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EFFECT OF A SHORT BOUT OF EXERCISE ON CARDIORESPIRATORY CHANGES IN IDEAL WEIGHT POPULATION

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ABSTRACT

Heart function can be described as the various measures of efficiency for the heart and circulatory systems during rest and activity and to investigate whether regular exercise was protective against reduced heart rate, or adverse effects of obesity and weight gain on heart rate were modified by regular exercise. In this study effect of a short bout of exercise on cardiorespiratory changes in ideal weight population were analyzed.Sedentary population, according to Baecke's Questionnaire both sexes, between 20 and 30 years with Body Mass Index (BMI) 18.5 to 24.9 were recruited using Purposive sampling (N = 50).The results were obtained using t-test. The ideal weight group is homogenous at the baseline and showed statistically significant changes after intervention with short bout of exercises in Rate of Perceived Exertion Scale, Respiratory Rate and Heart Rate.Cardiorespiratory changes in ideal weight population following short bout of exercise concludes that increasing levels of physical activity in subjects are associated with an increase in cardiorespiratory fitness.

Keywords: *BMI, Cardio Respiratory Changes, RPE, Heart Rate, Respiratory Rate*

INTRODUCTION

A sedentary lifestyle is a type of lifestyle with little or no physical activity. A person living a sedentary lifestyle is often sitting or lying, while reading, socializing, watching television, playing video games, or using a mobile phone/computer for much of the day (Lobstein et al., 2006).It is commonly found in boththe developed and developing world. A lack of physical activity is one of the leading causes of preventable death worldwide.Several studies showed that regular physical activity can improve the health of older people and contribute to the primary and secondary prevention of many chronic diseases, including sarcopenia (Zech et al., 2011).Furthermore, a sedentary lifestyle is associated with many chronic diseases, the change inbody composition (increased fat and decreased muscle mass) and development of premature death (Kim et al., 2012).Research evaluating in individuals who are physically active or sedentary practices suggests that regular physical activity can improve muscle mass and grip strength and lower limb mobility (Sherrington et al., 2004).With the sedentary lifestyle on the rise, fitness has become more and more essential.

Coronary heart disease is the leading cause of death worldwide, responsible for over 7 million deaths annually. Indian Asians (people originating from India, Pakistan, Bangladesh and Sri Lanka) comprise one quarter of the globe's population and are at high risk of developing CHD. Recent estimates from the Global Burden of Disease (GBD) 2010 Study (Lozano et al., 2010) indicate that CHD deaths are highest in South Asia, increasing by 87.8% between 1990 and 2010, second only to East Asia. Cardiovascular exercise is typically performed to improve and maintain cardiovascular health. Aside from endurance competitors (triathletes, cyclists, marathon runners, etc.), recreationally active men and women should be exercising at an intensity that promotes optimal heart health. However, it is not always clear as to what intensities one should be exercising at to facilitate the greatest return. For years exercisers have been

using both heart rate (HR) values and ratings of perceived exertion (RPE) to classify intensities during cardiovascular training. The intensity in which effort is expended is essential to the elaboration and control of any exercise program. Heart rate and perceived effort are the most frequently used indicators for the control of the intensity of effort in water exercises (Graef and Kruel, 2006).

During exercise testing, the quantity of blood pumped by the heart increases to match the increased skeletal muscle demand. Heart rate (HR) monitoring is a method commonly used to determine and assess exercise intensity levels. Exercise intensity is a key component of the training response. Therefore, it is important to understand the factors that can influence HR during exercise, so modifications can be made when establishing training heart rate. Rate of Perceived Exertion (RPE) is used as a means to quantify the subjective feelings of the intensity of exercise. The scale describes a range of intensity from resting to maximal energy outputs and is used as a visual aid to exercisers in keeping their efforts in the effective training zone, the rating range from 6-20 (Panton et al.1996). Over the past two decades cardiorespiratory fitness, i.e. the efficiency of the respiratory and cardiovascular systems, has been the subject of a very large number of studies. In contrast, it is only recently that the cardiorespiratory fitness of the general adult population, aged from 20 to 30 years, has received much attention. This is due to the fact that diseases of the respiratory and cardiovascular systems have become a major cause of adult deaths in Western nations.

Previous studies were done by Clifton and Skalon(May 2006), in normal physically active male and female to find out the correlation of heart rate and rate of perceived exertion (RPE) but very few studies has been done on sedentary individuals and overweight individuals to determine if the Rate of Perceived Exertion scale does accurately assess the subject's work rate and can be used as a helpful means of obtaining the work rate of an individual during exercise testing and in some cases could be used in lieu of HR (Clintof and Skalon,2006).So this study aimed to compare on ideal weight adults adults to determine if the Rate of Perceived Exertion scale does accurately assess the subject's work rate and can be used as a helpful means of obtaining the work rate of an individual during exercise testing and in some cases could be used in lieu of Heart Rate.

MATERIALS AND METHODS

Inclusion Criteria

- Sedentary population (N= 50), according to Baecke's Questionnaire both sexes, between 20 and 30 years with Body Mass Index (BMI) 18.5 to 24.9.
- Subjects not undergoing any exercise program in the form of training.

Exclusion criteria

- Hypertensive subjects.
- History of exertional dyspnoea.
- Clinically diagnoses cardiovascular and cardiorespiratory diseases.
- Medical conditions like Diabetes, Hepatic disease, Cancer, etc.
- Orthopaedic problems such as recent fractures, joint and muscle pathologies.
- Difficulty in following the commands and procedure.
- Women under hormonal replacement therapy.
- Alcoholics and Smokers.

Procedure

The target population of this study consists of 50 participants. Initial explanation about the aim and purpose of the study, test procedure, method of testing, instructions on how to perform test was given. Explanations about the procedure of parameters to be measured before and after the test were given. Subjects were oriented about Borg's rating of Perceived Exertion and how to rate it. A written consent was taken from all the participants and the study was approved by institutional ethical committee. The participants were selected based on following selection criteria.

Subject preparation

- Before the test the subject should not indulge them into any activities.
- Before commencement of test the subjects should be asked to rest for half an hour, so that the vital signs might come down to steady state, than all vital signs were measured.
- Subjects were expected not to have heavy

meals/tea/coffee atleast 2 hours before exercise and care is taken that they are properly hydrated.
- Subjects were advised to wear loose clothing.

Vital Signs Measurement

Position: Relaxedsitting posture on a chair.

Resting Heart Rate: A manual method of taking a heart rate will be done by feeling the pulse on the radial side of the wrist for 1 minute.

Respiratory Rate: Will be measured by observing the chest movement of the subject for 1 minute.

Test procedure
- Subjects are asked to step up and down (up-up; down-down) at the rate set by metronome.
- At the end of 1 minute, the subject will be asked to rate their rate of perceived exertion and pulse rate was measured and the values will be noted.
- Again the subject was made to step up and down for 2 minutes, and asked to rate their rate of perceived exertion and pulse rate will be measured and the values will be noted.
- Once again the subject was made to step up and down for 3 minutes, and asked to rate their rate of perceived exertion pulse rate will be measured and the values will be noted.
- Scoring procedure is remaining standing after test. Beginning 5 seconds after the cessation of test, take a 15-second pulse count. Multiply the 15-second count by 4 to express the score in beats per minute (bpm).

Outcome measures
- Heart Rate
- Respiratory Rate
- Rate of Perceived Exertion

RESULTS AND DISCUSSION

This study was performed with 50 ideal weight BMI adults. The age group selected was 20 to 30 years. The basic demographic data obtained included age, height, weight, BMI, heart rate and respiratory rate. The outcome measures used in this study are RPE, and heart rate that are measured before and after exercises. Statistical analysis of the data collected was done using SPSS software. Paired t- test was used to analyze the within group data and independent t-test was used to analyze between group values with 95% of level of confidence and p=0.05.

Table-1: Demographic data showing age, height, weight, heart rate and respiratory rate at baseline

Group	Age	Height	Weight	BMI	Heart Rate	Respiratory rate
Ideal weight group	25±4	159±7	52±3	21±4	77±7	13±4
P value	>0.05	>0.05	>0.05	>0.05	>0.05	>0.05

Values are expressed as Mean ± SD

The above table shows the baseline details of group in terms of age, height, weight, heart rate and respiratory rate. The age in Ideal weight group is 25±4. The height in Ideal weight group is 159±7. The weight in Ideal weight group is 52±3. The BMI in Ideal weight group is 21±4. The Heart rate in Ideal weight group is 77±7. The Respiratory rate in Ideal weight group is 13±4. P value for all these variables by using independent t-test at baseline is more than 0.05 and confirms the homogeneity of groups before the commencement of the intervention.

Table-2: SEX distribution among groups

Group	Male	Female	Total
Ideal weight group	27	23	50
Total	51	49	100

Values are expressed as Mean ± SD

The above shows sex distribution among the both groups. In ideal weight group there were 27 males and 23 females.

Table-3: Data analysis in ideal weight group

	Heart Rate	Respiratory rate	RPE
Before	77±7	13±4	6±0
After	98±6	22±9	13±7
P value	<0.05	<0.05	<0.05

Values are express as Mean ± SD

The above table shows with in group data analysis of ideal weight group by using paired t-test for the outcomes Heart Rate, Respiratory rate and RPE before and after the intervention. The Heart Rate before is 77±7 and after is 98±6. The Respiratory rate before 13±4 and after is 22±9. The RPE before 6±0 and after is 13±7. P value for all these variables before and after is less than 0.05 and confirms the statistically significant improvement in all the variables after intervention.

Aires et al (2010) did a study to analyze the relation between body mass index (BMI), Cardiorespiratory Fitness (CRF), and levels of physical activity (PA) from sedentary to very vigorous intensities, measured by accelerometry, in students from a middle and high school. This cross-sectional study included 111 children and adolescents. Pearson's correlation was used to analyze correlations between all variables. This paper provided evidence that BMI was inversely and significantly correlated with CRF. Low CRF is strongly associated with obesity, which highlights the importance of increasing CRF for a protective effect even in youth.

Physical fitness is an important part of life. It is an indicator which shows whether you have the ability to perform and enjoy day to day physical activities with ease. A large percentage of the adult population is relatively physically inactive. In a 1997 survey, only 34% of the population sampled (15 years and older) exercised one or more times a week, citing lack of time as a major factor for remaining inactive. The high incidences of cardiovascular diseases and modern scientific studies connecting physical activity and mortality of adults since the 1950s have resulted in increased awareness and research attention in cardiorespiratory fitness of the general population.

Leisure time physical activity increased among normal weight participants. Adolescents of normal weight had better cardiorespiratory performance than those classified as overweight at both assessment points. BMI - adjusted physical activity was a significant determinant for cardiorespiratory performance among over-weight adolescents, and very active overweight adolescents had similar cardiorespiratory performance levels as moderately active adolescents of normal weight. The results of the present study support the idea that the physical activity has the great importance for the cardiorespiratory performance in adolescents. Overweight adolescents, in particular, benefit from higher levels of physical activity.

Several studies (Fogelholm et al., 2008 ;Ortega, 2010) confirmed that physical activity and physical fitness are equally important for health.

In the following the results will be discussed with reviews analyzing only the relationship between two parameters, because no comparable reviews were found. The different strengths of the correlations between the three parameters may be at least in part attributed to the different measurements of physical activity. For instance, two studies (Fogelholm et al., 2008; Ortega,2010) assessed physical activity via questionnaire, one via accelerometer and one via activity monitor and questionnaire, and the collection period of objectively measured physical activity ranged from three to six days. In addition, the two studies that measured physical activity subjectively omitted reporting details on their measurement instruments.

CONCLUSION

This study on cardiorespiratory changes in ideal weight population following short bout of exercise concludes that increasing levels of physical activity in subjects are associated with an increase in cardiorespiratory fitness.

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