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Student's Physical Activity and Its Relation with Change of Some Physiological Indices

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ABSTRACT: There is number of non-athlete Students University that they are at risk of some cardiac diseases in future so, some information about physiological indices can help to protect them. This research is a simple way to measure of some physiological indices such as systolic blood pressure (SBP), diastolic blood pressure (DBP), body mass index (BMI) and resting heart rate (RHR) and their relation with physical activity. Participants were 30 non-athlete university students male with age: 21.5, heights: 177.8 cm and weight: 73.5 kg, also SBP and DBP measured by sphygmomanometer, RHR by counting of pulse in all of subjects and measured BMI (pre-test). Then participants trained three sessions per week for 13 weeks based on overload principle that exercise program was consist of: jogging (10 minutes) stretching training (10minutes) aerobic exercise (30minutes) and at the end of session cool down(5minutes). After 13 weeks physiological indices measured in all of students for second time (post-test). After analyses of obtained data, our results indicate that RHR reduced significantly in subjects but there is no significantly P<0.05 changes in SBP and DBP after training program. Also most numerous of participants loses a little body weight in the end of the exercises approximately 1.7 kg in fact BMI decreased.

Keywords: Resting heart rate, systolic blood pressure, diastolic blood pressure, body mass index

INTRODUCTION

Regular physical activity using large muscle groups, such as walking, running, or swimming, produces cardiovascular adaptations that increase exercise capacity, endurance, and skeletal muscle strength. Habitual physical activity also prevents the development of coronary artery disease (CAD) and reduces symptoms in patients with established cardiovascular disease. There is also evidence that exercise reduces the risk of other chronic diseases, including type II diabetes [1], osteoporosis [2], obesity[3], depression [4], cancer of the breast [5], and colon[6]. Continued debate as to how much, what type, how often, what intensity, and how long the physical activity dose should be and how this dose should be quantified and disseminated has led to the promulgation of numerous different public health and clinical recommendations. Some of the inconsistency among physical activity recommendations is due simply to the inherent uncertainties of biomedical science, augmented by methodological differences in collecting and interpreting the extant data. Some is due to a focus on different health outcomes by different groups. The benefits of regular physical activity on health of physiological indices such as blood pressure (BP) and heart rate (HR) have been reported widely [7]. Regular physical activity also helps manage the symptoms of chronic disease such as hypertension and improve quality of life [8].

Cardiovascular disease, a major cause of morbidity, mortality and healthcare costs among adults [9], is a progressive disease that has its roots in the early years of life [10, 11, and 12]. Focusing on puberty is essential, since it is an era of unique biological changes in human body, including changes in the cardiovascular system [13, 14]. Furthermore, adolescents rather than adults adopt independent behavior patterns that influence lifetime cardiovascular risk. Nowadays, elevated blood pressure during childhood and adolescence is not so rare and increases the risk of hypertension in adulthood [15] contributing to the adverse cardiovascular outcome. In adults, hypertension is associated with a number of other markers of cardiovascular risk such as obesity, unhealthy nutrition pattern and physical inactivity [16, 17]. Prospective studies have demonstrated that moderate-to-vigorous intensity physical activity at baseline seems to be associated with a lower incidence of hypertension among white men, regardless of body size [18].

Further, interventional studies [19, 20] have demonstrated that increased physical activity reduces BP in hypertensive and normotensive individuals independently from weight loss. In light of these, physical activity should be practiced at a moderate intensity level in order to reduce systolic and diastolic BP. Thus, physical activity should be considered as an important measure for the prevention and treatment of hypertension in adulthood. Even though for adults the effect of physical activity on blood pressure is well established, the literature data are still limited regarding young adolescents. Physical activity is a key component of the therapeutic lifestyle changes recommended for preventing and treating hypertension in children and in youth [21]. The American Heart Association recommends that children and youth should participate in at least 60 min of moderate-to-vigorous physical activity daily for cardiovascular health promotion [22, 23].

Cardiac diseases and arrhythmias are common with aging and at least partly linked to increasing cardiac electrophysiological and autonomic dysfunction [24, 25, 26, and 27] Heart rate variability provides indices related to cardiac electrophysiology and autonomic regulation, including respiratory, baroreflex, and circadian fluctuations that are indicative of healthier responses. With advancing age, increased heart rate variability can also reflect abnormal (erratic) sinus patterns that are associated with increased risk [28]. In middle-aged populations, habitual physical activity has been associated with more favorable heart rate variability indices, especially those reflecting increased vagal modulation and reduced sympathetic activity [29, 30]. However, several key issues remain to be addressed in older adults [31, 32] who are at much higher risk for both abnormal heart rate variability and cardiac events than middle-aged populations. Several health conditions and disorders have been attributed to being overweight in children and adolescents [33]. For instance, overweight children and adolescents are more likely to suffer from cardiovascular, metabolic, pulmonary, skeletal or psychosocial disorders [34]. Even if these conditions or disorders are not manifested during childhood, being overweight in childhood increases the risk of illness in adulthood [33]. Hence, it is critical to identify risk factors for overweight in children and adolescents and to address overweight during childhood and adolescence. Being overweight may originate from many different factors ranging from environmental influences to genetic variations [35]. The heritability of predisposition for a high body mass index (BMI) or body fat content is between 25 and 40% [36], which suggests that other factors such as environmental factors may also play a critical role. According to Bouchard et al. [36], both the family environment and genetic predisposition influence the development of body fat content and distribution.

MATERIALS AND METHODS

In this research tried to know the effect of physical activity three days per week on BP, BMI and HR. So, purpose of this study is to employ healthy method to enhance quality of life among university students. Also recent reviews have summarized the benefits of regular physical activity on the health of youth and its potential for reducing the incidence of chronic diseases that are manifested in adulthood, a more systematic approach is indicated. Participants were 30 non-athlete university students male with age: 21.5, heights: 177.8 cm and weight: 73.5 kg, also systolic blood pressure (SBP) and diastolic blood pressure (DBP) measured by sphygmomanometer, resting heart rate(RHR) by counting of pulse in all of subjects. Components of training session: Warm-up, prior to physical activity, Prepare heart & other muscles for more intense activity, Raise core body temperature, Physical activity participation, Principles of Fitness: Frequency, Intensity, Time , Type ,(FITT), Overload (more than normal), Progression (using FITT to increase overload), Cool-down after physical activity. Also to measuring heart rate, we have to answer to three questions: Why? To optimize health benefits to assess student effort, Where? Radial (below thumb) Carotid (on neck), How? Palpate for: 60s, 30s x 2, 15s x 4, 10s x 6, and 6s x 10 HR monitor. For monitoring of HR there are cautions: 1.Never use thumb to palpate, 2.Count 0, 1, 2, 3, etc. 3. Higher HR greater measurement error. For determining HR zones: Max HR (MHR): 220-age, Resting HR (RHR): Awaken & check before lifting head; repeat for 6 days and average, In university setting: lay down on floor for 10 mines then check, Target Heart Rate Zones (THRZ): 50-60% MHR: sufficiently strenuous daily physical activity, 60-70%MHR: fat burning, 70-80%MHR: improved cardiovascular endurance, 80-100%MHR: competitive training, recovery Heart Rate: How long it takes the heart to return to "normal" after physical activity, Usually one, three, five minute intervals. Then participants trained three sessions per week for 13 weeks based on overload principle that exercise program was consist of: jogging (10 minutes) stretching training(10minutes) aerobic exercise (30minutes) and at the end of session cool down(5minutes). Then, after 13 weeks physiological indices measured in all of students for second time.

RESULTS

Our results about physiological indices that they measured in all of students showed in table 1. After analyses of obtained data, our results indicate that RHR reduced significantly in subjects but there is no significantly P<0.05 changes in SBP and DBP after training program. Also most numerous of participants loses a little body weight in the end of the exercises approximately 1.7 kg. So, BMI reduced in subject too.

Table 1. Amount of variables (pretest & posttest).

Variables	Pretest	Posttest
Age,yr	23.5	----------
Min-max, yr	19-28	----------
Height, m	177.8	----------
Fat, %	16±4	16±3
BP_{dia}, mmHg	82.4	81.8
BP_{sys}, mmHg	120.2	119.7
RHR, beats/min	73.8	68.9
BMI	23.48	22.68
Weight, kg	73.5	71.8

Values are means; RHR, Resting heart rate; BP_{dia}, diastolic blood pressure; BP_{sys}, systolic blood pressure, BMI, Body Mass Index

*** *P* < 0.05 † *P* < 0.01 ‡ *P* < 0.001: comparisons are between pre training (Pre) and post training (Post) values**

DISCUSSION

The results of this study supported the research hypothesis that there would be a significant difference in the amount of physiological indices before and after physical activity. This report presents results of a systematic evaluation of evidence dealing with the effects of regular physical activity on several health and behavioral outcomes in youth, with the goal of developing a recommendation for the amount of physical activity deemed appropriate to yield beneficial health and behavioral outcomes. The data on the relationship between physical activity and overweight, body mass index blood pressure and resting heart rate are inconsistent. Specifically, the different levels of physical activity (measured by objective measurement methods) showed different relationships to overweight. In addition, the effect of gender on the relationship between physical activity and overweight was inconsistent. While Deforche *et al.* [37], Haerens *et al.* [38] and Gonzales-Suarez *et al.* [39] reported no gender effect on the relationship between overweight and physical activity, other studies [40, 41] revealed that gender affected the relationship between overweight and physical activity but that this association depended on the anthropometric measurement method used to measure overweight. All studies included in our review observed inverse relationships between physical fitness and overweight. Training programs revealed positive adaptations on body composition. In particular, body weight is decreased by after 16 weeks of physical training. Physical activity especially aerobic exercise decreased significantly resting heart rate and BMI, as a result to be an independent risk factor for overweight. In addition, high BMI and inactive life style to be risk factors for elevated SBP.

These findings suggest that physical activity promotion programs are needed in university districts. It is recommended that parents, teachers, and university district personnel make efforts to promote physical activity among students in and out of university. If sport administrators and educators want as many young people as possible to participate in healthier lifestyle and be more physically active it is necessary to make known the opportunities that are available to potential university students. Based on our results physical activity; especially aerobic exercise, three sessions per week can be effective on RHR and BMI. Now, if persons that they haven't much time for physical activity, they can only with 3 days per week based on results of this research project helps to physiological indices health. Furthermore, aerobic exercise or another simple activity is executable in everywhere and every time, easily. Moderate aerobic physical training can lead to changes in systolic and diastolic blood pressure among the examined groups. Of course this change was not significantly but it is likely if the number of sessions or the duration of each session to be added can effective on SBP and DBP probably. The only significant finding was a lower heart rate in the group with physical training at the end of the follow-up period. Obviously, there were trends in reduction of blood pressure in group.

There is consistent evidence that a regular rhythmic physical exercise of the lower extremities decreases both systolic and diastolic blood pressure by 5-7 mm Hg independent of weight loss, alcohol intake or salt intake [42]. These results of exercise training did not seem to be affected by the type of aerobic training because several studies used home training programs and found comparable reductions in blood pressure to those in which subjects trained under staff supervision [43]. Thus, it appears that the antihypertensive effects of exercise are additive with those of most antihypertensive medications [44]. It is hypothesized that interaction of exercise training and chronic nitroglycerin treatment would maintain/regulate the BP through the up-regulation of NO and cardiac antioxidant system in rat [45]. Heart rate was lower in subjects after 13 weeks compared to the starting values; these results are in line with similar study conducted [44]. Also some researchers founded reduction of blood pressure and decreasing of heart rate in physically-active smokers compared to sedentary smokers [46]. Also, a research In summary suggest that exercise training alone is effective in reducing BP (SBP & DBP) also the exercise training can play a important role to weight loss [47].

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