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## EFFECT OF HIGH & LOW INTENSITIES OF AEROBIC EXERCISE ON PHYSICAL FITNESS INDEX

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### HOW TO CITE THIS ARTICLE:

Madhusudhan U. "Effect Of High & Low Intensities of Aerobic Exercise on Physical Fitness Index". Journal of Evidence based Medicine and Healthcare; Volume 2, Issue 22, June 01, 2015; Page: 3296-3300.

**ABSTRACT: BACKGROUND:** Aerobic exercise reduces body fat and improves weight control, increases HDL&Vo2 max. Also improves PFI (physical fitness index) which is defined as ability to carry out daily tasks with vigour and alertness without undue fatigue. Though aerobic exercise is found to improve physical fitness, the relative merits of different intensities of aerobic exercise in improving physical fitness is still uncertain. **AIM:** The present study was conducted to know the Effect of High & low intensity aerobic training on physical fitness index. **MATERIALS & METHODS:** 80 sedentary men (18-40 years) were randomized in to 2 equal groups (High Intensity & low intensity group). The High [80% HR max] & Low intensity [50 % HR max] groups underwent aerobic exercise training using Bicycle ergo meter (COSCO) at 900kpm & 540kpm, for 15mins/day & 30mins/day respectively, 5days a week, for a period of 14weeks. Physical fitness index of each subject was recorded by Modified Harvard step test before & after intervention. **RESULTS:** After 14 weeks of aerobic training both the exercise groups had improvement in PFI, but high intensity group had a significant ( $p < 0.05$ ) improvement in PFI (97.18 -101.14) than low intensity group (98.12-100.6). **CONCLUSION:** High intensity aerobic exercise is effective in improving physical fitness.

**KEYWORDS:** Skinfold thickness, Body fat percentage, PFI.

**INTRODUCTION:** Aerobic exercise is physical exercise that depends primarily on the aerobic energy-generating process. Aerobic literally refers to the use of oxygen to adequately meet energy demands during exercise via aerobic metabolism.<sup>1</sup> Regular aerobic exercise improves health in the following ways: Reduces body fat, improves weight control, resting blood pressure (systolic and diastolic), maximal oxygen consumption (VO<sub>2</sub> max) and blood supply to the muscles. With increased awareness about the importance of fitness many people are taking to various modalities of exercise programmes. Physiological fitness implies the capacity for skilful performance and rapid recovery. The physical fitness index measures the physical fitness for muscular work and the ability to recover from the work. Though aerobic exercise is found to improve PFI,<sup>2,3</sup> the relative merits of different intensities of aerobic exercise on PFI is still uncertain. So the present study was conducted to study the effect of high & low intensities of aerobic exercise on PFI.

Hence, this study will help in guiding the people and fitness trainers in deciding the fitness training programmes to improve physical fitness.

**AIM:** To study the Effect of High & low intensities of aerobic exercise on Physical fitness index.

**MATERIALS & METHODS:** 80 over weight men aged between 18-40years with BMI ranging from 25-29.9kg/m<sup>2</sup> were recruited from two fitness centres. Subjects were informed about the

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study & informed written consent was taken. The anthropometric measurements included weight, height, WC (waist circumference) & WHR (waist hip ratio) following the recommendations of the World Health Organization.<sup>4</sup>

**EXERCISE TRAINING PROTOCOL:** Digital Cycle ergo meter (COSCO, MODEL-CEB-JK-7007 A) which displays heart rate & level of exercise was used for the aerobic exercise. The aerobic training was designed to exercise the upper and lower body.

**FOR HIGH INTENSITY GROUP:** Subject exercised at Level 5, at 50rpm, accounting to 150 watts (900kpm) for a period of 15 min at 80% HR max.

**FOR LOW INTENSITY GROUP:** Subject exercised at Level 3, at 75 rpm, accounting to 90 watts (540kpm) for a period of 30 min at 50 % HR max.

All subjects used to exercise 5 days a week continuously for a period of 14 weeks. At the end of 14weeks all the parameters (Weight, BMI, VO2 max &PFI) were measured again.

**PHYSICAL FITNESS INDEX:** Physical fitness index of each subject was recorded by using modified Harvard step test with step height 40 cms. The observer calls the rhythm, at the signal "start" stopwatch is started, metronome is turned on. The subject places one foot on the platform and later the other, and immediately steps down, bringing down first the same foot which he placed up first. All subjects were stopped at 5 minutes. When the subject successfully completes the test, recovery time starts counting. He is made to sit quietly on a chair or lie on the cot. Beginning exactly one min after he stops, the radial pulse was taken. Three readings were taken during this recovery phase.

The first reading was from 1 minute to 1 minute 30 seconds after the exercise, the second reading was from 2 minutes to 2 minutes 30 seconds after the exercise and the third reading from 3 minutes to 3 minutes 30 seconds after the exercise.

The Physical Fitness Index is calculated by using following formula.<sup>5</sup>

$$PFI = \frac{\text{Duration of exercise in seconds} \times 100}{2 \times \text{Sum of the three half minute post exercise pulse counts}}$$

**STATISTICS:** SPSS 16.5 version of statistical package was used for analysis of the data. Descriptive statistics and t test and analysis of variance was used.

**RESULTS:** Majority of our study population (52.5%) were between 21-30yrs of age group, very few (12.5%) were below 20yrs (Table 1). Majority of the study subjects (73.5%) had fair PFI only few (5%) had excellent PFI (Table 2).There was significant ( $p<0.05$ ) improvement in PFI in high intensity group (97.18-101.14) than low intensity group. Other parameters before & after intervention are summarised in (Table 3). RHR (resting heart rate) decreased in both the groups being more significant ( $p<0.05$ ) in High intensity group (78.8 - 74 beats/min).

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**DISCUSSION:** The main finding of the study was that higher intensities of exercise elicit greater improvements in PFI than lower intensities of exercise over a 14wk training period in healthy, young adults.

**PHYSICAL FITNESS INDEX:** Many studies have shown improvement in PFI after regular aerobic training.<sup>6,7,8</sup> But we didn't get proper references for the studies which compared intensities of aerobic exercises on PFI. But some studies have found improvement in VO2 max or aerobic fitness after regular aerobic training especially High intensity exercise.<sup>9,10</sup>

**Reasons why regular aerobic exercise training showed improvement in PFI are as follows;**

1. Exercise makes demands on the body systems over and above normal daily activities and as result, the systems adapts anatomically and physiologically
2. With regular exercise training there is an increase in the size of energy stores as well as in the activity of enzymes which generate energy.
3. The ability of the muscle to extract oxygen improves and there is a shift towards aerobic metabolism.
4. The main physiological change due to training is in lowering cardiac frequency, indicating increase in stroke volume.<sup>11</sup>

The Harvard test is a submaximal fitness test, as it predicts cardiovascular fitness (endurance) from the rise of heart rate during moderate exercise, rather than exercise to exertion. This makes it a very popular fitness test with health clubs, schools and colleges.<sup>5</sup>

Endurance-trained subjects are known to have a significant resting bradycardia. However, only a few studies have examined the role of training intensity in lowering resting heart rate. Some studies<sup>12,13</sup> showed that there is significant decrease in resting heart rate. Whereas other studies<sup>14,15</sup> showed no difference in RHR. In our study the RHR decreased in both intensities of aerobic exercise but more significant in High intensity group. Vigorous-intensity exercise confers greater cardio protective health benefits than moderate-intensity exercise, including a lower incidence of coronary heart disease that may be related to lower risk factors. Clinical trials have found that higher-intensity exercise resulted in greater reductions in resting blood pressure (BP) than lower intensity.<sup>16</sup>

**CONCLUSION:** High intensity aerobic exercise significantly improves physical fitness by reducing resting Heart rate than low intensity aerobic exercise.

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Age groups (In years)	High intensity group n=40	Low intensity group n=40
<20	3 (7.5%)	5(12.5%)
21-30	23(57.5%)	21(52.5%)
31-40	14(35%)	14(35%)

Table 1: Age wise distribution of study population

PFI ratings		Study subjects (%) n=80
Excellent	> 115	5
Good	103-115	11.25
Fair	91-102	73.75
Poor	<91	10

Table 2: PFI rating according to modified harvard step test

VARIABLES	LOW INTENSITY			HIGH INTENSITY		
	BEFORE	AFTER	t value	BEFORE	AFTER	t value
HEIGHT(cms)	161.32±5.13	-		162.5±5.78	-	
WEIGHT(kg)	68.8± 4.65	67.1±4.9	5.4	74.8±7.09	70.45±7.2	7
BMI (kg/m <sup>2</sup> )	26.39± 1.17	25.6±1.2	2.58	28.57±2.44	26.39±2.46	6.58*
RHR(beats/min)	76.85±7.13	74.2±5.96	2.60	78.85±6.01	74.3±6.02	6.73*
PFI	98.12±4.45	100.6±4.66	3.80	97.18±5.78	101.14±5.86	7.10*
VO2 max (ml/kg/min)	37.67±4.00	38.9±3.41	2.92	36.4±3.23	38.89±3.60	8.72*

Table 3: Comparison of study variables among 2 groups of study population

\*SIGNIFICANT (P<0.05) RHR –resting heart rate, PFI – physical fitness index

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Date of Submission: 21/05/2015.  
Date of Peer Review: 22/05/2015.  
Date of Acceptance: 27/05/2015.  
Date of Publishing: 01/06/2015.