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Original Research Article

Association between Cardio Respiratory Fitness and Sedentary Life Style

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ABSTRACT

Introduction: Working women having sedentary as well as nonsedentary life style due to type of work as they do such as office job where women works by sitting in chair and having sedentary life style where as women working at building construction site generally having nonsedentary life style.
A sedentary life style has been associated with an increased prevalence of obesity and decreased cardio respiratory fitness. There is abundant evidence that obesity increases the risk of elevated blood sugar, hypertension, and hypercholesterolemia. The present study was initiated to estimate the VO_2 max in working women. Most of the VO_2 max studies are in sports persons Very few studies have been taken in working women having sedentary life style. We intended to take VO_2 max levels in working women having sedentary life style and compare these levels in working women having nonsedentary life style.
Aims and Objectives: The purpose of this study was to compare maximum oxygen uptake (VO2 max) between sedentary and nonsedentary working women.
Material & Methods: The present study was carried out in 60 working women aged between 30-58 yrs. Subjects were divided into two groups, sedentary and nonsedentary group. The maximum oxygen uptake (VO2 max) was measured by using walking test and compared results between groups.
Results: The VO2 max was significantly less in sedentary working women than women working at building construction site having nonsedentary life style.
Conclusion: In present study we found that mean vo2 max was poor in sedentary working women. Therefore, we conclude that sedentary life style decrease cardiorespiratory fitness by decreasing vo2 max. Hence we recommend that working women having sedentary life style need to undertake regular physical exercise to improve cardiorespiratory fitness level thereby preventing complications of poor cardiorespiratory fitness and to improve quality of life.

Keywords: *Cardiorespiratory fitness, VO_2 max, Sedentary life style.*

INTRODUCTION

Working women having sedentary as well as nonsedentary life style due to type of work as they do such as office job where women works by sitting in chair and having sedentary life style where as women working at building construction site generally having nonsedentary life style. Women working as administrative job have physical inactivity due to busy schedule in office as well as at home leading to poor health.

A sedentary life style has been associated with an increased prevalence of obesity, decreased cardio respiratory fitness, a lower resting metabolic rate, higher rates of weight gain, and greater likelihood of the metabolic syndrome.

There is abundant evidence that obesity increases the risk of elevated blood

sugar, hypertension, and hypercholesterolemia. Similarly there is ample evidence that regular exercise and weight loss mitigates those risk factors.

Aerobic capacity - It is the maximum rate of oxygen consumption as measured during incremental exercise. [1] It is also called as Maximum Oxygen Uptake/Maximum Oxygen Consumption/ VO_2 max. VO_2 max reflects physical fitness of an individual. It is the best indicator of cardio-respiratory endurance and aerobic fitness. [2]

The present study was initiated to estimate the VO_2 max in working women. Most of the VO_2 max studies are in sports persons. Very few studies have been taken in working women having sedentary life style. We intended to take VO_2 max levels in working women having sedentary life style and compare these levels in working women having nonsedentary life style.

Aims and objectives was to determine and classify the vo2 max levels and to compare VO_{2max} between two working women groups having nonsedentary and sedentary life style.

MATERIALS AND METHODS

Study design: The present study was carried out in 60 working women aged between 30-58 years. There were two groups study group and control group. 30 women working in Government Medical College having sedentary life style were included in study group. Women working at building construction site having nonsedentary life style were included in control group. Selection criteria for inclusion were as follows - The subjects were asked to fill up or answer a questionnaire about their daily physical activities, accordingly it was ensured that the subjects had sedentary or nonsedentary life-style. Following questionnaire were asked: Type of exercise, Frequency of exercise and Duration of exercise. Results of questionnaire in sedentary working group were as follows: 91% of women were not doing any type of exercise, in 9% of women intensity, frequency and duration of physical exercise was far less than desired levels; 100% of women were using petrol vehicle for transportation, working hours of study group was 8-9 hours/day. Results of questionnaire in nonsedentary working group were as follows: 100% of women were doing nonsedentary work at building construction site, daily working hours 8-9 hours, duration of work not less than 1 year. A detailed history was taken including personal history, past history and menstrual history. The study was carried out during proliferative phase of menstrual cycle of all the females. General and detailed systemic examination was done in both the groups. The subjects having cardio-respiratory diseases or having any major systemic illness were excluded from the study. Informed written consent was taken from each subject involved in this study. Basic data such as Height, Weight were recorded, wt in Kilogram and height in meters. Age wise distribution of subjects as follows-

Age wise distribution of subjects:-

Age	Control group No. of subjects	Study group No. of subjects
30-39	10	07
40-49	12	11
50-58	08	12
Total	30	30

Procedure: Vo2 Max was determined by using walking test. [3] Prior to test detail information and brief demonstration was given. Subjects were asked to perform 1 mile track walk and HR1-4 is the heart rate in beats per minute measured immediately at the last quarter- mile.

The following equation is used to calculate the VO_{2max} in mL/ kg /min.

VO_{2max} =132.853 - (0.0769×Wt) – (0.3877 × Age)+(6.135 × 0) – (3.2649× T1) – (0.1565× HR1-4).

Wt is Body weight in pounds; Age is in years; T1 is Time for 1 mile track walk, expressed as minutes and hundredths

of a min; HR1-4 is rate in beat per minutes measured immediately at the end of the last quarter- mile.

OBSERVATIONS & RESULTS

In the present study we measured the VO_{2max} in both the groups and classified VO_{2max} according to cardio respiratory fitness classification and compared between groups. [3]

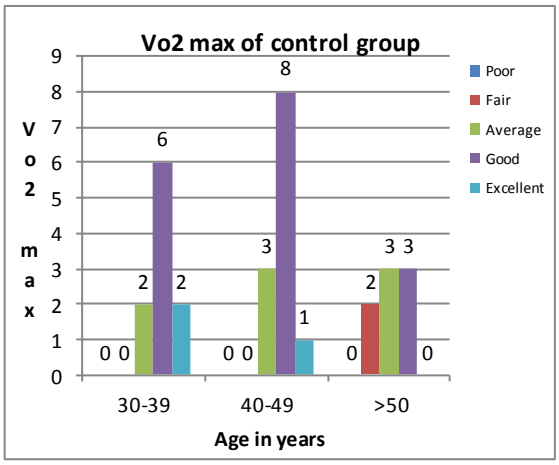
Cardiopulmonary fitness classification

Age	poor	Fair	Average	Good	Excellent
30-39	≤19.9	20-27.9	28-36.9	37-44.9	≥45
40-49	≤16.9	17-24.9	25-34.9	35-41.9	≥42
50-59	≤14.9	15-21.9	22-33.9	34-39.9	≥40
60-69	≤12.9	13-20.9	21-33.9	33-36.9	≥37

In the present study we observed that in control group 56% of women had good $VO_{2max,}$ in10% of women VO_{2max} was excellent, 26% and 6% women had average and fair VO_{2max} respectively. It was noteworthy that nobody had poor VO_{2max} (Table 1).

Table 1. VO_{2max} ml/kg/min - control group

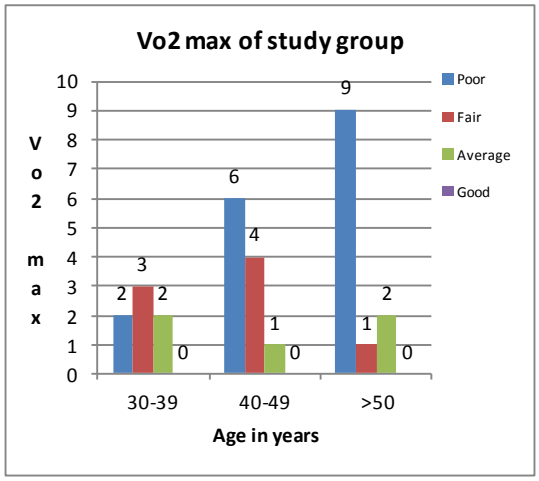
Age	Poor	Fair	Average	Good	Excellent
30-39	0	0	2	6	2
40-49	0	0	3	8	1
>50	0	2	3	3	0
Total =30	0	2 (6%)	8 (26%)	17(56%)	3(10%)



In study group 60% of women had poor $VO_{2max,}$ 26% and 13% of women had fair and average VO_{2max}. Nobody had good or excellent VO_{2max} (Table2).

Table 2. VO_{2max} ml/kg/min -study group

Age	Poor	Fair	Average	Good	Excellent
30-39	2	3	2	0	0
40-49	6	4	1	0	0
>50	9	1	2	0	0
Total =30	18 (60%)	8 (26%)	4 (13%)	0	0



The mean VO_{2max} levels in nonsedentary working women was 33.45±2.16. The mean VO_{2max} in working women having sedentary life style was 19.78±4.36. There was statistically significant difference in VO_{2max} level between groups, VO_{2max} was significantly less in sedentary working women as compared to nonsedentary working women (Table 3). Unpaired 't' test was used to analyse the difference between two means.

Table 3 -VO_{2max} ml/kg/min between both the groups

Groups	Mean VO_{2max}± SD(ml/kg/min)	P value	Signifance
Non sedentary working women	33.45±2.16	P<0.001	Significant difference
Sedentary working women	19.78±4.36		

SD-standard deviation.

DISCUSSION

VO2 (or oxygen consumption) is a measure of the volume of oxygen that is used by your body to convert the energy from the food you eat into the energy molecules, called adenosine triphosphate (ATP), that your body uses at the cellular level. VO2max (or maximal oxygen consumption) is simply the maximum possible VO2 that a given person can achieve.VO2 and VO2max are important in the context of exercise, because they are a measure of your body's ability to generate ATP, and ATP is the energy source that allows your muscles to continue working while you are exercising. Therefore, by definition, a VO2max measurement is ultimately a measure of your cardio respiratory fitness level. [4]

In the present study we assessed VO_{2max} in working women and classified subjects according to cardio respiratory fitness classification. There is significant difference in VO_{2max} level between the groups. It was found that mean VO_{2max} in study group significantly less as compared to control group.

Nonsedentary working women life style included regular walking and weight lifting which suggest that muscles working harder than normal and required more energy and more oxygen demand than sedentary women. In nonsedentary working women high VO_{2max} may be attributed to their regular specific exercise. In our study we also found that decrease in VO_{2max} as age advances although there is a negative correlation between VO2max and age, the available evidence indicates that the influence of a person's fitness level on VO_{2max} is stronger than the influence of their age.

Factors affecting VO_2 max are age, gender, heredity, body composition, exercising training and exercise mode Physiologically VO_2 max is the intensity of an individual to increase metabolic processes with the requirements of increased physical efforts. [5] This results due to transformation of chemical energy into mechanical one. [6,7] VO_2 max is the measure of aerobic capacity and determined as international standard of physical capacity. [6,7] It is expressed as liters of O_2/ min or ml of O_2 per kg of body wt/min. Exercise/Training increases VO_2 max by increasing the cardiac output secondary to high stroke volume. [8] Training/exercise also increases Arterio-venous oxygen difference. [8] Regular aerobic exercise increases VO_2 max 50% by increasing stroke volume and 50% increase is due to increased extraction of oxygen by working muscles which is reflected in an increased arterio-venous difference. The intense aerobic endurance training can induce considerable enlargement of all muscles with a change in cardiac configuration. [8] Exercise increases density of capillaries in skeletal muscles. This increased capacity to irrigate the muscles with blood lead to increased vascularization. [9] Training/exercise also results in increase in no. of mitochondria with increased capacity to generate ATP aerobically by oxidative phosphorylation. [10] VO_2 max increases cardio-respiratory fitness and it is the predictor of success in endurance events. [2] Results of our study are found to be consistent with studies of Hermansen and Andersen (1965) 8 Amanda L. et al (2011). [10] They found significant increase in VO_2 max in trained/exercising group as compared to untrained/sedentary group. Amanda L. et al (2011) [10] reviewed VO_2 max and suggested physical training/exercise for improving VO_2 max.

CONCLUSION

In our study we conclude that VO_2 max level in sedentary working women was poor where as VO_2 max level in nonsedentary working women was average. There was statistically significant decrease in VO_2 max in sedentary working women due to their sedentary working life

style. Hence we recommend to working women having sedentary life style need to undertake regular physical exercise such as 30-40 minutes of moderate to vigours running, swimming, bicycling or 60 minutes of brisk walking exercise to improve cardiorespiratory fitness level thereby preventing complications of poor cardiorespiratory fitness and to improve quality of life.

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