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The Relationship Between Physical Activity, Obesity and Overweight Among University Going Students of Jamshoro, Sindh

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A B S T R A C T

Background: Obesity is a current major concern of young adults in Pakistan and it is also a global health issue. According to WHO obesity has increased by 2005-2015 from 1.6 billion and 40 million to 2.3 billion. Increased BMI (body mass index) depends on the amount of time a person spends in a sedentary lifestyle and decrease with increased PA(Physical Activity) without exception of gender.

Objectives: The purpose of this study is to examine the relationship between physical activity obesity and overweight among university going students and to identify the interrelationship among these three parameters using IPAQ (International Physical Activity Questionnaire)

Methodology: An observational cross sectional survey was conducted using non-probability purposive sampling method at 4 universities situated in Jamshoro, Sindh for a duration of six (06) months. This sample size was 382 and all enrolled students were included except females with known hormonal disorders which were excluded from the study. SPSS version 23 was used to analyze the data in tabular and graphic format. Written informed consent was obtained from all the participants. The study was approved by the ERC of BDMC, Mirpurkhas.

Results: Three hundred and Eighty two students participated in this study which consisted of 219 males (57.3%) and 163 females (42.7%) with mean age 22.3 ± 1.8 years. The association of performance of exercise and BMI was significant (p value = 0.02). The BMI of the studied subjects was also significantly associated with number of hours spent sitting. (p value = 0.01). The association of total physical activity with BMI was also found to be significant. (p value = 0.01)

Conclusion: this study shows that physical activity is inversely proportional to obesity and overweight, sitting time during work hours and lack of sports and leisure activity, less involvement in home and care activities more time spending in involving in social media playing video games are also can be considered as reasons of an increasing number of overweight and obesity.

Introduction

Obesity is a current major concern of young adults in Pakistan and it is also a global health issue. Increasing obesity not only reduces the efficient activity of a person but also creates major health concerns like CVD (cardiovascular disease), diabetes, secondary OA (osteoarthritis), MS (metabolic syndrome), inflammation, psychosocial abnormalities and other mechanical and general health issues.

According to WHO obesity has increased by 2005-2015 from 1.6 billion and 40 million to 2.3 billion. In

children and young adults with obesity cardiovascular diseases are common, adults with increases glycosylate hemoglobin > 8%, the occurrence of Arthromata in aorta and coronary arteries, females are more prone to obesity due to lack of interest in engaging themselves in PA (physical activity) or sports due to gender issues and lack of facilities of PA (physical activity).[1]

Increased BMI (body mass index) depends on the amount of time a person spend in sedentary lifestyle and decrease with increased PA (Physical Activity) without exception of gender. Several studies regarding over weight and obesity concludes that at least 30 minutes exercise or any physical activity can keep an individual healthy and prevent many diseases related to obesity.[2] Many studies have shown the relationship of physical activity and obesity as its rate is increasing day by day due to physical inactivity, some behavioral and social family and cultural problems, most important consumption of high density of unsaturated food. [3]

Currently in many countries young as well as adult are spending more than 4hours in watching TV, even if they are physically active or not they both are prone to obesity. However, as it is clear that sedentary life pattern includes watching TV, Play video games are direct cause of obesity because a person consumes much time in one position and eat at that time that directly deposits in form of fat. Students also spend much time in searching in mobile and computer for making projects and preparation of exams; to active they use Tea Coffee or other unhealthy beverages. [4, 5]

Males are more likely to do weekly physical activity than females, those individuals habitual to perform daily household activity or gardening are 33%less likely to be over weighted than the person who don't perform physical activity and adapted sedentary lifestyle have 18% chances of being obese. [6]

Physically active individual have less body fat than a non-physically active individual, have reduced cardiorespiratory fitness due to lack of activity in their leisure time and use of cell phones in their free time, due to social media their interest is more towards their surfing rather than focusing about increasing weight and their related problems. [7]

Louaylabbon in 2014 had studied the association between physical activity, overweight and obesity among Syria students according to him ,males were more obese and over weighted than females , but he also mentioned that overweight males spent more time in vigorous physical activity than females who spent less time in moderate to low-intensity physical activity. [2]

J. salmon et.al study shows an association between Television viewing and overweight among Australian adults participating in varying level of leisure time physical activity. It explains that BMI and physical activity is interrelated .participants who spend 1-2.5 hour in watching TV having screen time activities they have 93% chances of obesity ,even if a person is physically active but spends more than 2.5 hours in screen time they have 183% more chances of obesity because of their habits.[4]

SJ, Marshall et.al studied in 2004 about the relationship between media use, body fatness, and physical activity in children and youth, as far as time spent on watching TV increase the body fatness and have a negative relationship with physical activity, all this behavior is included in sedentary life style.[5]

Andrew lepp explain in his research about the cell phone use drawbacks, cell phone use reduce the leisure time activities, lack of physical activities which cause sedentary life style pattern reduces loss the cardio respiratory fitness and many other problem concern to it. Spending time surfing Facebook, twitter searching and playing games engages person for a long sitting time, reduces physical activity results in loss of fitness in person.[7]

Steven I. Gortmarker et.al in their study about reducing obesity via school based interdisciplinary intervention among youth. They have taken girls and boys as their intervention groups that include the reduction time of time spend on TV and eating fresh fruits and vegetables in their diet and they found a reduction in the weight and also found that it decreases the chances of obesity.[8]

Richard Lowry et.al in their research paper informed about the sedentary lifestyle, dietary habits, lack of not consuming enough vegetables and fruit create the chances of obesity in school going student, those who are low grades students spend more than 2 hour/day of watching TV whereas 9th to 12th standard students spend

more than 5 hour/day screen time more prone for obesity. Male prevalence is more for obesity than female.[9]

The purpose of this study is to examine the relationship between physical activity obesity and overweight among university going students and to identify the interrelationship among these three parameters using International Physical Activity Questionnaire.[10]

Methodology

An observational cross sectional survey was conducted using non-probability purposive sampling method at 4 universities situated in Jamshoro, Sindh for a duration of six (06) months i.e., from February to April 2018. This sample size was 382 students calculated by RAOSOFT, Inc. All students enrolled in any of the university situated in Jamshoro, male or female from age 18 – 25 years were included in the study. Females with known hormonal disorders were excluded from the study.

The study was carried out at 3 universities and one Institute of Jamshoro Sindh. The tool used was English version of short International Physical Activity Questionnaires (IPAQ).[10] The IPAQ collects information on the time (i.e., number of days and average time per day) spent being physically active and the intensity of this activity (vigorous, moderate, walking or sitting).

Energetic physical movement was characterized as a gathering of exercises requiring oxygen utilization equivalent to or higher than 6 METs/hour (physical action vitality cost unit). The exercises included, for example, heart stimulating exercise, quick bike riding, lifting loads, running for significant distance, or exercises that include substantial increase in respiration.

Moderate physical movement was characterized as a gathering of exercises requiring less vitality use/oxygen utilization (somewhere in the range of 3.0 and 5.9 METs/hour, for example, lifting light weighted items or riding a bike at typical pace. It did exclude strolling. Time spent strolling was classified into an alternate classification and remembered strolling for the grounds, starting with one spot then onto the next, or strolling during save time for sports, exercise or joy for in any event of minimum 10 minutes.

Sedentary activities or low physical action that require less vitality utilization were additionally defined, for example, time understudies spent sitting at class or concentrating in home, staring at the TV, or resting.

Overweight or stoutness depended on BMI (weight in kilograms//height in meters^2). Anthropometric estimations were taken utilizing a standard weighting (Bathroom) scale and stature estimating scale which was fixed on a divider For measurement of height, the subjects were asked to stand without their shoes on a horizontal surface with their bodies stretched to the fullest and their heads in the Frankfort plane (a position in which lower margins of the orbits, the orbitals and the upper margins of the ear canals all lie in the same horizontal plane).[38] The measurement were substituted in the BMI equation i.e.

$$BMI=\frac{\text{weight in kg}}{\text{Height in m}^2}$$

The participants were ordered by their nutritional status utilizing the cutoff esteems for BMI as follows: underweight (BMI < 18.5), normal weight (BMI from 18.5 to 24.9), overweight (BMI from 25.0 to 29.9), and obesity (BMI > 30.0) (11). BMI less than 15 & over 58 kg/m2 weren't thought of as valid values. SPSS version 23 was used to analyze the data in tabular and graphic format. The level of significance was set at $P < 0.05$. Goals, methodology, dangers and benefits of the investigation were disclosed in detail to each potential member. Written informed consent was obtained from all the participants. The study was approved from the ERC of BDMC, Mirpurkhas.

Results

Three hundred and Eighty two (382) students participated in this study which consisted of 219 males (57.3%) and 163 females (42.7%) with mean age 22.3 ± 1.8 years as shown in Table I

In the collected data 78 participants 20.4 % were found to be in the overweight category of BMI i.e. 23 to 24.99. According to BMI 112 participants 31.9 % were found to be pre obese i.e. they fall in BMI category of 25 to 29.9. Forty nine participants 12.8% were found obese i.e. they fall in BMI category of >30 as shown in table I.

According to IPAQ analysis out of 382 participants 198 (51.8%) responded yes to any sort of exercise although 184 participants (48.2%) responded no to any exercise as shown in table II.

27 participants (7.1%) responded yes to hormonal problems and co morbidities and 355 participants (92.9

%) responded no to hormonal problems and co morbidities as shown in table II.

Table I: Demographic characteristics of the studied subjects (N= 382)

Variable	Frequency (n)	Percentage (%)
Gender		
Male	219	57.3
Female	163	42.7
BMI		
Underweight (<18.5)	22	5.8
Normal (18.6 – 22.9)	111	29.1
Over-weight (23-24.9)	78	20.4
Pre-Obese (25-29.9)	122	31.9
Obese (>30)	49	12.8

The total job related physical activity was reported low in 204 participants (53.4%), moderate physical activity is reported in 105 participants (27.5%), high job related physical activity is reported by 73 participants (19.1%) as shown in table II.

In total transportation, physical activity question 274 out of 382 participants 71.7% reported low transportation physical activity. 88 participants 23% reported moderate transportation physical activity. 20 participants 5.2% reported high transportation physical activity as shown in table II.

Total House Work, House Maintenance and Caring for Family Related Physical Activity question 283 participants (74.1%) reported low, 66 participants 17.3% reported moderate and 33 participants (8.3%) reported high physical activity as shown in table II.

Total Recreation, Sport and Leisure Time Physical Activity question 283 participants (74.1%) reported low involvement in physical activity related to sports recreation or leisure, 81 participants (21.2%) reported moderate and 18 participants (4.7%) reported high activity as shown in table II.

In total of 382 participants 26 participants (6.8%) reported to spent < 2hours in sitting position, 4 participants (1.0%) reported 2to 3 hours sitting time, 4 participants (1.0%) reported 3 to 4 hours sitting time, 54 participants (14.1%) mentioned 4 to 5 hours of sitting duration, 16 participants (4.2%) mentioned 5 to 6 hours sitting time, 41 participants (10.7%) reported 6 to 7 hours of sitting, 33 participants (8.6%) reported to been seated for more than 7 to 8 hours, and 204 most of the participants mentioned more than 8 hours of sitting as shown in table II.

Total overall physical activity of 382 participants showed low physical activity in 120 participants (31.4%), 181 participants (47.4%) with moderate overall activity and only 81 participants (21.2%) are doing high overall physical activity as shown table II.

Table II: Distribution of the responses of subjects to IPAQ questionnaire (N=382)

IPAQ	Response	Frequency (n)	(%)
Do you perform any exercise?	Yes	198	51.8
	No	184	48.2
Do you have any hormonal problem or co-morbidities?	Yes	27	7.1
	No	355	92.9
Total Job Related Physical Activity	Low	204	53.4
	Moderate	105	27.5
	High	73	19.1
Total Transportation Physical Activity	Low	274	71.7
	Moderate	88	23.0
	High	20	5.2
Total House Work, House Maintenance and Caring for Family Related Physical Activity	Low	283	74.1
	Moderate	66	17.3
	High	33	8.6
Total Recreation, Sport and Leisure Time Physical Activity	Low	283	74.1
	Moderate	81	21.2
	High	18	4.7
Total Time Spent Sitting	< 2 hours	26	6.8
	2 to 3 hours	4	1.0
	3 to 4 hours	4	1.0
	4 to 5 hours	54	14.1
	5 to 6 hours	16	4.2
	6 to 7 hours	41	10.7
	7 to 8 hours	33	8.6
	> 8 hours	204	53.4
Total Overall Physical Activity	Low	120	31.4
	Moderate	181	47.4
	High	81	21.2

Twelve participants out of 382 who perform some kind of exercise were found to have BMI of less than 18.5 and was catered as underweight, 67 participants were between 18.5 to 22.9 which is normal BMI, 40 participants were between range of 23 to 24.99 BMI, 59 participants were pre obese between 25 to 29.9 BMI, 20 participants were obese i.e. more than 30 BMI as shown in Table III

On the other hand, 10 participants who were not involved in any exercise were underweight i.e. BMI of

less than 18.5, 44 participants were between 18.5 to 22.9 i.e. Normal in BMI, 38 were overweight i.e. 23 to 24.99 in BMI, 63 participants were pre-obese i.e. 25 to 29.9 and 29 participants were obese i.e. more than 30 BMI.

Participants who spent less than two (02) hours in sitting position only 1 have found to have BMI of more than 30 i.e. obese, 11 participants were under normal range 18.5 to 22.9 BMI, 7 participants reported to be overweight 23 to 24.99 in BMI, 6 participants reported pre obese 25 to 29.9 BMI and 1 participant in underweight category i.e. <18.5 BMI, out of 382 participants only 26 were reported to sitting for less than 2 hours as shown in table IV.

Out of 382 participants, 1 was reported to be underweight 1 participant in normal BMI 18.5 to 22.9, and 2 participants reported overweight 23 to 24.99 BMI out of total 4 participants reported to sit for 2 to 3 hours as shown in table IV.

Participants who were reported to sit for 3 to 4 hours have zero participants in underweight category i.e. <18.5 BMI, 3 participants in normal BMI category 18.5 to 22.9, and 1 in pre obese 25 to 29.9. out of total 4 as shown in table IV.

Participants reported to sit for 4 to 5 hours have a mixed type of response i.e. 4 were reported underweight, 17 in normal BMI, 11 participants are overweight and 17 are pre obese and 5 were obese, out of 54 participants as shown in table IV.

Participants reported to sit for 5 to 6 hours have more pre obese reported participants out of 16 but the general population in this category is dispersed, i.e. 1 reported underweight, 4 participants with normal BMI, and 4 with overweight. 5 in pre obese and 2 in obese i.e. in more than 30 BMI as shown in table IV.

41 Participants reported sitting for 6 to 7 hours from which 3 are underweight, 11 are normal BMI, 12 were overweight, 10 reported to be pre obese and 5 are obese as shown in table IV.

33 participants are reported to sit for 7 to 8 hours from which 1 was underweight, 9 were normal BMI, 3 were reported to be overweight, 15 pre obese and 5 obese as shown in table IV.

204 participants mentioned that they sit for more than 8 hours out of which 11 were found to be underweight, 55 were normal BMI, 39 participants were overweight, 68 participants reported to be pre obese and 31 were in obese category having BMI >30 as shown in table IV.

Total reported participants in respect to time spent in sitting, 22 were found underweight, 111 with normal BMI, 78 participants are overweight, 122 are pre obese and 49

Table III: Association of BMI of subjects with their level of exercise

	Do you perform any exercise?				*p* value*
	Yes		No		
	(n)	(%)	(n)	(%)	
BMI					
Underweight (<18.5)	12	3.14	10	2.6	
Normal (18.6 – 22.9)	67	17.5	44	11.5	
Over-weight (23-24.9)	40	10.5	38	9.9	**0.02**
Pre-Obese (25-29.9)	59	15.4	63	16.4	
Obese (>30)	20	5.2	29	7.6	
Total	198	**51.8**	184	**48.2**	

Table IV: Association of total time spent sitting and BMI of participants

Total Time spent sitting	BMI of the studied subjects (N=382)										*p* value*
	Underweight (<18.5)		Normal (18.6 – 22.9)		Over-weight (23-24.9)		Pre-Obese (25-29.9)		Obese (>30)		
	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	(n)	(%)	
< 2 hours	1	0.26	11	2.88	7	1.83	6	1.57	1	0.26	
2 to 3 hours	1	0.26	1	0.26	2	0.52	0	0.00	0	0.00	
3 to 4 hours	0	0.00	3	0.78	0	0.00	1	0.26	0	0.00	
4 to 5 hours	4	1.05	17	4.45	11	2.88	17	4.45	5	1.31	
5 to 6 hours	1	0.26	4	1.05	4	1.05	5	1.31	2	0.52	**0.01**
6 to 7 hours	3	0.78	11	2.88	12	3.14	10	2.61	5	1.31	
7 to 8 hours	1	0.26	9	2.36	3	0.78	15	3.93	5	1.31	
> 8 hours	11	2.88	55	14.4	39	10.2	68	17.8	31	8.11	
Total	22	5.76	111	29.06	78	20.4	122	31.94	49	12.83	

participants are obese. Out of 382 regardless of gender and risk factor evaluation as shown in table IV.

Participants performing low to high physical activity in relation to BMI were total of 120 participants performing low physical activity, 181 performing moderate physical activity and 81 participants performing high physical activity. 22 participants are underweight <18.5 BMI out of which 8 participants were reported to perform low physical activity, 7 participants with moderate physical activity and 7 participants reported high physical activity. 111 participants are normal BMI 18.5 to 22.9 from which 29 reported to perform low physical activity, 58 with moderate physical activity and 24 performs high level physical activity.78 participants are reported overweight from which 21 performs low physical activity, 46 performs moderate activity and 11 performs high physical activity. 122 participants were pre obese from which 44 performs low physical activity, 45 participants perform moderate activity and 33 performs high physical activity. 49 participants were reported to be obese in relation to physical activity and BMI out of which 18 participants perform low physical activity, 25 performs moderate physical activity and 6 participants performs high level physical activity as shown in table V

Discussion

The findings of this research have shown that physical movement was contrarily connected with the prevalence of overweight/obesity in a selected sample of students of the Universities situated in Jamshoro. Although this study lacks the relationship of obesity and physical activity in both genders separately but still it is a good measure of rising weight and health issues associated with lack of physical activity, such association was observed regardless of gender. This is the first study, to our recognition, reporting this finding in a region wise practicability sample of Sindhi adolescents of both genders. Lesser physical movement in participants, specially high and medium, may be counted for the impact on the affiliation. There may be a probability of overvaluation of physical exercise in participants with overweight & obesity, mentioned in earlier studies.[12] The findings gathered from this study are almost in agreement with an earlier study by Lichtman S et al.[13] in which he found an inverse association between the intensity of physical activity and the prevalence of overweight and obesity and sitting times were directly related to overweight and obesity. The results show the new vogue towards lack in physical exercise related to the inactive nature of different work activities, the modernization and innovation in locomotors method & rising concrete jungles. Also, the increase in excessive energy-rich foods, rich lipids and carbohydrates, has created an irregularity among admission and vitality utilization. [14] Additionally, physical movement was estimated through the IPAQ questionnaire, a globally bona fide/approved instrument for estimating physical action in people 18 to 25 years of age, which can be utilized in pervasiveness considers dependent on national populaces. As a standard marker, the IPAQ questionnaire is suggested for making correlations inside a nation, among nations, and around the world. This study has some clampdown that should be considered for being not representative of the whole region or province. However, this information is valuable as it provides the hookup between physical activity and overweight/obesity and helps to identify groups that perform less physical activity. This study promotes the need of targeting interventions on young population group to encourage physical activity. In summarized opinion, physical movement was contrarily connected with

Table V: Association of BMI of the subjects with total overall physical activity (N=382)

	Total Overall Physical Activity						*p* value*
	Low		Moderate		High		
	(n)	(%)	(n)	(%)	(n)	(%)	
BMI							
Underweight (<18.5)	8	2.09	7	1.83	7	1.83	
Normal (18.6 – 22.9)	29	7.59	58	15.18	24	6.28	
Over-weight (23-24.9)	21	5.50	46	12.04	11	2.88	**0.01**
Pre-Obese (25-29.9)	44	11.52	45	11.78	33	8.64	
Obese (>30)	18	4.71	25	6.54	6	1.57	
Total	120	31.41	181	47.38	81	21.20	

overweight/heftiness in a representative sample of students of universities in Jamshoro both males and females. Therefore, encouraging vigorous or moderate-intensity physical activity and minimizing inactive life style, along with the encouragement of a healthy and balanced diet, are necessary pillars aimed at preventing and controlling overweight/ obesity in both adolescents, thus reducing the risk of chronic diseases in those population groups.

These findings suggest that overweight and obesity are linked with distorted eating behaviors and perceptions. Therefore, screening for these attitudes in overweight youths may accelerate the development and success of obesity treatment programs. Overweight and obesity remain a treatment hurdle because we have yet to fully understand the barriers to weight loss and how best to address these challenges.

Although the results of this study are independent of gender body fat percentage and other factors which may be a cause of error or may be a cause of increased BMI results. The result of this study also shows that participants performing high physical activity and are even are not sitting for longer durations still have chances of obesity or over weight. The result of this study is regardless of gender difference in result and has not been divided into male and female groups independently which in further studies can use as a measure between male and female adiposity and obesity. Although obesity in females according to their BMI is because of their body aft composition because of required energy for their parenting and nursing needs for child birth and its development is necessary.

According to the results of this study majority of the participants reported low physical activity at job place, which can be considered a major factor in the involvement of people in lesser activity and association with obesity and overweight.

Low activity was reported by participants in this study regarding transportation also, modernization and more use of vehicle plays an important role in increasing obesity and overweight. In spite that more than 51 percent youngsters reported any kind of exercise to perform daily. According to this study only 7 percent participants reported any kind of hormonal problem or co morbidities which shows that obesity in this age group is probably not associated with hormonal disturbances but rather other domains needs to be explored to know the factors of obesity and overweight.

Total House Work, House Maintenance and Caring for Family Related Physical Activity was reported to be very low by the majority of the participants which shows the changing behaviors of young adults to more lean on sedentary lifestyle and hiring maids and workers to even perform small house hold works, which decreases house caring physical activity also promoting factors increasing obesity.

74 percent individuals reported low involvement in recreational activity and sports which may be due to increasing academic load more sedentary life adaptation or just lack of interest in sports and leisure activity, decreasing sports and leisure activity is also a cause of overweight and obesity because the intake of food and calories are more than expenditure of energy which in turn increases chances of obesity. Physical education should be an important part of the academic curriculum also as recreational activities to promote healthy life style and active physical state.

Majority of participants 54 percent reported more than eight hours of sitting which also is a causative factor of lack of energy expenditure and risking overweight and obese life style. Sitting in front of TV, using social media and playing video games may also be a causative factor for increasing lack of physical activity resulting in overweight and obesity.

In this study the association of sitting time of individuals and BMI shows that participants who sits for more than eight hours are more likely to be in pre obese and obese category of BMI. As the duration of time increases for sitting from two hours to eight hours the risk of obesity also increases.

In this study the relationship of BMI with physical activity shows that the numbers of participants performing high physical activity are lesser towards obesity and decreasing in number. On the other hand low physical activity is more towards obesity and overweight.

Conclusion

This present study with its limited spectrum on small population according to the results obtained concludes that BMI is one of the indicators of obesity to assess for individuals with overweight and increasing

risks of obesity related hazards, this study shows that physical activity is inversely proportional to obesity and overweight, sitting time during work hours and lack of sports and leisure activity, less involvement in home and care activities more time spending in involving in social media playing video games are also can be considered as reasons of increasing number of overweight and obesity.

Recommendations: According to the findings of this study it is recommended for the educational institutes and universities to make physical activity a compulsory part of curriculum, extracurricular activities should be promoted to decrease the chances of increasing obesity and sedentary life styles. Parents and teachers should encourage young adults to engage in regular physical activity, and avoid prolong sitting for many hours. This study discussed the relationship of prolong sitting and proved that sitting more than 8 hours in a day promotes chances of obesity and overweight. This study recommends that at least moderate level physical activity must be involved in daily routine to avoid chances of obesity.

Although BMI is not the only indicator and cannot be considered as the sole indicator of obesity but if other indicators are used in conjunction they can be useful measurement method for more proper assessment which can be clinically applied.

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