



EFFECT OF YOGA ON CARDIOVASCULAR ENDURANCE AND BALANCE IN MIDDLE AGED POPULATION ON COMPARISON WITH AEROBIC EXERCISES: A CROSS SECTIONAL STUDY ANALYSIS

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Abstract:

Aims: The present study aimed at assessing the effect of regular yoga sessions based on the system Yoga in Daily Life on aerobic capacity (cardiovascular endurance (VO₂ max) and balance (Berg Balance Scale)) of the yoga practitioners and comparing it with the aerobic practitioners.

Methodology: The present study was a Cross sectional study design which included (60) middle aged men and women of age between 35-65 years of age which were recruited from societies, village, and near vicinity. The study included the middle aged male and female those who are already performing either yoga or aerobic training regularly. One of the two groups consist of the populations those who are yoga practitioners and on regular basis they are performing yoga and another group consist of subjects with regular cardiovascular training only. Balance (Berg balance scale) and Cardiovascular Endurance (VO₂ max) was calculated and compared between both the groups.

Results: After the statistical analysis of the data it was found that there was no significant difference between the groups on Balance. Subjects of both the groups were found to be at grade of good level of balance whereas there was a significant difference in the level of VO₂ max between both the groups. The AER group was found to have a good level of VO₂ max as compared to the YOG group.

Keywords: Cardiovascular Endurance, Balance, Yoga

Introduction

A strong heart and healthy vessels (developed from regular physical activity) help to make a strong cardiovascular system. Cardiovascular endurance is the ability of the CV (cardiovascular) system to meet the energy demands (Oxygen delivery) incurred by exercise. The best indicator of cardiovascular fitness is VO₂ max. It represents the maximal amount of oxygen the body can take in, deliver, and utilize. A person with a high VO₂ max has healthy lungs to take in a lot of oxygen, strong heart to pump the blood loaded with Oxygen to the body, efficient network of vessels to deliver blood carrying Oxygen to the body, competent muscles to utilize Oxygen¹. Cardiovascular Endurance Exercises Improves cardio respiratory functioning and also uplift the cellular metabolism and also decrease the risk of Cardiovascular diseases, Type 2 diabetes and Osteoporosis.²

Balance can be defined as the process that maintains the center of gravity within the body's support base and requires constant adjustments that are provided by muscular activity and joint positioning. The position of the

body in relation to space is determined by visual, vestibular and somatic sensitive functions. Muscular control and dynamic maintenance of balance involve the activity of coordinates of muscular kinetic chains. Adipose tissue accumulation and body mass increases can cause a reduction in the body balance and be a major contributing factor concerning falls, particularly when combined with low muscular mass, which can generate biomechanical failure of muscular responses and loss of stability mechanisms.³

There are a number of studies which are published on the positive effect of physical aerobic training on balance. A number of reviews are there which appreciates the positive effect of physical training on dynamic as well as static balance. Yoga therapy confirms an improvement on the balance component of various age groups but a combined study which contains both the effect of physical training as well as yoga therapy on balance has not been done till date. So, the purpose of this study is to compare the effects of both the therapies on cardiovascular endurance and balance on middle age population.

Methodology: The present study was a Cross sectional study design which included (60) middle aged men and women of age between 35-65 years of age which were recruited from societies, village, and near vicinity. The study included the middle aged male and female those who are already performing either yoga or aerobic training regularly. Patients with respiratory complications and with recent orthopedic injury were excluded from the study. Middle aged man and women of age between (35-65 years of age) were randomly allocated between two groups. One of the two groups consist of the populations those who are yoga practitioners and on regular basis they are performing yoga and another group consist of subjects with regular physical activity only. Baseline measures like heart rate, blood pressure, pulse was noted down during the basic assessment of the subjects. Participants were queried regarding their duration of yoga practice, i.e. yoga styles used, length and intensity of yoga practice, and practice patterns to make surety of the subjects that they are regularity practicing the same.

Berg Balance Test

Berg balance scale was used to analyze the balance of the subjects in both the groups.

Procedure

The patient is evaluated and graded on a sequence of balance activities, such as sitting unsupported with arms folded, rising, standing, transferring between one surface and another, reaching forward in standing, picking up objects off the floor, turning around in a full circle, and standing on one leg. Scoring for each task ranges from 0 to 4. A score of 0 indicates that the patient is unable to complete a particular task. A score of 4 indicates that the patient can completely carry out the task. Higher scores on the BBS indicate greater independence and better ability to balance. In contrast, lower scores indicate a greater fall risk.

VO2 max calculation

The VO2 max was assessed by using the formula given by uth et al. 2004 Research by Uth et al. (2004) found that VO₂ max can be estimated indirectly from an individual's maximum heart rate (HR_{max}) and resting heart rate (HR_{rest}) with an accuracy that compares favorably with other common VO₂ max tests. It is given by:

$$VO_2 \text{ max} = 15 \times (HR_{\text{max}} \div HR_{\text{rest}})^4$$

Statistical analysis of data:

Data analysis was done using SPSS version 21.00. Sixty subjects were assessed in both the groups (n=60). The demographic characteristics and the baseline criterion measure and the assessed variables were compared

between the two groups by an independent t-test. Baseline characteristics are reported as mean (SD) with changes from baseline given as mean and the 95% confidence interval (CI). For testing the normality of the data Shapiro walk test was used. A *p* value of < 0.05 was considered as significant.

Results:

There were no significant differences between the groups at baseline. The demographic data Mean (SD) at baseline for both the groups (AER and YOG) has been demonstrated in table 1.1 given below.

At baseline heart rate, pulse, systolic and diastolic blood pressure was measured for both the groups at the initial assessment of the subjects.

Table 1: COMPARISON OF BASELINE CRITERION MEASURES BETWEEN THE GROUPS:

Variables	AER Group (1) Mean (SD)	YOG Group (2) Mean (SD)	<i>p</i>
Age(years)	62.88(6.72)	61.88(11.93)	0.766
Height (cm)	157.82(9.69)	164.24(7.53)	0.39
Weight (kg)	57.76(12.12)	64.76(19.33)	0.21
Gender			
Male, n (%)	21	20	0.29
Female, n (%)	9	10	
BMI (kg/m ²)	22.78(4.25)	23.78(5.51)	0.56
RHR	94.35(16.73)	95.41(30.45)	0.84
SBP	126.24(16.89)	129.53(26.95)	0.67
DBP	77.65(13)	80.53(15.24)	0.55

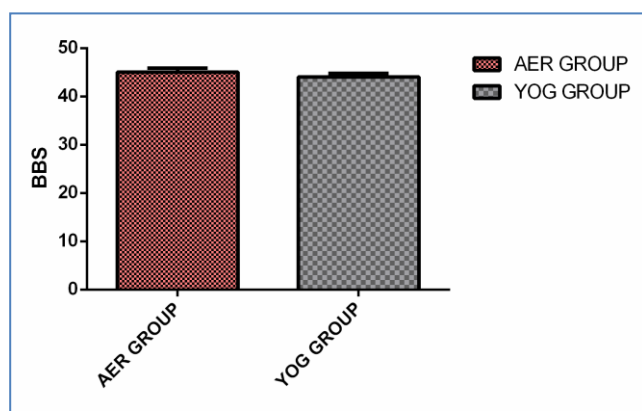
BMI: body mass index; HR: heart rate; SBP: systolic blood pressure; DBP: diastolic blood pressure

Table 2: RESULT OF INDEPENDENT SAMPLE T TEST

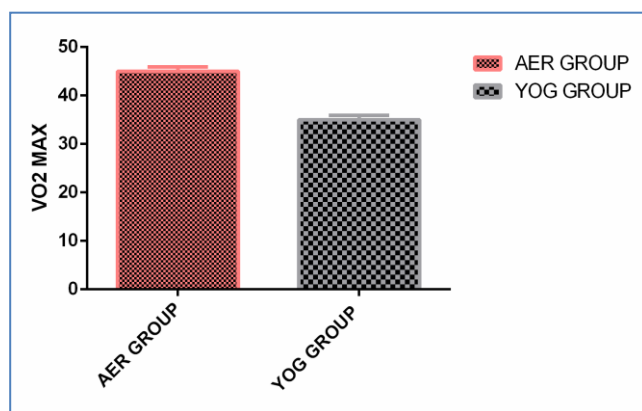
VARIABLE	GROUP	N	MEAN	S. D	S. E	<i>p</i>	<i>f</i>
BBS	YOG	30	44.87	4.48	0.81	0.02	5.34
	AER	30	45.93	5.65	1.03		
VO2	YOG	30	40.53	7.11	1.30	0.001*	
MAX	AER	30	35.93	3.95	0.72		14.95

BBS: Berg balance scale, VO2 Max: maximal oxygen uptake

After the statistical analysis of the data it was found that there was no significant difference between the groups on balance. Subjects of both the groups were found to be at grade of good level of balance whereas there was a significant difference in the level of VO2 max between both the groups. The AER group was found to have a good level of VO2max as compared to the YOG group.



Graph 1: Demonstrates the difference of level of balance (BBS) between both the groups



Graph 2: Demonstrates a significant difference between the groups on VO2 Max

Discussion:

Balance and cardiovascular endurance is a very important aspect to maintain the quality of life. Our findings show that there was no significant mean change was found between both the groups on balance that may indicate that the aerobic training and yoga training both have a positive effect on the balance. It was hard to determine that which training is more beneficial to gain more benefits on the balance because no significant difference of mean change was found might be a larger number of subjects were required to determine the actual difference. Both the groups represent the similar results for the balance that indicates that both the trainings have a positive effect on the balance of middle-aged population. So, it can be concluded from the present study that any one of them either the aerobic training or yoga training can be prescribed for the balance training during rehabilitation.

Many studies have demonstrated that Yoga training leads to improvement in balance control. A systematic review indicated that Yoga improved performance on clinical balance control tests such as the Berg balance scale in both young and older healthy adults. Another study compared

the effect of a custom-designed Yoga program with both Tai Chi training in healthy 6 older adults and concluded that Yoga was as effective as Tai Chi for improving both static and dynamic balance control. Furthermore, recent studies have reported that Yoga is effective in improving various higher cognitive functions such as executive control, mental flexibility, and working memory⁵. Execution of Yoga practice requires the employment of intentional balance control. Through regular practice, intentional balance control may have turned out to be almost automatic with limited involvement of cognitive resources among Yoga practitioners⁶.

The identification of all determinants of balance ability is of critical importance. A better understanding of mechanism leading to poor balance performance is a crucial step in identification of patient at risk and for designing therapeutic strategies. Therefore, it is also an important subject of concern to assess and diagnose properly prior to balance training for a better treatment protocol. There is number of studies published which supports the physical activity to be beneficial for the improvement of quality of life. It has been concluded that the subjects have a good balance status those who are pursuing the aerobic training. It was hard to conclude the superior effect between both the groups because of the similar results. A significant change was found between the groups on VO2 max. VO2 max is better in the AER group which was performing regularly the aerobic training. A significant mean difference with a p value of 0.001 was found after the statistical analysis of the data. So, lack of supportive data to contradict our results and to support the outcome of the study took place, but in future a large sample size with different parameters might be helpful to filter the result and to gain more possible outcomes from the result.

Conclusion and future perspective of the study:

This new information derived from a prospective study and the fact that the aerobic training is a better booster for the cardiovascular endurance and hence can be prescribed according to the present condition of the patients. Furthermore, research is recommended with a large sample size and different parameters for better results.

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