SHORT REPORT

Effect of obesity on academic grades among Saudi female medical students at College of Medicine, King Saud University: Pilot study

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Abstract

The aim was to investigate the effect of obesity on academic grades among Saudi female medical students. This cross sectional study was conducted in the Department of Plastic Surgery, College of Medicine, King Saud University, Riyadh, Saudi Arabia during the period November 2014 to June 2015. In all 191 second and third year female medical students with an average age of 21.31 years and body mass indices 15-40 were included. An English language questionnaire was established to obtain the information about age, gender, body mass index, level of study and the academic grades [Grade Point Average-GPA]. Female medical students with BMI 21-25 and 26-30 achieved high GPA while female medical students with higher BMI 31-35 and greater than 36 obtained low GPA. High BMI in female medical students impair the academic performance. The academic institutes must establish extra-curricular physical fitness policies to minimize the obesity and achieve better health and academic outcomes.

Keywords: Academic grades, Obesity, Body Mass Index (BMI).

Introduction

The prevalence of obesity has significantly amplified in many developed and developing countries, all age groups, and both genders. Adiposity causes impairment in body physiology leading to diabetes mellitus, hypertension, coronary artery disease and cognitive impairment. The most eminent cognitive deterrent effect of obesity is lower academic grades. A number of research articles highlighted the positive interaction of obesity and pitiable grades in examinations,[1,2] others did not find any obvious association between these two variables.[3] The actual relationship between body mass index and academic performances is still unclear. Although, a variety of preventive measures have been taken to minimize obesity related issues, but the proportion of overweight and obese population remained almost constant. High expectation from academic staff to progressively boost student's abilities, has led a number of instructors to introduce edible items as an incentive for students to obtain better scores in examinations. However, many instructors are unaware of any relation between physical fitness of learners and their educational achievements. As there have been a few regional research studies in consideration of obesity and cognitive functions so far, little is known about the relationship between health, obesity and academic grades.[4] In the current study, we determined the effect of BMI on academic grades among Saudi female medical students at College of Medicine, King Saud University, Riyadh, Saudi Arabia.

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Subjects and Methods

The present cross sectional study was conducted in the Department of Surgery (Plastic Surgery Division), College of Medicine, King Saud University, Riyadh, Saudi Arabia during the period November 2014 to June 2015.

In the Kingdom of Saudi Arabia there are about 68 universities and degree awarding institutes and 30 medical schools.[5] On a computer-generated students list, and considering the inclusion and exclusion criteria, initially we selected 200 female medical students. After interview 9 students were excluded, finally we had recruited 191 female medical students with an average age of 21.31 years and body mass indices 15 to 40. Students were fully informed about the research methodology, objectives and their formal written consent was obtained. A well-structured English language Questionnaire was distributed among the female medical students of the same class at College of Medicine, King Saud University. Information about age, gender, weight, height, body mass index, year of study and the overall academic grades were obtained to determine the association of overweight and obesity with academic grades [Grade Point Average-GPA]. After getting the anthropometric data and academic grades of the medical students, we confirmed their academic grades from Assessment Unit, College of Medicine, King Saud University, Riyadh, KSA.

Apparently healthy, volunteer, Saudi female medical students studying at College of Medicine, King Saud University were invited. The students who were smokers

or having health related condition like chronic anaemia, diabetes mellitus, visual problems, rheumatic fever or rheumatoid arthritis leading to limited physical activity were excluded from the study. Students who suffered from any serious illness during the last two years were also excluded from the study because debilitating diseases including diabetes mellitus impair the memory and cognitive functions.[4] The potential confounding factors were carefully considered due to their known or plausible associations with impact and outcomes.

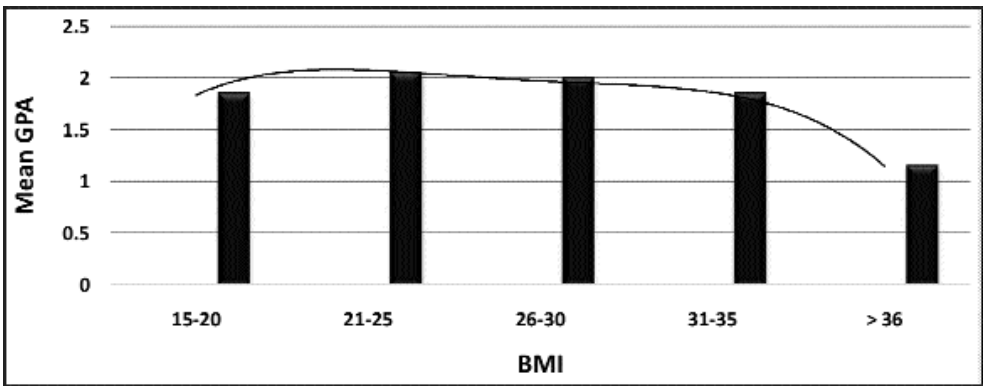

Figure: Effect of BMI on academic grades.

Ethical approval was obtained from the Institutional Review Board, College of Medicine, King Saud University, Riyadh, Saudi Arabia (Ref # 14/ 4378/IRB).

Statistical Analysis

Statistical analysis was performed using the IBMSPSS Statistics (software) version 21. Data were expressed as counts (percentage) and mean. Correlations of ordinal data were assessed using Gamma statistics. Statistical significance was considered at $p<0.05$.

Results

A total of 191 females with a wide range of body mass indices from 15 to 38 and with an average age of 21.31 years were included in the study. Majority of the female students 85 (44.50% were having BMI 21-25, while the remaining were as follows: 53 (27.75%) had Body Mass Index range 15-20; 35 (18.32%) with BMI 26-30; 13 (6.81%) with BMI 31-35; and 5 (2.5% with BMI more than 36 (Table).

Figure demonstrates that female medical student with BMI 21-25 and 26-30 achieved highest academic grades (GPA) and female medical students with high BMI 31-35 and greater than 36 showed poor educational performance (GPA). The research hypothesis that learners with high BMI show poor educational performance proved correct for female medical students.

Discussion

Obesity is a leading public health problem, affecting all age groups and both genders. Obesity and its impact on educational performance is a hot topic for discussion. In the present study, we found that female medical students with high BMI achieved lower academic grades irrespective of their year of study and other factors that were included in analysis.

Abdelalim et al.,[3] found out the association between childhood obesity and academic score in various subjects including Mathematics, Science and Arabic literature. They reported that the overweight children achieved slightly better scores as compared to their obese and normal body weight classmates. The effect of parental education was found to be much more pronounced than body weight a related issue which was not the case in our study and this difference may be attributed to study population in which we analyzed adult medical students where parents are generally not involved in direct supervision of their children.

MacCann et al.,[6] conducted a study with the impression that obese students had lower academic profiles than their physically fit counterparts. But at the end of their research they found that although, obese students received significantly lower grades at middle school, but

Table: Effect of BMI on Academic Grades.

BMI	15-20	21-25	26-30	31-35	>36
Frequency (%)	53 (27.75%)	85 (44.50%)	35 (18.32%)	13 (6.81%)	5 (2.5%)
GPA (Mean SEM)	1.9 ±0.10	2.1±0.13	2.0±0.11	1.9± 0.03	1.15 ± 0.25
Correlation between BMI and GPA					
BMI	Gamma (0.131)		p-value (0.022)		

*GPA has a positive correlation with BMI.

not at college and university levels. Authors concluded that low educational grades may be a reflection of peer and teacher prejudice against overweight and obese students and not because of any intellectual deficiencies. Florin et al., in 2011,[1] from United States tried for improved understanding of adolescent obesity and poor academic performance interrelation. They divided young obese participants in two groups, first group had defined obesity with high BMI without perception of the situation and the other group was over cautious about being overweight. The researchers compared the records of both groups and found that the perception of being overweight had a negative effect on academic performance, while no direct association between obesity and educational achievements could be established.

London et al.,[7] described the link between childhood fitness and their school performance longitudinally from fourth to seventh and sixth to ninth grades in a California Community School. They found that physical fitness achievement was a better predictor of academic achievement than obesity as measured by body mass index. Earlier Huang et al.,[2] in 2006 examined both body mass index and body fat in relation to measured and self-reported school grades. They found that obesity was not related to educational performance in a sample of Latino and Asian-American adolescents. A recent research of Freidl et al.,[8] described the previous observation that overweight and obese students had impairments in performance IQ and executive function and poor school functioning in comparison to their friends of normal weight. They stressed upon teachers and school counselor's awareness regarding potential cognitive and school problems in students. According to authors, it would prove the first step to improve academic support and educational system deficiencies for students with overweight and obesity. Another report by Krombholz et al.,[9] from Germany in 2013 elicited the link between gross and motor skills and cognitive performance in obese and overweight children who were compared to healthy weight children. According to the author, overweight children showed lower performance on gross motor skills, manual dexterity and intelligence compared to healthy weight children, even after controlling for the effects of social class and immigration status.

An interesting observation made by Schwartz et al., in 2013[10] from Canada, revealed that visceral fat had more adverse effects on cognitive performance. They also suggested that female subjects were more sensitive to the potentially detrimental effect of visceral fat on cognition. Present study results are similar to this observation. In 2013, Kantomaa et al.,[11] from USA demonstrated that obesity and physical inactivity might have detrimental implication for young people's cognitive function and academic achievement.

An economist from United States of America, Zavodny in 2013[12] analyzed the data from five series of childhood longitudinal study-kindergarten to examine how children's weight is related to standardized tests and to teacher's assessment of their educational capability. As a final point, it was concluded that obesity was more negatively related to teacher assessments of their academic performance than to their tests score. A recent study by Afzal and Gortmaker[13] also analyzed association between obesity and Peabody Individual Achievement Test (PIAT) scores. It was observed that the scores were low amongst students who had been obese since beginning than other students who were never obese. Additionally, PIAT scores were also less among those who recently turned overweight than others who were within normal weight range.

Heshmat et al.,[14] studied the impact of adiposity on academic performance. The BMI was considered as an obesity indicator. The students' GPA along with score in Maths, Geometry, Calculus, English and school attendance were considered to assess educational performance. It was reported that, students with more than ideal body weights had lower exam grades. Female students' data analysis of present study also favours this observation.

Study Limitations

In the present study we used BMI as an indicator of obesity but literature indicates that BMI may fail to show difference between lean muscle mass and fat mass. On the other hand, measuring hip circumference and abdominal fat may be more useful to study the link between obesity and brain stem function. Furthermore, our sample size is also limited especially in a group with BMI more than 36 and we did not determine the association in male gender. Therefore, in future large sample sized studies in both genders with BMI, hip circumference and abdominal fat ratio and their association with academic grades should be conducted to achieve a better conclusion.

Conclusion

It is concluded that female medical students with normal and slightly above normal BMI 21-25 and 26-30 achieve higher academic grades (GPA) and female medical students with high BMI 31-35 and greater than 36 show poor educational performance. This observation warrants more research in order to determine the association of

body weight and academic outcome, with special consideration of both genders. We suggest that, in educational institutes, administration must improve the health provision, encouraging healthy dietary habits and introduction of physical fitness programmes and highlight these activities in public health programmes to minimize the obesity and to achieve the better health and academic outcomes.

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Competing Interest: The authors declare no conflicts of interests.

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