test was performed and post exertional level was noted on borg–rate of percieved exertion scale.There was 4 drop outs in between the study.

Inclusion Criteria

Obese females [5].
Age group-18 to 45 years [3].
BMI: 25-29.9kg/mt^2 (Overweight) 30-34.9kg/mt^2 (Grade 1) [1].

Exclusion Criteria

Any Unwilling participants
Any Musculoskeletal disorders
Any Neurological disorders
Any Metabolic disorders
Any Cardiovascular disorders
Any Congenital deformities t

Result

- A total of 56 subjects
- Paired t-test used for pre and post exertional values in obese females
- 95% confidence interval for difference: 2.233 to 3.053
- t= 12.921 with 55 degrees of freedom; P= 0.000
- The difference is considered to be extremely statistically significant

Table 1: Table shows the difference between pre and post interventional exertional dyspnoea value in obese females

	Pre exertion	Post exertion	Difference of pre & post exertional value
Mean	13.25	10.61	2.643
Standard deviation	1.621	1.448	1.531
SEM	0.2166	0.1935	0.2045
t value	12.921 with 55 degrees of freedom		
P value	P value is <0.0001, considered extremely statistically significant		

Above table shows that there is significant decrease in exertional dyspnoea levels post tai chi exercises in obese females.

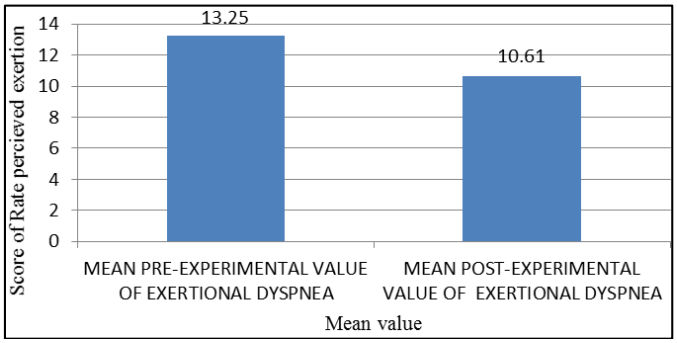

Fig 1: The above Graph is showing the difference between MEAN of PRE & POST Interventional values of Exertional Dyspnoea

Discussion

In our study we found P-value is <0.0001 which is showing highly significant improvement of post interventional dyspnoea values in obese subjects, the difference of mean of pre and post interventional exertional dyspnoea is 2.643 and difference of standard deviation of pre & post interventional exertional dyspnoea is 1.531.Reason behind this significant improvement in post interventional dyspnoea value can be because of cardiopulmonary benefits of Tai chi as a response to aerobic exercise [15]. Tai chi is a Chinese medicine and the practice involves the recognition,

development. It is an exercise that combines deep diaphragmatic breathing and relaxation with many fundamental postures. Increased oxygen uptake up to 50% of the peak oxygen consumption & Heart rate within 58% of HR range were noted during Tai chi chuan sessions [12]. so that is why the result was found that the pre & post exertional dyspnoea difference was extremely statistically significant.

Obesity is one of the major health problems worldwide. It impacts not only the individual's health but also on Health care system. The prevalence of obesity has increased dramatically over the past several decades; dyspnoea on exertion is also very common symptom in obesity and major barrier in the management of obesity. Body composition and fat distribution could affect breathlessness, especially when excess fat is located primarily in the chest and abdomen. Abdomen fats displace the diaphragm upward and impedes its downward movement during inspiration [7] of chronic diseases. For past few years, Tai chi has been widely applied in physical rehabilitation of COPD patients [13].

Tai chi could reduce symptoms of dyspnoea, alleviate the decline of lung function, enhance exercise capacity and improve life quality for patients [12] numerous other studies have been investigated that there is decline in dyspnoea and improvement in lung function post Tai chi chuan is asthmatic children's and COPD patients.

The oxygen cost of breathing was significant (p<0.0001) increased in the obese women with dyspnoea on exertion. There was also a significant relationship between the oxygen cost of breathing and the Rate Perceived Exertion during exercise [11].

Hsin-Chia Lin had concluded that Tai chi chuan exercise is often referred to as "meditation" through movement incorporating elements of balance, postural alignment, and concentration. Tai chi is a therapeutic exercise based on Chinese medicine and the practice involves the recognition, development. Tai chi pressure, cardiopulmonary benefits of Tai chi may be partially explained as a response to aerobic exercise [15]. It is an exercise that combines deep diaphragmatic breathing and relaxation with many fundamental postures. Liu X had concluded an increased oxygen uptake up to 50% of the peak oxygen consumption & Heart rate within 58% of HR range were noted during Tai chi chuan sessions [12].

Tai chi chuan exercise is moderate intensity exercise that is aerobic in nature. Tai chi chuan exercise is beneficial to cardiopulmonary function, mental control, flexibility & balance control. Many studies have showed that pulmonary function improves in children after 3 months of Tai chi chuan exercise [12].

Tai chi for lungs are done while taking long deep breaths that help to increase the oxygen content of your blood calm your mind and relieve stress. Tai chi exercise positively affect physical function, exercise capacity & psychological state, moreover long term practice of this exercise helps in treatment. There is significant effect of Tai chi exercise to reduce dyspnoea in obese females so Tai chi appears to be possible intervention to reduce dyspnoea in obese females. There is significant effect of Tai chi exercise to reduce dyspnoea in obese females so Tai chi appears to be possible intervention to reduce dyspnoea in obese females.

Conclusion

There is significant effect of Tai chi exercise to reduce dyspnoea in obese females so Tai chi appears to be possible intervention to reduce dyspnoea in obese females.

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