Impact of Life Behaviour on Students Physical Fitness at University of Dammam in Saudi Arabia

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ABSTRACT

Objectives: *The aims of this study were to study the impact of University life behaviour and Body Mass Index (BMI) on exercise-induced Heart Rate (HR) and Blood Pressure (BP) of college students.*

Participants*: Around (68) Male college students at University of Dammam were recruited; all participants were surveyed, interviewed, and physical exam.*

Methods: *The studied parameters in the present study were included measurement of BP and BMI. Finally HR and Respiratory rate (RR) were continuously recorded before during and after each exercise's session of the research protocol.*

Results*: Our findings showed that participants with BMI ≥ 30 kg/m^2 and weekly training ≥ 150 minutes per week significantly affect physical fitness as measured using exercise induced HR and Systolic blood pressure (SYS).*

Conclusions*: The levels of physical activity among the college students towards the recommended time should be address to avoid future serious public health problem.*

Keywords: Heart Rate, Blood Pressure, Respiratory rate, Body Mass Index

INTRODUCTION

An increase in the time of free-living physical activity is recommended to reduce body weight and to improve glucose metabolism (Kriska et al., 2006). Several studies have supported the association between the increase of leisure-time activity and the decrease in body weight (Basterra et al., 2009). While the majority of young college students showed an increase in the rate of fat percentage which is associated with several metabolic risk factors, students who were fit demonstrated more optimal levels of metabolic factors independent of body fat percentages (Sacheck et al., 2010). It is therefore important to assess and encourage healthy body weight and physical fitness among young adults.

Physical activity is associated with a lower risk of CVD, Type 2 Diabetic T2D, metabolic syndrome (MS) and obesity in adults (Hamilton et al., 2007) and (Sisson and Katzmarzyk, 2008). In addition, evidence has supported an engagement in moderate-intensity *aerobic exercise* on most days of the week for adults to reduce coronary heart disease (CHD), stroke, hypertension and T2D (Warburton et al., 2007). Low level of physical fitness detected by HR parameters can predict the risk of cardiovascular mortality. For example, middle-aged men without clinical CHD who were not able to reach maximal capacity and stopped exercise training at 85% of age-predicted HR max had a higher risk of sudden death (Adabag et al., 2008).

International health organisations have stated that more research is needed to establish the dose-response curve and the minimum physical activity level required to improve health and

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prevent various diseases (ACSM, 2006) and (Thompson, 2009). They recommends the engagement in moderate-intensity physical activity of 150 min per week, and recommends 200-300 min per week for the most obese to stabilise their weight (ACSM, 2006).

There is a lack in data of physical activity levels among college students, and reasons included lack of attention to college students' physical activity behaviours, unbalanced research focus, weak intervention research design, inconsistent and subjective physical activity measures, and lack of multiple approaches (Keating et al., 2005).

There is limited data regarding health-related lifestyle among adults in Saudi Arabia. While it could be expected that sedentary behaviour is widespread among Saudi adults, a study recruited 1064 Saudi adults in Riyadh City using IPAC questionnaire showed that 59.4% of the sample size were minimally or physically active (Al-Hazzaa, 2007). Another study, which also used self-reported questionnaire, showed that 21.8% of a total of 357 male students aged 18-24 years were overweight and 15.7% were obese, and 55.2% exceeded the normal limits of body fat (Al-Rethaiaa et al., 2010). Medical students in the final clinical years (age was 21.06 ±1.85) at Taibah University in the Northern West of Saudi Arabia were overweight (BMI was 26.26 ±5.27 kg/m^2), and the majority (64.4%) were physically inactive (Allam et al., 2012).

This study investigated the effect of weekly training time, daily sitting time and BMI on exercise-induced HR and SYS in first-year health sciences college students at University of Dammam and life habits using a self-reported questionnaire,.

METHODS

68 Male students who study at University of Dammam were surveyed, interviewed, and physical exams of students' health status carried out. Participant who was free from any diseases and with normal ECG results were eligible for this study.

All sessions was started in the early afternoon to control for diurnal variation in blood pressure. Participants were instructed to refrain from exercise and consumption of caffeine or smoking on the days of testing. The participants at the begging were asked to remain at rest in a supine position for 10 min.

The studied parameters in the present study included measurement of BP by using electronic sphygmomanometer, BMI (Ihmels et al., 2006).Heart rate (HR) was continuously recorded during each session by using Zephyr Bio Harness (Hailstone and Kilding 2011).

Based on their exercise test results, BP, RR and HR responses to exercise were evaluated.

At the beginning of this session, participants were assessed for baseline BP, RR and HR. Measures of BMI is also obtained at this time. Participants were then instructed to perform a warm-up consisting of 5 minutes of cycling, static stretching, and a set of light resistance exercise.

A graded symptom-limited sub maximum exercise test was performed on an electronic Treadmill. The treadmill speed was set at 3.3 mph at 0.0% incline. After 1 minute, the grade increased to 2.0% while maintaining the same speed. Throughout the test, ECG lead V3 and HR were monitored continuously, and BP was recorded every minute n**on**invasively with an automated sphygmomanometer **(**Ades and Grunvald, 1990**).** Measurements of HR, RR and BP at rest and during and immediately after exercise routinely were used clinically to assess Cardiovascular and Respiratory function.

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Statistical analyses were performed using Microsoft Office Excel and the Statistical Package of Social Science (SPSS) version 10. Data are presented as means ± standard error of the mean (SEM). The level of significance was set at $P < 0.05$.

RESULTS

The present study showed that there were about 31.3% of the participants sit less than three hours per day, whereas 69.7% of the participants are sitting three hours or more (Figure 1) and 64.7% of the participants did not attain the recommended 150 minutes of regular training per week (Figure 2).

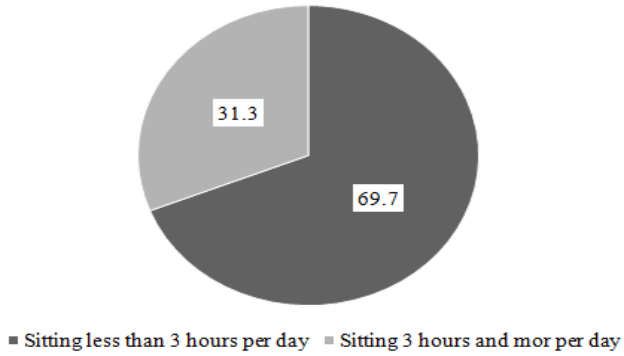

Figure 1. Sitting time for the college students participants

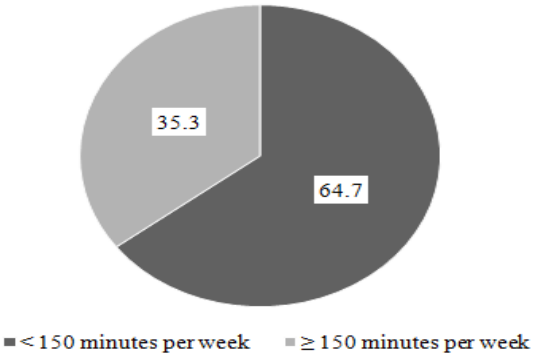

Figure 2. Regular training time per week for college students participants

The mean BMI is 24. Participants were divided to four groups as follows: underweight kg/m^2 18-< 20 (n=17), normal weight ≥20-<25 kg/m^2 (n=28), overweight ≥25-<30 kg/m^2 (n=13) and obese ≥30-<48 kg/m^2 (n=10) (Figure 3).

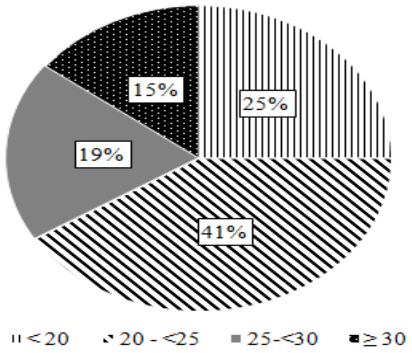

Figure 3. Rates of body mass index (BMI) for college students participants

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One-way ANOVA revealed that, resting HR among obese participants (99 ±16) was higher than all groups but was not significant. Immediately after 5-minute walk, exercise-induced HR among obese participants (168 ±31 beats/min) was significantly higher than underweight participants (132 ±35 beats/min) ($p = 0.007$) and was higher than normal weight group (145 ±16 beats/min) and overweight group (143 ±14 beats/min) but the difference was not significant Figure 4).

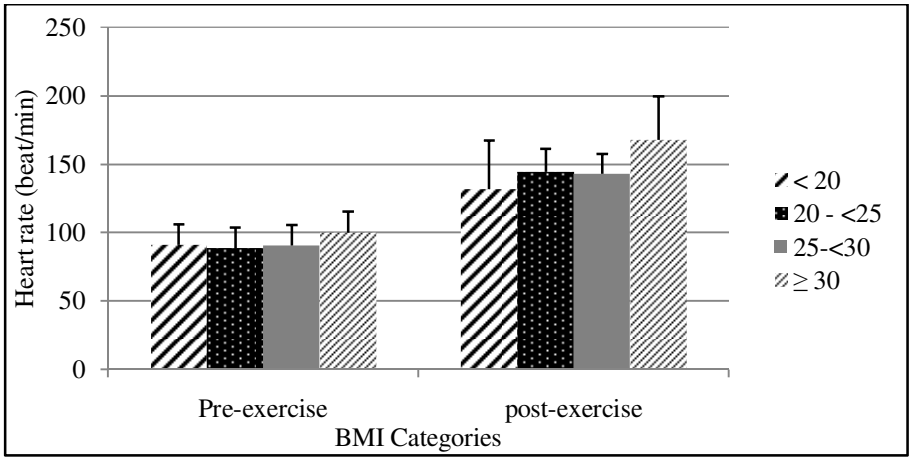

Figure 4. Heart rate in pre and post exercise session for college students participants based on their body mass index (BMI). Data represents mean ±SD

The result showed that, resting SYS among obese group (135.8 ±17.6 mm Hg) was significantly higher than underweight group (121.1 ±12.1 mm Hg) at $p \leq 0.01$ and normal weight group (122.5 ±9.9 mm Hg) at $p \leq 0.05$ and the difference with overweight group (121.2 ±9.9 mm Hg) approached significance $p = 0.056$. Likewise, there was significant differences between groups in exercise-induced SYS, obese participants was significantly higher than all groups (163.3 ±18.6 mm Hg) at $p \leq 0.05$ (underweight participants= 132.3 ±33.2 mm Hg, normal weight= 139.2 ±9.9 mm Hg, overweight= 139.7 ±11.6 mm Hg) (Figure 5).

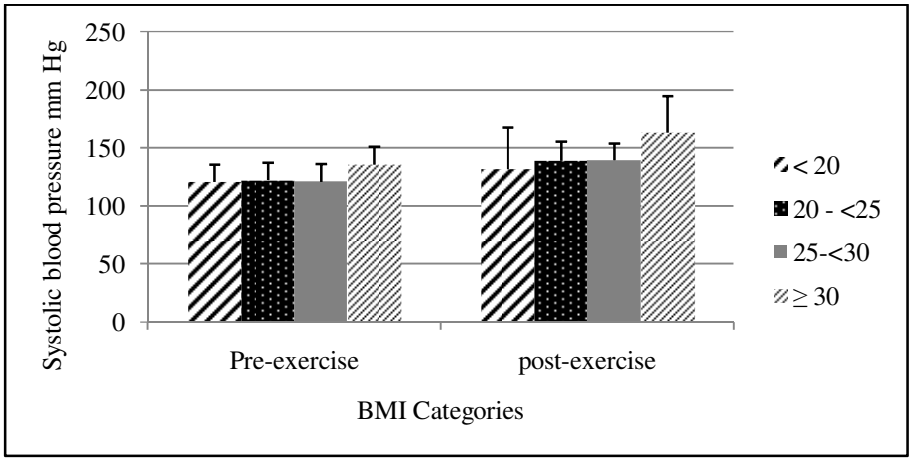

Figure 5. Systolic blood pressure in pre and post exercise session for college students participants based on their body mass index (BMI). Data represents mean ±SD

DISCUSSION

This work was aimed to analyze the physical aspect for college students, health sciences year at University of Dammam. Participants of this work were representing over 5 different Health

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sciences colleges oriented year students on the main campus. The main findings were BMI ≥ 30 kg/m^2 and weekly training ≥ 150 minutes per week significantly affected physical fitness as measured using exercise induced HR and SYS, and sitting time did not affect physical fitness.

The mean BMI for the participants in the study was 24.5 kg/m^2, which was the same with other study conducted in the same region on a group of undergraduate nursing students in Kuwait (Al Kandari et al., 2008). Thus, body composition as estimated using BMI which expect to grow up with advance academic years is a strong indicator of physical fitness. The BMI for the current first year health sciences students was lower than BMI for the final clinical year of medical students in another university in Saudi Arabia (26.2 ±5.3 kg/m^2) (Allam et al., 2012).Many studies have shown inverse associations between body weight and physical activity. Being abnormal body mass index is now recognised as an important cause for the mortality of many diseases (Schmitz et al., 2000).

Exercise-induced HR and SYS were significantly higher among participants with BMI ≥ 25 kg/m^2 than participants with BMI < 25 kg/m^2. Thus, body composition as estimated using BMI is a strong indicator of physical fitness. These increases in HR and SYS in obese group due to the variety of adaptations in cardiovascular system occur in the individual as fat tissue accumulates in excess amounts, even in the absence of co-morbidities (Kasper et al., 2005). Furthermore, it has been reported that, obesity in part by the increased metabolic demand induced by excess body weight, leads to increase in total blood volume and cardiac output. Mechanisms also linking obesity with high HR and SYS are an increase in peripheral vascular resistance, increased sympathetic nervous system activity, increased endothelial dysfunction (Poirier et al., 2005) and increased activity of the renin–angiotensin-aldosterone system (Tuck et al., 1981).

When BMI was tailored to quartiles, the increases in HR and SYS were significant among participants with BMI ≥ 30 kg/m^2.

Our finding showed that about 65% of the participants did not meet the recommended level of health-related physical activity. This was in agreement with a study showed that the majority of medical students at Taibah University in Saudi Arabia were physically inactive. Moreover it was reported by Keating that 40 to 50% of college students are physically inactive (Keating et al., 2005). According to results obtained in other studies among university students, there are many factors such as the Internet, watching TV and the pressure of study were contribute in reduce the interest in exercise training (Hacihasanoglu et al., 2011). Other observed that with the increase in body weight in the first year of university, computer and studying time significantly increased, while television time and hours of nightly sleep significantly decreased (Pullman et al., 2009). These facts could be a real negative factors plus humid weather at Dammam city and bad time management, for students at University of Dammam to exercise.

The majority of participants sit more than 3 hours a day which can contribute to long term in gaining weight among college students; however the negative relationship between sedentary behaviours and physical activates has yet to be fully explained (Buckworth and Nigg, 2004).

LIMITATIONS

Limitations of our study are energy expenditure was not measured and therefore our explanation of the relation between the behavioural and physical aspects of the students remains speculative and we have used self-reported exercise estimated intensity and physical activity.

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RECOMMENDATION

It is a strong recommendation for the development of programs to focus on the promotion healthy education especially for develop and lead the lifestyle and behaviours for health sciences college students should be considered, since they will be responsible for the encouragement of healthy habits among future generations. College campuses need to offer adequate facilities for exercise and various activities that promote health. It is important to understand students' attitude towards physical activity because the current students would engage in physical activity for health and fun, but may not engage in exercise for competition.

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