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PREVALENCE OF OBESITY, OVERWEIGHT AND UNDERWEIGHT AMONG SCHOOL GOING CHILDREN AND ADOLESCENTS IN ABHA CITY, KINGDOM OF SAUDI ARABIA

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In this study, 200 school going adolescent girls, 12-19 years were selected randomly from two schools which were randomly sampled out of 30 schools in Abha province. Their height, weight and waist circumference were computed. Socio demographic details, physical activity, time spent on the computer and family histories of obesity or thinness were collected by an interview process. Pearson's Chi square was computed between BMI and family history of obesity or thinness and time spent on the computer. Statistical analysis was done using SPSS 17 software. It was found that family history of obesity or thinness ($p<0.05$) and time spent on computer everyday significantly related ($p<0.001$) with BMI. Also none of the study subjects had central obesity. However 4.5% of the subjects were obese based on BMI.

INTRODUCTION

Adolescence is a critical period of growth and development, so good nutrition is essential. During adolescence, the need for most nutrients including energy, protein, vitamins and minerals increases. As appetite is also likely to increase, it is important that food choices are made carefully. It can be tempting at this time to increase the intake of snack foods and fast foods that are high in fat, sugar and salt (http://daa.asn.au/for-the-public/smart-eating-for-you/nutrition-a-/adolescent-nutrition).

Proper nutrition promotes the optimal growth and development of children. Healthy eating helps prevent high cholesterol and high blood pressure and helps reduce the risk of developing chronic diseases such as cardiovascular disease, cancer, and diabetes (Dietary Guidelines Advisory Committee Report of the Dietary Guidelines Advisory Committee on the Dietary Guidelines for Americans, 2010). Healthy eating helps reduce one's

risk for developing obesity, osteoporosis, iron deficiency, and dental caries (cavities) (CDC, 1998). Healthy eating is associated with reduced risk for many diseases, including several of the leading causes of death: heart disease, cancer, stroke, and diabetes. Healthy eating in childhood and adolescence is important for proper growth and development and can prevent health problems such as obesity, dental caries, iron deficiency, and osteoporosis (CDC, 1998).

Obese children are at risk of becoming obese adults (Singh *et al.*, 2008) and can experience immediate health consequences such as psychosocial stress, elevated blood pressure and cholesterol, and abnormal glucose tolerance (Barlow, 2007). Monitoring trends in childhood obesity is important in order to assess interventions aimed at reducing the burden of obesity.

With this background, an attempt has been made in this study to identify overweight, obese and underweight

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adolescents in schools and colleges of Abha city with the following objectives:

1. To study the height, weight, BMI and waist circumference of the selected school children and adolescents, 13 to 18 years of age.

2. To compare the above parameters with standards.

3. To study the relationship between physical activity, time spent on the computer, family history of obesity or thinness and Body Mass Index (BMI) of the study subjects.

MATERIALS AND METHODS

Abha city in Saudi Arabia was selected for the study due to ease of accessibility. Out of 30 schools available, two schools were randomly selected for the study. Around 200 adolescents, 13 to 18 years of age were randomly selected from the two schools.

Family background details to include age, education of the parents and parental income were collected through interview. Height, weight, (calculation of BMI) and waist circumference were measured using standard equipment. BMI, waist circumference, hip circumference and waste hip ratio were calculated using the standard formulas:

BMI = Weight in kg/Height^2 in meters (www.cdc.gov/healthy weight/assessing/BMI/adult_BMI)

Waist circumference = Risk factor for women if greater than 88 cm (http//www.topend sports.com/testing/tests/WHR.htm)

Details about physical activity, watching TV and working on computers and family history of obesity or thinness, etc., were collected during the interview. The above data was collected after informed consent from the study subjects and the ethical committee approval of King Khalid University.

The collected data was loaded on to SPSS 17 software after coding and the analysis using descriptive statistics such as Chi square was computed.

RESULTS AND DISCUSSION

Socio Economic Data of the Study Subjects

The study subjects (only females) selected belonged to the age group of 12 to 19 years, the mean age being 15.3750 years.

Table 1: Age of the Selected Subjects

	N	Minimum	Maximum	Mean	Std. Deviation
Age	200	12	19	15.38	1.66681

Table 2: Type of School Studied

Type of School	Frequency	Percent
Intermediate school	100	50
Secondary school	100	50
Total	200	100

Fifty percent of subjects selected were from the intermediate school, while the remaining 50% were from secondary school.

A majority of the subjects selected were Saudi nationals (88%), while only 12% were of a different nationality.

A majority of the mothers were educated (65.5%), whereas only 34.5 % were house wives. Regarding occupation of the mothers', 50% were employed, whereas the remaining 50% were unemployed.

From Table 5 it is evident that a majority of the fathers (29.4%), followed by 28.2% of the mothers and 24.7% of the

Table 3: Nationality of the Selected Subjects

Nationality	Frequency	Percent
Saudi nationals	176	88
Non Saudi	24	12
Total	200	100

Table 4: Mother's Education and Occupation of the Selected Subjects

Mother's Education	Frequency	Percent
Yes	131	65.5
No	69	34.5
Total	200	100
Mother's Occupation		
Yes	100	50
No	100	50
Total	200	100

Table 5: Family Degree Holders of the Study Subjects

Family Member	Frequency	Percent
Mother	24	28.2
Father	25	29.4
Sister	21	24.7
Brother	15	17.6
Total	85	100

sisters of the study subjects were educated up to the degree level.

The family income of a majority of study subjects (45%) were between 10000 to less than 15000 Saudi riyals. The family income of only 16.5% of the subjects was above 15000 riyals.

Table 6: Family Income of the Study Subjects

Income (Saudi Riyals)	Frequency	Percent
5000-<10000	77	38.5
10000-<15000	90	45
15000 and more	33	16.5
Total	200	100

Anthropometric Profile of the Study Subjects

From Table 7, it is evident that the mean weight, height and waist circumference of the study subjects were 58 kg, 157.6 cm and 35.8 cm respectively. It was interesting to note that the waist circumference of the study subjects ranged between 28 cm to 66 cm, which is below the cutoff point of 88 cm for females. From the above we can conclude that none of the subjects had central obesity.

Table 7: Anthropometric Profile of the Study Subjects

	N	Minimum	Maximum	Mean	Std. Deviation
Weight (kg)	200	38	98	58.441	11.01744
Height (cm)	200	139	187	157.52	7.34502
Waist circumference (cm)	146	28	66	35.753	4.61267

Table 8: BMI Status of the Study Subjects

BMI Category	Frequency	Percent
Underweight	16	8
Normal weight	125	62.5
Overweight	50	25
Obese`	9	4.5
Total	200	100

It is evident from Table 8 that a majority of the subjects were of normal weight (62.5%), followed by 25% who were overweight, 8% who were underweight and 4.5% who were obese. This finding is similar to the results of other studies in the same geographical area (Abahussain *et al.*, 1999).

**Table 9: Family History of Obesity/Thinness of the Study Subjects**

Anthropometric Criteria	Frequency	Percent
Obesity	43	21.5
Thinness	42	21
No obesity or thinness	115	57.5
Total	200	100

Figure 1: BMI Status of the Study Subjects
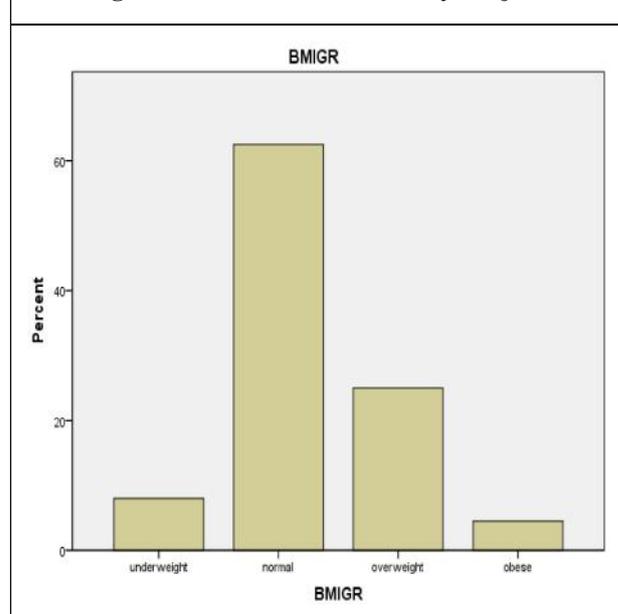
Family History of Obesity vs. BMI Group
Chi Square – p < 0.05

From the above table it is evident that a significant majority of the families of the study subjects (57.5%) were neither obese nor thin. Only 21.5% and 21% of the families were significantly obese or thin. Chi square was significant at p<0.05 when family history of obesity or thinness vs BMI was studied.

Figure 2: Family History of Obesity/Thinness of the Study Subjects
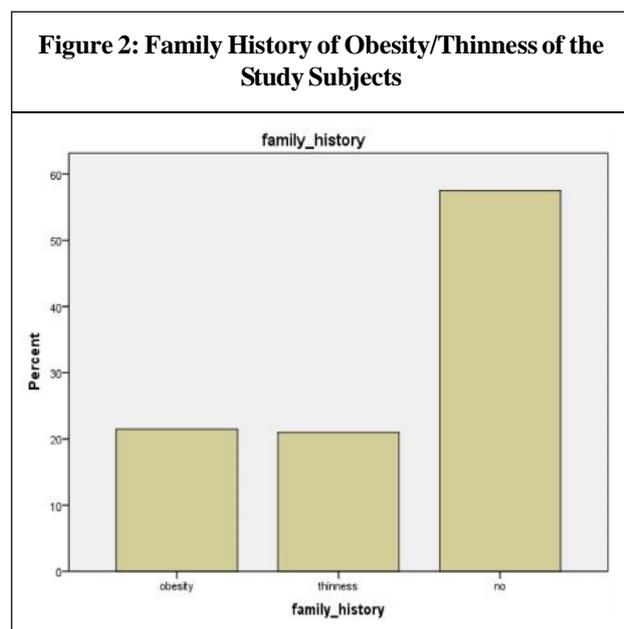
Acute and Chronic Diseases Among Study Subjects

From the above Table 10, it is evident that there is no disease or infection in a majority of the subjects (81.5%). In 64.9% of the subjects with acute disease, influenza is present, whereas diarrhea is present only in 35.1% of the study subjects.

Table 10: Presence of Acute Diseases Among the Study Subjects

Acute Diseases	Frequency	Percent
Present	37	18.5
Absent	163	81.5
Total	200	100
Influenza	24	64.9
Diarrhea	13	35.1
Total	37	100

Table 11: Presence of Chronic Diseases Among the Study Subjects

Presence of Chronic Diseases	Frequency	Percent
Absent	171	85.5
Diabetes mellitus	1	0.5
Hypertension	14	7
Cardiovascular disease	9	4.5
Anemia	1	0.5
Obesity	2	1
Others	2	1
Total	200	1

In a majority of the study subjects (85.5%), there was absence of chronic diseases. However in 7.0% and 4.5% of the study subjects respectively, diseases such as hypertension and cardiovascular diseases were present. In 0.5% of the subjects, diseases such as diabetes mellitus and anemia were present.

Physical Activity of the Study Subjects

A majority of the subjects involved in exercise (62.5%), whereas 37.5% of the subjects did not do any exercise.

Regarding the type of exercise the study subjects were involved in, a majority of 69.6% did walking, followed by 13.6%, who were involved in swimming. A minimum of 7.2% of the subjects involved in aerobics.

Table 12: Exercise Frequency and Type of Exercise of the Subjects

Exercise	Frequency	Percent
Doing exercise	125	62.5
Not doing exercise	75	37.5
Total	200	100
Type of exercise		
Gym	12	9.6
Walking	87	69.6
Swimming	17	13.6
Aerobics	9	7.2
Total	125	100

Table 13: Duration of Watching Computer by the Study Subjects							
Computer Duration vs BMI			**BMI Group**				**Total**
			Underweight	Normal	Overweight	Obese	
Computer duration	1 hr or less	Count	8	31	5	0	44
		% within BMI group	53.30%	25.00%	10.20%	0.00%	22.30%
	2-3 hr	Count	6	57	13	1	77
		% within BMI group	40.00%	46.00%	26.50%	11.10%	39.10%
	4-6 hr	Count	1	29	23	3	56
		% within BMI group	6.70%	23.40%	46.90%	33.30%	28.40%
	>6 hr	Count	0	7	8	5	20
		% within BMI group	0.00%	5.60%	16.30%	55.60%	10.20%
Total		Count	15	124	49	9	197
		% within BMI group	100.00%	100.00%	100.00%	100.00%	100.00%

Note: Pearson's Chi square $p<0.001$.

The duration of exercise per hour among the study sample was between 1 to 3 hours duration. The mean of exercise duration was 1.2306 hours.

Duration of Watching Computer by the Study Subjects

It is evident from the above table that a majority (53.3%) of underweight subjects spent 1 hour or less on the computer. Similarly a majority of normal weight subjects (46%) spent two to three hours on the computer. With respect to overweight and obese subjects, a majority (46.9%) of overweight subjects spent four to six hours on the computer, whereas a majority of obese subjects (55.6%) spent greater than six hours on the computer. The above results were highly significant ($p < 0.001$). It can be discussed that greater the percent of time spent by subjects on the computer greater the percent of obesity and vice versa.

DISCUSSION

From the above results it is evident that a majority of the study subjects were of normal weight (62.5%), followed by 4.5% who were obese. When Chi square was computed between BMI and family history of obesity or thinness, it was significant at $p<0.05$. Waste circumference was within the cutoff point of less than 88 cm for women, showing absence of central obesity.

Likewise when Chi square was computed between BMI and time spent on the computer, it was highly significant ($p < 0.001$). This shows that more time spent on the computer relates to incidence of obesity. Though Chi square drawn between BMI (Body Mass Index) and physical activity were not significant, the importance of physical activity in maintaining normal body weight cannot be ruled out.

CONCLUSION

This study throws light on the factors affecting Body Mass Index (BMI) of an individual. It reveals the fact that more time spent on the computer and family history of obesity or thinness significantly related to incidence of obesity. Sixty two percent of the study subjects were of normal weight and only 4.5% were obese. Also there is absence of central obesity among the subjects. We can conclude that more importance should be given to underweight and overweight subjects so that they return to normal weight. Intervention in the form of nutrition education or counseling is the need of the hour.

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