Original Article

Relationship Of Waist To Hip Ratio And Academic Performance Of First Year Medical College Students

L. J. Borse *, D. G. Bansode b, R. D. Yadav c, H. K. Modak d

ABSTRACT

During education main concern of the students and their parents is academic performance. Overweight/obesity in children and adolescent is growing problem in developed as well as in developing countries. The present study was carried out to find the relationship of waist to hip ratio (WHR) with the academic performance in first year medical college students during their academic year. The study included 100 healthy students, 60 males and 40 females. Considering cut-off value of WHR for Asian Indian adults they were divided into three groups: Group I with higher WHR (Males > 0.88 and Females > 0.81) and Group II with lesser WHR (Males < 0.88 and Females < 0.81). Rounding up internal assessment marks were compared between males (30 with higher and 30 with lesser WHR), females (20 with higher and 20 with lesser WHR) and total students (50 with higher and 50 with lesser WHR). Student’s unpaired t test was applied for statistical analysis. The outcomes were presented as a mean (SD) and ‘p’ value of less than 0.05 was considered as significant. Our study concluded that academic performance of Group I students was significantly less than Group II when total and only male students were compared. But difference was not significant in females. Psychosocial behaviour and less mental processing due to poor physical activity in group I students may be the cause of significant findings. More research work is needed to obtain precise relationship between WHR and academic performance.

1. Introduction

Obesity should be defined as excess body fat or adipose tissue; it is this, not weight which is associated with the comorbid conditions. [1] This is further complicated by findings that it is central (also described as intra abdominal, or visceral) fat which is more pathogenic. [1, 2] One of the leading global risks for mortality is overweight and obesity. [3] The Centers for Disease Control and Prevention in 2003, reported a 4-fold rise in child and adolescent obesity (ages 6-19) in 20 years. [4] Simple clinical anthropometric measurements, such as Waist Circumference (WC), Waist-to-Hip Ratio (WHR) and Body Mass Index (BMI) may be conveniently used to assess regional adiposity. [5] WHR is a method for assessing abdominal fat. This is important because increased total abdominal fat places individuals at higher risk for chronic metabolic illness regardless of their weight or BMI. [6] Study found that WHR was best predictor of cardiovascular events and mortality in patients with type-2 diabetes. [7, 8] Excess abdominal fat giving an apple shape increases the risk for diseases such as metabolic syndrome, heart disease, hypertension and diabetes. [9] All of these studies [6-9] have correlated the WHR with risk of developing various chronic metabolic diseases.

Getting the good education and achieve desired goal in professional college is the dream of every student as well as their parents. Even students studying in same class and taught by the same teacher shows variation in academic performance. Study found that achievement in school is affected by a number of factors, including the quality of the school, characteristics of the student’s family such as socioeconomic status and parent’s educational level, and the characteristics of the child. [10] Motivation and home environment have a positive relationship with academic achievement. [11] In Spanish adolescents, boys academic performance was more influenced by school-related factors such as their attitude to the school. [12] Optimal sleep, [13] intake of fruits and vegetables, dietary quality and the nutritional status of the adolescents [14] have positive influence on academic performance. For school failure, both psychological and health related factors were found to be more prevalent. [15] Regular breakfast consumption has been linked with improvement in academic achievement, psychosocial functioning and cognition. [16] All of these studies have shown relationship of academic performance and health related as well as other factors which are not directly related to health.

A R T I C L E I N F O

Keywords:
Academic performance
Medical student
Obesity
Physical activity
Psychosocial behaviour
Waist to hip ratio.

* Corresponding Author: L. J. Borse
Assistant professor, Department of Physiology, Seth G S Medical College and KEM Hospital Parel, Mumbai
borselaxmikant@gmail.com

©Copyright 2010 BioMedSciDirect Publications. All rights reserved.
Keeping WHR within normal range is a part of maintaining good health. Understanding of the relation between health and academic performance of the student has significant implications. There is converging interest among public health scientists and school policy makers in the health status of adolescents and its impact on their academic achievement. [17] The purpose of present study was to find out relationship of waist to hip ratio and academic performance of first year medical college students admitted for different courses and the knowledge of the study result can be use by students at their personal level and for policy making of medical colleges.

MATERIAL AND METHODS

The present study was conducted in the Department of Physiology, Dr. Ulhas Patil Medical College Jalgaon. Study was approved by the institutional ethical committee. There were total 121 first year students of MBBS and Physiotherapy course studying in the college. They have to face examination of three subject anatomy, physiology and biochemistry for the first year. According to the rules of Maharashtra University of Health Sciences, in medical colleges of Maharashtra two internal examinations, one terminal and one preliminary are conducted in every academic year. As per university guidelines marks of these two examinations are rounded up and considered for internal assessment of the students for that academic year. In present study we have considered their internal assessment marks obtained in first year as their academic performance indicator. Data of marks was obtained from student section, academic department of the college. Before conducting the study consent was taken from all participants. Anthropometrical measurements Age, Waist circumference and Hip circumference were recorded along with preliminary clinical examination to exclude any systemic disorder affecting academic performance. As per the study design absent students for any one of examination was excluded and randomly 100 healthy students were selected as study group from the remaining.

ANTHROPOMETRY

The age of the individuals was determined from their reported date of birth. The circumferences in waist and hip were obtained using a retractable measuring tape to the nearest 0.1 cm while maintaining close contact with skin without compressing the underlying tissues. Waist was measured horizontally between the lower costal rib and the upper border of the iliac crest. Subjects were in standing position and the measurement was made at the normal minimal respiration. With light summer clothing hip was measured at the maximum circumference of the buttocks. In females all the measurements were taken by female author. The waist-to-hip ratio (WHR) was calculated from above measurements by using the formula, WHR = waist circumference (cm)/hip circumference (cm).

Waist to hip ratio is measure of centralized obesity. Various studies have given various cut-off values for WHR in different population on the basis of prone to various chronic metabolic disorders. [18] It is also observed that Indians have higher upper-body adiposity measured as the WHR, although they have lean body mass. [19, 20] Study analyzed that normal cutoff values for WHRs in males and females were 0.88 and 0.81 respectively in Asian Indian adults. [21] So as per our study design shown in chart 1, we selected 100 students (60 males and 40 females) and made group I with higher WHR and group II with lesser WHR than cutoff values. Out of 60 males, 30 were with WHR > 0.88 (Group I) and 30 with WHR < 0.88 (Group II). Out of 40 females, 20 were with WHR > 0.81 (Group I) and 20 with WHR < 0.81 (Group II). Total students were divided as Group I, 50 students (Males with WHR > 0.88 and Females with WHR > 0.81) and Group II, 50 students (Males with WHR < 0.88 and Females with WHR < 0.81). Student’s first year academic performance indicated by their internal assessment marks (Sum total of all three subjects) was compared in these different study groups.

Statistical analysis

Data analysis was done by using SPSS version 16.0 (SPSS Inc, Chicago, USA) software. Student’s unpaired t test was applied to compare academic performance in study groups. The outcome of analysis was presented as a mean (SD) and ‘p’ value of less than 0.05 (*p<0.05) was considered as significant.

RESULTS AND OBSERVATIONS

Table No 1 and 2 depicts the statistical analysis for age, WC, HC and WHR of the male, females and total students in between Group I and Group II which were expressed as mean and SD for both the study groups.

There was no significant difference found between study groups when age was considered, indicating that the groups were homogenous in this respect. Difference was significant for WC and WHR but not for HC in males, females and total students.
These results suggest that WHR does have an effect on academic performance in male students. Specifically, our results suggest that in male students, academic performance is significantly less in those with WHR > 0.88 compared to those with WHR < 0.88.

Table No 4 and chart 3 depicts the statistical analysis for comparison of academic performance in female students with WHR > 0.81 (Group I) and WHR < 0.81 (Group II) which were expressed as mean and SD for both the groups.

Study found that there was a significant difference in academic performance of Group I (Mean = 60.1, SD = 9.98) and Group II (Mean = 65.8, SD = 6.85) male students; t(58) = 2.59, p = 0.012*. As here the p value was less than 0.05, so by conventional criteria, this difference in Group I and Group II was considered to be statistically significant.

These results suggest that WHR does have an effect on academic performance in female students. Specifically, our results suggest that in female students, academic performance is less in those with WHR > 0.81 compared to those with WHR < 0.81 but difference is not significant.

Table No 5 and chart 4 depicts the statistical analysis for comparison of academic performance in total students of Group I (Male with WHR > 0.88 and Female with WHR > 0.81) and Group II (Male with WHR < 0.88 and Female with WHR < 0.81) which were expressed as mean and SD for both the groups.

Study found that there was a difference in academic performance of Group I (Mean = 68.3, SD = 9.37) and Group II (Mean = 73.8, SD = 9.24) female students; t(38) = 1.73, p = 0.091. Here the mean value of Group I was less than that of Group II, but the p value was not less than 0.05, so by conventional criteria, this difference was considered to be not statistically significant.

These results suggest that WHR does have an effect on academic performance in female students. Specifically, our results suggest that in female students, academic performance is less in those with WHR > 0.81 compared to those with WHR < 0.81 but difference is not significant.

Table No 3 and chart 2 depicts the statistical analysis for comparison of academic performance in male students with WHR > 0.88 (Group I) and WHR < 0.88 (Group II) which were expressed as mean and SD for both the groups.

Study found that there was a significant difference in academic performance of Group I (Mean = 68.3, SD = 9.37) and Group II (Mean = 73.8, SD = 9.24) female students; t(38) = 1.73, p = 0.091. Here the mean value of Group I was less than that of Group II, but the p value was not less than 0.05, so by conventional criteria, this difference was considered to be not statistically significant.

These results suggest that WHR does have an effect on academic performance in female students. Specifically, our results suggest that in female students, academic performance is less in those with WHR > 0.81 compared to those with WHR < 0.81 but difference is not significant.

Table No 5 and chart 4 depicts the statistical analysis for comparison of academic performance in total students of Group I (Male with WHR > 0.88 and Female with WHR > 0.81) and Group II (Male with WHR < 0.88 and Female with WHR < 0.81) which were expressed as mean and SD for both the groups.

Study found that there was a difference in academic performance of Group I (Mean = 68.3, SD = 9.37) and Group II (Mean = 73.8, SD = 9.24) female students; t(38) = 1.73, p = 0.091. Here the mean value of Group I was less than that of Group II, but the p value was not less than 0.05, so by conventional criteria, this difference was considered to be not statistically significant.
Study found that there was a significant difference in academic performance of Group I (Mean = 63.4, SD = 10.50) and Group II (Mean = 68.9, SD = 8.65) students; t (98) = 2.85, p = 0.005*. As here the p value was very less than 0.05 so by conventional criteria, this difference was considered to be very statistically significant.

These results suggest that WHR does have an effect on academic performance in students. Specifically our results suggest that academic performance of students with higher WHR (Male with WHR > 0.88 and Female with WHR > 0.81) is significantly less than those with lesser WHR (Male with WHR < 0.88 and Female with WHR < 0.81).

Taken together, these results of all the tables and charts suggested that study groups were homogeneous as per age as was considered whereas values of WC and WHR in study groups were significantly different. Academic performance was significantly influenced by WHR of the student. Specifically academic performance of students with higher WHR (Male with WHR > 0.88 and Female with WHR > 0.81) was significantly less than those with lesser WHR (Male with WHR < 0.88 and Female with WHR < 0.81). When considered separately academic performance was significantly less in males with higher WHR and also less in females with higher WHR but difference was not significant.

*P < 0.05
DISCUSSION

Once a student get admission in medical college the race of good academic performance begins. Not even every student but their parents also work hard to achieve best academic result at their level best. During this stressful phase student hardly bother about their life style. Physical efforts taken by all the students, whether he/she is overweight, normal weight or underweight are roughly same but final results are different. A number of factors including academic pressure, workload, financial concerns, and sleep deprivation, exposure to new environment, student abuse, and vast curriculum have been hypothesized for psychological morbidity. Even at the preliminary stage of medical training the medical students find aspects of medical course stressful. [22] Higher WHR has been associated with various systemic disorders. [6, 7, 8, 9] In present study we tried to find out relationship of WHR and academic performance in first year medical college students. Our study has shown that the academic performance of the students with higher WHR (Male with WHR > 0.88 and Female with WHR > 0.81) was significantly less than those with lesser WHR (Male with WHR < 0.88 and Female with WHR < 0.81). When considered separately academic performance was significantly less in males with higher WHR and also less in females with higher WHR but difference was not significant. Means WHR does have negative relationship with academic performance of the first year medical college students.

We found several studies that assessed the utility of waist circumference and/or waist-to-hip ratio to classify people as obese or overweight compared with classification by BMI. [23, 24, 25] WHR is the measures of visceral or abdominal fat mass. This measurement is independent of height and muscle mass, has emerged as important predictors of risk of obesity related diseases and is thus very useful indicators of excess body fat and increased health risk. [26] Considering WHR reduces the risk of misclassifying someone who is tall from being abnormally obese and which can independently predict health risk when BMI is not markedly elevated. [27] Therefore we have considered calculation of WHR as a tool to classify the students in two groups, one with higher and other with lesser WHR than ideal cut off values for Asian Indians adults. As per the MUHS pattern two internal examinations are conducted by the college in an academic year. Marks of these examinations are rounded up to calculate internal assessment marks. Therefore we have considered their internal assessment result, the sum total of marks obtained in all three subjects to get an idea about their academic performance throughout the first year.

Key finding of this study is academic performance of the students with higher WHR is significantly less than those with lesser WHR. When considered separately this difference is significant only in males. Surprisingly we didn’t find any study on relationship of WHR and academic performance in adolescent while searching research papers on internet. Many studies have shown link between overweight/obesity and academic performance, an inverse association of academic performance and BMI. [28, 29, 30] While a reason for this association is not explained in these studies. Overweight children had significantly lower math and reading scores compared with non overweight children. [31] Obesity at 14 years of age was associated with a low school performance at 16 years and a low level of education persisting until at least age 31. [32] Youths who were overweight generally achieved relatively lower educational outcomes. [33]

Academic performance is influence by many factors so it is difficult to conclude the cause for low performance in the students with high WHR. Obese females as adolescents may be at increased risk for development of depression or anxiety disorders. [34] Psychosocial variables, such as weight-based teasing is also a proposed factor for low performance. [35] Obesity often accompanied by a parallel rise in type 2 diabetes, as well as increased rates of psychosocial complications and lower measures of quality of life. [36] Potential social isolation of overweight has been also observed. [37] Therefore social, psychological and behavioral factors may be responsible for the lack of concentration leading to low academic performance in overweight students.

Physical activity can have an impact on cognitive skills and attitudes and academic behaviour, all of which are important components of improved academic performance. These include enhanced concentration and attention as well as improved classroom behaviour. [38] Systematic exercise programs may actually enhance the development of specific types of mental processing known to be important for meeting challenges encountered both in academics and throughout the lifespan. [39] Regular physical activity may reduce plasma noradrenalin. It may also increase the transfer of the serotonin precursor tryptophan across the blood brain barrier, having a calming effect in children enabling them to sit and concentrate on academic pursuits. [40] All these studies directly or indirectly relate the physical activity with the mental processing and brain activity. Study on nationally representative sample in United States has shown that the obesity in adolescence is linked with poor physical quality of life. [41] So poor physical activity may be causing low academic achievement which is seen in students with high WHR.

Mean value for academic performance of females with higher WHR is less than those with lesser WHR, but difference is not statistically significant. This is an unexpected finding which we come across. Reasons for this finding are difficult to explain but literature survey on gender differences in scholastic performance at different levels indicate one common finding in mixed results, that females outperform their male counterparts in higher education. [42] Other researchers have argued that women receive higher grades than men because they work harder and attend class more frequently. [43] Females have better study skills than the male students. [44] So hard working, sincerity and better study skill might be responsible for better performance in females giving us the non significant result.
DISCUSSION

Our study suggests that students with higher WHR should be encouraged to make healthy changes in their life style so that their academic performance may be improved along with the psychosocial behavior. Though this not primary strategy for improving academic performance, it is possible that modification of health-related behaviors could help improve health related risks, quality of life, and academic performance of students. This could be pushed by university through the provision of easily accessible work out equipment and affordable healthy food options. It is hoped that the alteration of lifestyle of all college students would result in a healthier adult population in future.

Further detailed studies are required on a large scale to find out precise relationship of WHR on academic performance. We are planning to expand the study considering their achievement of previous and next few academic years. We are also planning to include other parameters such as their attendance in the academic sessions, birth history, family income, parent’s education, nutritional history, family culture so as to obtain more precise correlation between factors affecting academic performance.

CONCLUSION

Present study is based on the premise that the WHR of a student has an affect on his or her ability to learn and to achieve academically. More specifically the purpose of this study is to examine the relationship of WHR and academic performance of the first year medical college students. Based on results of this study, significant negative relationship is observed between WHR and academic performance of the students. Causes for this negative relationship are difficult to explain but psychosocial behaviour and lack of physical activity leading to less mental processing and brain activity may be causing lower academic performance seen in students with higher WHR. But this negative relationship is not significant in female students. Our study suggests that professional institutes should encourage the students to improve health and wellness. This will help the medical students to cope up better with the stress during studying as well in their future and also result in improved academic outcomes for some students.

REFERENCES


©Copyright 2010 BioMedSciDirect Publications IJBMR - ISSN: 0976:685. All rights reserved.