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ORIGINAL ARTICLE

Impact of Low Intensity Physical Activity on the Vitals of Normal Individuals with Varying BMI

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Keywords

BMI, Low impact activity, Vitals, 6 min walk test.

Author`s Contribution

[1]Data analysis, Interpretation and manuscript writing
,[2]Conception, synthesis
[3] Synthesis, Interpretation and manuscript writing
[4]Planning of research and manuscript writing

Article Info.

Received: June 30, 2018
Revised: July 25, 2018
Accepted: Aug 15, 2018

Conflict of Interest: Nil

Funding Sources: Nil

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Cite This article as: Malik K B, Sheraz S, Nafees S M, Amjad M I. Impact of Low Intensity Physical Activity on the Vitals of Normal Individuals with Varying BMI. JRCRS. 2018; 6(1):29-32.

A B S T R A C T

Background: Physical activity tends to improve cardiorespiratory fitness of individuals. Incorporating physical activities including exercise in daily life can lead to improvement in vitals of an individual. This study is intended to assess the effects of low intensity physical activity on vitals of individuals with normal weight, overweight and obesity.

Objective: To determine effects of low impact activity on vitals of normal individuals with varying BMI

Methodology: Study design was experimental study. The sample size chosen was 300 normal individuals. Pre-walk values of heart rate, oxygen saturation, respiratory rate, and blood pressure of the participants were taken. Then, low impact activity i.e. 6min walk was performed on treadmill and participants were assessed again. The duration of study was six months (Feb, 2016 to July, 2016). The data was collected from Railway General Hospital, Rawalpindi.

Results: The heart rate (p-value, 0.001) and respiratory rate (<0.001) increased significantly after 6min walk. Resting heart rate (0.028) was high in over weight individuals. Pre walk (systolic: <0.001, diastolic: <0.001) and post walk (systolic: 0.038, diastolic: 0.049) blood pressures were increased significantly in individuals with high BMI as compared to ones with normal BMI.

Conclusion: The low impact activity improves the heart rate and respiratory rate of normal individuals. The resting as well as post walk heart rate and blood pressure are higher in overweight as compared to normal individuals.

Introduction

Physical activity refers to body movements produced by the contraction of skeletal muscles resulting in substantial increase in energy expenditure.[1] The regular physical activity is a vital component of a healthy lifestyle resulting in a vast number of mental and physical health benefits. In spite of this apparent acceptance of the significance of physical activity, millions of adults remain virtually sedentary. The most common obstacles to the participation in the physical activities are the lack of time, injury, cigarette smoking, body composition (percentage of body fat); it is not a strong predictor of physical activity practices; still, people who are obese are mostly inactive. Alongwith these, the environment e.g. lack of walking and jogging tracks also present an important obstacle to the participation in the physical activity.[2]

Physical activity is essential in the prevention of the chronic diseases and premature deaths. The regular physical activity is correlated with a usual increase in life expectancy. The cardiovascular fitness and the moderate intensity exercises are efficient in the prevention of the type 2 diabetes.[3]

An active lifestyle does not require a regulated, vigorous exercise program. Rather, small changes that upgrade daily physical activity may contribute to the improved

quality of life.[2] Evidence suggests that the long term health benefits are achieved by the regularly performed low intensity exercises. It also reduces the risk for the cardiovascular diseases. Exercise helps to manage the diabetes, blood lipid abnormalities, and obesity. The aerobic exercise results in an independent blood pressure lowering effect in the hypertensive individuals. It decreases both the systolic and the diastolic blood pressure.[4]

6 minute walk test is used in this study as low impact physical activity to assess the changes in vitals of normal and overweight individuals. In a study titled "Six-Minute Walk Test (6MWT) in Children and Adolescents" 6MWT proved to be safe, easy to perform, and highly acceptable to children. It proved to be a simple and inexpensive means to measure functional exercise capacity.[5]

Another study was conducted to investigate changes in oxygen saturation of soccer players with short-term exercise.[6] Kaur et al surveyed college students to assess obesity, dietary habits, and physical activity in college students.[7] A study done in March 2003 assessed the differences in walking capacity, perceived exertion and physical complaints between lean, obese and morbidly obese women. It also identified anthropometric, physical fitness and physical activity variables that contribute to the variability in the distance achieved during a 6-minute walk test in lean and obese women.[8]

In December 2012, comparison of the affective responses of normal weight, overweight, and obese women to increasing levels of exercise intensity was done.[9]

This study was intended to assess the effects of low impact activity (6min walk) on the vitals of normal, lean and obese individuals with varying BMI so that the results of this study could be applied on patients to prevent, improve or maintain the conditions such as hypertension and heart diseases.

Methodology

This Experimental study was conducted in Railway General Hospital, Rawalpindi from Feb, 2016 to July, 2016. The data was collected from 300 individuals selected through non probability convenient sampling technique. 74 participants were in underweight category of BMI, 176 in normal weight and 50 were in overweight category. Sample was based on young participants from normal population age ranging 18-30 years; both males and females with varying BMI were included. Any individual with any diagnosed disease were excluded. Vitals i.e. blood pressure, respiratory rate; oxygen saturation and heart rate of the participants were taken before 6 minutes' walk. Oxygen saturation and pulse rate were taken from the pulse oximeter, blood pressure were taken by the stethoscope and sphygmomanometer; respiratory rate was measured manually standing on the foot side of the participant. 6 minutes' walk test was applied then and all the parameters of the participant were assessed again after 6min walk. The data was analyzed using SPSS version 21 and Paired sample T test was applied where p value <0.05 was considered significant. Analyzed data was presented in the form of charts and graphs and tables.

Data were analyzed using SPSS (statistical package for social sciences) 21 and was expressed in form of tables and graphs. Paired sample T-test was applied at 95% level of significance for accurate and significant results. A level of statistical significance was established at a value of $p < 0.05$.

Results

The sample size consists of 300 individuals. The mean age of participants was 23 $\pm$ 1.5.32 (10.7%) participants were males whereas 268 (89.3%) females were included in the study. Participants in underweight category according to BMI were 74 (24.7%), those in normal weight were 176 (58.7%) and those in overweight category were 50(16.7%).

Paired sample T-test applied at 95% level of significance depicted statistically significant difference in heart rate (p value <0.001) and respiratory rate (p value <0.001) of individuals after low impact physical activity i.e.6 minutes' walk. (Table I)

Independent t test was applied to analyze the differences between vitals of normal and overweight individuals and it found statistically significant difference in pre and post walk heart rate, systolic and diastolic blood pressures of normal and overweight individuals.

Table II Shows Mean $\pm$ SD values of pre and post walk heart rate, oxygen saturation, systolic blood pressure, diastolic blood pressure and oxygen saturation in normal and overweight BMI.

Table I: Shows mean ± SD and p value of the pre and post walk heart rate, oxygen saturation, systolic, diastolic blood pressure and respiratory rate.

Variables	Pre walk readings Mean ± SD	Post walk readings Mean ± SD	P value
Heart rate in beats per min	92.71± 12.411	102.37±15.133	0.00
Oxygen saturation in percentage	96.51±1.960	96.45±2.040	0.68
Systolic blood pressure in mmHg	105.07±10.773	104.73±12.974	0.61
Diastolic blood pressure in mmHg	72.47±7.829	71.72±9.373	0.15
Respiratory rate in breaths per min	22.03±3.236	26.69±3.307	0.00

Table II: Shows mean + SD values of pre and post walk heart rate, oxygen saturation, systolic blood pressure, diastolic blood pressure and oxygen saturation in normal and overweight BMI.

Variables	BMI normal Mean ± SD	BMI over weight Mean ± SD	P value
Pre walk heart rate in beats per min	91.51 ± 13.127	96.10 ± 12.425	0.02
Post walk heart rate in beats per min	102.05± 15.202	105.26± 17.579	0.03
Pre walk oxygen saturation in percentage	96.52 ± 2.084	96.60 ± 1.666	0.81
Post walk oxygen saturation in percentage	96.68± 2.160	96.20± 1.654	0.14
Pre walk systolic blood pressure in mmHg	104.26± 10.393	112.10± 11.207	0.00
Post walk systolic blood pressure in mmHg	105.88± 13.156	110.20± 12.078	0.03
Pre walk diastolic blood pressure in mmHg	71.93±7.462	76.40± 9.205	0.00
Post walk diastolic blood pressure in mmHg	72.44± 8.229	75.30± 11.312	0.04
Pre walk respiratory rate in breaths per min	21.99± 3.239	21.92± 3.050	0.89
Post walk respiratory rate in breaths per min	26.60± 3.204	26.56± 2.887	0.93

Discussion

This study conducted on a sample of 300 individuals resulted in both clinical and statistical increase in heart rate and respiratory rate of individuals but there is difference in oxygen saturation and blood pressure after low impact physical activity.

A study conducted by Balady GJ et al states that the cardiovascular system's immediate response to the exercise was an increased heart rate. Heart rate increases because of the decrease in vagal tone and increase in sympathetic outflow. The magnitude of heart rate acceleration are effected by age, de-conditioning, body position, type of exercise, and various states of health and therapy, including heart transplant.[10] The present study also resulted in an increase in heart rate after low impact activity.

The short term exercise doesn't affect the oxygen saturation according to a study conducted in Turkey. The insignificance is due to the fact that the circulatory system adapts to the skeletal muscle's oxygenation as a result of regular training.[6] There was no significant difference found in pre-walk and post-walk oxygen saturation in our study.

Another study conducted by Cornelissen V et al states that a single bout of exercise causes immediate reduction in blood pressure.[11] However the current study shows that the difference in the systolic and diastolic blood pressure before and after 6 minutes' walk was insignificant.

The Progressive incremental exercises in healthy subjects usually are associated with increase in respiratory rate[12]. The rate of breathing increases during rhythmical work such as pedaling or walking on the treadmill. In most normal women as the frequency of breathing increased both inspiratory and expiratory duration fell. However, in most normal men inspiratory duration did not fall as ventilation increased. Women breathed faster than men.[13] The current study also found that the respiratory rate increases sinificantly after low impact activity i.e. 6 min walk.

A study concluded that the resting pulse rate was found to be higher in the obese Individuals than in the normal individuals.[14] Our studed also found that the over weight individuals have higher resting heart rate as compared with the resting heart rate of the normal weight individual.

Our study proved that the resting systolic and diastolic blood pressure of the overweight participants were higher as compared with the normal weight individuals. A study showed that for both men and women, high blood pressure was the most common overweight- and obesity-related health condition and its prevalence showed a strong increase in blood pressures with increasing weight.[15]

The oxygen saturation at rest is slightly higher in the obese individuals as compared to the normal individuals. During exercise, the oxygen saturation increases in the obese individuals. This is due to the greater work associated with the extra weight or the higher respiratory rates[14]. In the current study there is no significant difference in the resting oxygen saturation and oxygen saturation after 6min walk in obese and normal weight individuals.

The systolic blood pressure increases slightly during exercise and the diastolic pressure remaines practically fixed. This indicates a rather fine quantitative adjustment between increased cardiac output and widening of the peripheral vascular bed since the resistance against which the heart has to work in order to open the aortic valves remains constant during rest and mild exercise.[14] The results of our study show that after performing the low impact walk the sytolic and diastolic blood pressures of the over weight individuals are higher than the normal weight individuals.

The results of our study provides evidance that there is significant effect of the low impact activity on the vitals of the normal individauls with varring BMI. The heart rate and respiratory rate was increased after performing the 6 minutes walk on treadmil. The oxygen saturation, systolic and diastolic blood pressures were decreased, however, the result was insignificant. The resting heart rate of the over weight individuals was high. The resting and post walk heart rate, systolic and diastolic blood pressures increased in individuals with high BMI as compared to the normal weight individuals.

Conclusion

Heart rate and respiratory rate of normal individuals is improved whereas there is no increase in oxygen saturation, systolic and diastolic blood pressures after low impact physical activity. Also pre and post walk heart rate, systolic and diastolic blood pressures were higher in over weight as compared to normal individuals therefore exercise plan for normal or overweight individuals should be designed keeping in view these normal variations in vitals after low impact physical activity.

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