

Anthropometric Parameters and Its Effects on Academic Performance among Primary School Female Students in Jazan, Saudi Arabia Kingdom

Research Article

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Abstract

Background: The prevalence of malnutrition in Saudi children is higher when compared with the countries having less economic resources. All anthropometric indicators were lower in girls when compared to boys. The problem is going to persist unless great effort is kept to improve their nutritional status.

Aim: To investigate the anthropometric parameters status and its effect on academic performance among primary school female students of rural and urban area of Jazan region, Saudi Arabia Kingdom.

Methods: A cross sectional study was conducted among female school children aged from 6 to 12 years at rural and urban area of Jazan region, South Western part of Saudi Arabia. The anthropometric measurements were assessed as Weight for Age Z-Score (WAS) and Height for Age Z-Score (HAZ). Body Mass Index (BMI) was calculated as weight in Kg/height in meter square and standard charts of BMI for age was used as reference. A pre designed questionnaire was used for collecting socioeconomic information include parents education, family size, house size. Scholastic achievement of students was assessed using their grades in three different subjects Arabic, Science and Mathematics.

Results: Among total female students 30.8% were severe underweight ($WAZ < 0.85$), where as region wise 32.6%, 30.1% and 26.2% from the urban regions Abu Arish, Jazan and the rural region Al Dayer respectively. Average Body Mass Index was 18.3 for the female students from Abu Arish and Al Dayer where as in Jazan female students average Body Mass Index was 17.3. Obesity recorded lower ratio 13.3% and 15.9% for children in urban regions of Abu Arish and Jazan and 23.8% was recorded for children in the rural area of Al Dayer. Approximately 82% of the participants with normal body weight were showing excellent academic performance however it was found 74% of obese participants have got only pass status in the academics. $P\text{-Value} < 0.01$ statistically there was highly significant association between nutritional status and academic performance.

Conclusion: Great effort is still needed to improve the nutritional status of primary school female students in South Western area of Saudi Arabia Kingdom.

Keywords: Nutritional status; Anthropometric measurements; Academic performance; Female primary school; Jazan area

Introduction

Saudi Arabian government give the most priority for developing the educational level of different Saudi Governorates, furthermore Jazan district in southern area of Saudi Arabia Kingdom has been received the most attention. Several studies have been indicated to the negative effect of poor feeding on children growth and mental development [1]. Malnourished children suffer from slow rate of

brain development in form of low brain weight, thin cerebral cortex and decrease number of neurons [2]. Therefore, there is no doubt malnutrition has the greatest effect on academic performance of primary school children [3]. Malnutrition can be quantified using anthropometric measurements as weight for age, height for age and weight for height which are expressed as Z-Score in comparison with standard references [3,4]. Wasting (low body weight) and stunting (low body height) in primary school children was associated with low

academic performance [5]. As well, over weight and obese children are more likely to have low self-esteem and depression which cause poor academic achievement [6]. Also academic performance of children are affected by social variables such as household income, parent education level and household size [7,8].

The rate of malnutrition prevalence between Saudi children is still higher than other countries with less economic resource, so great effort is still needed to improve their nutritional status [9]. Physical growth and cognitive development in children are fast and about 92% of adult and intellectual capacity is attained by 13 years old [10]. The study on prevalence of malnutrition in Saudi children conducted in 2010 reported that all anthropometric indicators were lower in girls when compared to the boys [11]. Current study was designed to investigate the anthropometric parameters status in female students and its effect on academic performance and for studying the association between socio demographic variables and academic performance among primary school female students of rural and urban area of Jazan region, Saudi Arabia Kingdom.

Materials and Methods

A cross sectional study was conducted in three primary schools run by the Ministry of Education in Jazan area, south western part of Saudi Arabia. Randomly two schools are selected from urban area of the cities Abu Arish and Jazan and one school randomly selected from the rural area of Al Dayer village. Total 240 female students were participated in this survey. The variable age was categorized into three groups as 6-7, 8-9, and 10-12 years old. Among 240 female students 135 from Abu Arish primary school, 63 students from Jazan primary school and 42 students from Al Dayer primary school. A pre prepared questionnaire was used for collecting socioeconomic information include parents education, family size, house size. Parent education was classified into high (Bachelors of Science or more), moderate (secondary school qualification) and low (essential education).

The anthropometric measurements were assessed according to WHO (1986) where body weight was recorded in Kg., body height in meter. Weight for Age Z-Score (WAZ) and Height for Age Z-Score (HAZ) values were assessed as: actual body weight/ standard body weight of students age, and actual body height/ standard height of age [12]. Weight and height for age Z-score values were used as indicators for nutritional status and classified into severe malnutrition < 0.85, mild malnutrition 0.85 - 0.90, normal 0.90 to 1.1 and over weight > 1.1 [13]. Body Mass Index (BMI) was calculated as weight in Kg/ height in meter square. Standard charts of BMI for age was used as

reference standard and the results were classified into four categories as students with BMI < 5th percentile underweight, from 10th to 85th percentile normal weight, from 85th to 95th percentile, over weight and obese was classified as BMI > 95th percentile [14] (Chart 1). Scholastic achievement of students was assessed using their grades in three different subjects, Arabic, Science and Mathematics with score of 100 each and average grade was classified according to the likert 4 point scale into excellent 90 - 100, very good 80 - 89, good 70 - 79 and pass from 60 - 69 mark.

Results

Average body weight and standard body weight among female school children aged from 6 to 12 years in rural and urban area of Jazan region, South Western part of Saudi Arabia Kingdom were 33.44 Kg and 32.06 Kg. respectively. Among the 240 female students from three primary schools 30.8% were severe underweight (WAZ < 0.85), where as region wise 32.6% , 30.1% and 26.2% from the urban regions Abu Arish, Jazan cities and the rural region Al Dayer respectively. *P-value* > 0.05 statistically not significant (Table 1).

Average height and standard height among female school children aged from 6 to 12 years were 1.35 Mts. and 1.36 Mts. respectively. Among the 240 female students not more than 8% height for age Z-score under moderate category (HAZ range 0.85 - 0.90). More than 90% of students HAS score under normal category (HAZ range 0.9 - 1.1) in the three primary schools. *P-value* > 0.05 statistically not significant (Table 2).

Body Mass Index values were in parallel with the results of weight for age Z-score. Average body mass index among female school children aged from 6 to 12 years was 18.00. Among the 240 female students from three primary schools 27.5% were underweight (BMI < 0.05), where as region wise 27.3% , 30.1% and 23.8% were

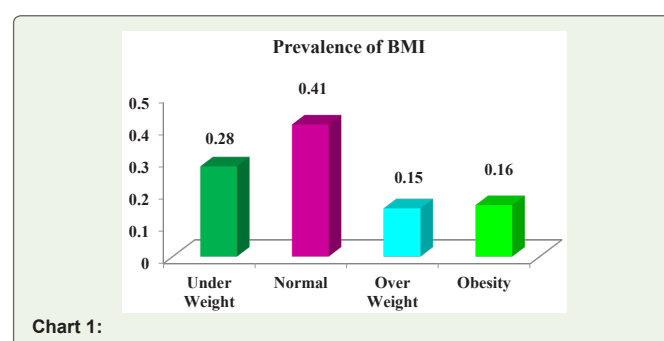


Table 1: Body Weight and Weight for Age Z-Score Values.

Region		Abo Arish				Jazan				Al Dayer			
Age in Years		6-7 (%)	8-9 (%)	10-12 (%)	Total (%)	6-7 (%)	8-9 (%)	10-12 (%)	Total (%)	6-7 (%)	8-9 (%)	10-12 (%)	Total (%)
Avg. Body Wt.		22.5	27.2	37.8	35.4	20.4	30.8	36.8	30.1	21.2	31.5	38.0	32.1
Standard Body Wt.		20.5	28.2	36.8	34.5	21.0	27.6	36.6	28.2	21.5	28.0	36.9	29.8
WAZ Score	Severe < 0.85	4(3)	6(4.4)	34(25)	44(32.6)	3(4.8)	12(19.0)	4(6.3)	19(30.1)	1(2.4)	7(16.7)	3(7.1)	11(26.2)
	Mild 0.85 - 0.9	0(0.0)	1(0.7)	11(8.1)	12(8.9)	2(3.2)	5(7.9)	1(1.6)	8(12.7)	1(2.4)	2(4.8)	1(2.4)	4(9.5)
	Normal 0.9 - 1.1	2(1.5)	8(5.9)	21(15.6)	31(23.0)	5(7.9)	6(9.5)	3(4.8)	14(22.2)	2(4.8)	7(16.7)	3(7.1)	12(28.6)
	Over Wt > 1.1	4(3.0)	1(0.7)	43(31.9)	48(35.6)	2(3.2)	15(23.8)	5(7.9)	22(34.9)	1(2.4)	9(21.4)	5(11.9)	15(35.7)
Total		10(7.4)	16(11.9)	109(80.7)	135(100)	12(19)	38(60.3)	13(20.6)	63(100)	5(11.9)	25(59.5)	12(28.6)	42(100)

Chi Square value for 6 degrees of freedom at 5% level of significance is 3.772 and P-value is 0.708 (not significant).

Table 2: Body Height and Height for Age Z-Score Values.

Region	Abo Arish				Jazan				AlDayer			
Age in Years	6-7 (%)	8-9 (%)	10-12 (%)	Total (%)	6-7 (%)	8-9 (%)	10-12 (%)	Total (%)	6-7 (%)	8-9 (%)	10-12 (%)	Total (%)
Avg. Height	1.16	1.28	1.41	1.38	1.26	1.29	1.39	1.31	1.21	1.28	1.41	1.31
Standard Height	1.16.	1.31.	1.43	1.40	1.16.	1.31.	1.43	1.40	1.16.	1.31.	1.43	1.40
HAZ Score	Severe < 0.85	0(0.0)	0(0.0)	2(1.5)	2(1.5)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)
	Mild 0.85 - 0.9	0(0.0)	1(0.7)	7(5.2)	8(5.9)	0(0.0)	2(3.2)	1(1.6)	3(4.8)	0(0.0)	2(4.8)	3(7.1)
	Normal 0.9 - 1.1	10(7.4)	14(10.3)	99(73.3)	123(91.1)	11(17.5)	34(54)	12(19)	57(90.5)	5(11.9)	23(54.8)	11(26.2)
	Tall > 1.1	0(0.0)	1	1	2	1	2	0(0.0)	3	0(0.0)	0(0.0)	0(0.0)
Total	10(7.4)	16(11.9)	109(80.7)	135(100)	12(19)	38(60.3)	13(20.6)	63(100)	5(11.9)	25(59.5)	12(28.6)	42(100)

Chi Square value for 6 degrees of freedom at 5% level of significance is 6.066 and P-value is 0.416 (not significant).

underweight (BMI < 0.05) from the urban regions Abu Arish, Jazan cities and the rural region Al Dayer respectively. Obesity (BMI > 0.95) recorded lower ratio 13.3% and 15.9% for children in urban regions Abu Arish and Jazan in comparison with 23.8% in rural area of Al Dayer. *P-Value* < 0.05 statistically significant effect of students region on the prevalence of underweight (Table 3).

Academic performance varied widely with body mass index it was clearly depicted that academic performance is strongly associated with the body mass index. 82% of the participants with normal body weight are shown to have excellent academic performance followed by 10% of very good performance. In the overweight participants 80% were found to have good academic performance in contrast to the normal participants with 82% of excellent academic performance. Approximately 74% of obese participants have settled with just pass status showing the strong association of nutrition with academic performance (Table 4).

Table 5 shows that socio demographic variables distribution of female school children aged from 6 to 12 years in rural and urban area of Jazan region, South Western part of Saudi Arabia Kingdom. Among the 240 female students from three primary schools most of the students were having low level father education. Region wise 47.37%, 33.33% and 19.30% were having low level father education

in Abu Arish, Jazan and Al Dayer respectively. *P-value* > 0.05 not significant. 44.20%, 34.06% and 21.74% were having low level mother education respectively. *P-Value* < 0.05 significant. More than 50% of the students having the family size 6-9 persons. *P-value* > 0.05 not significant. 44.2% of students were having 3 to 5 house rooms. *P-value* < 0.05 significant.

Table 6 shows that relationship between socio demographic variables with academic performance, There is a clear effect of parent's education levels on academic performance but statistically poor significant. Among the high level education category fathers, 78% of students have excellent performance. Among low level education mothers, 2% of students settled with pass. Family size has significant effect on academic performance *p-value* < 0.05. whereas house size not shown any significant affect on academic performance.

Discussion

Among the 240 female students from three primary schools 30.8% were severe underweight (WAZ < 0.85), where as region wise 32.6%, 30.1% and 26.2% from Abu Arish, Jazan cities and Al Dayer village respectively. Present study reveals that 91% of primary female school children from age 6-12 years were normal height. Parallel results indicated that 60.7% of Saudi female children were in normal height for age, 28% was taller and only 11% were stunted in

Table 3: Distribution of Body Mass Index.

Region	Abo Arish				Jazan				AlDayer			
Age in Years	6-7 (%)	8-9 (%)	10-12 (%)	Total (%)	6-7 (%)	8-9 (%)	10-12 (%)	Total (%)	6-7 (%)	8-9 (%)	10-12 (%)	Total (%)
Av. BMI.	16.8	16.7	18.6	18.3	13.4	18	18.5	17.3	14.4	18.7	18.8	18.3
BMI	Under Wt. < 0.05	5(3.7)	6(4.4)	26(19.2)	37(27.3)	7(11.1)	10(15.9)	2(3.1)	19(30.1)	3(7.1)	6(14.2)	10(23.8)
	Normal 0.05 - 0.85	1(0.7)	7(5.1)	48(41.4)	56(47.3)	4(6.3)	13(20.6)	8(12.7)	25(39.7)	1(2.4)	9(21.4)	18(42.9)
	Over Wt. 0.85 - 0.95	0(0.0)	2(1.5)	22(16.3)	24(17.8)	1(1.6)	6(9.5)	2(3.2)	9(14.3)	1(2.4)	2(4.8)	4(9.5)
	Obese > 0.95	4(3.0)	1(0.7)	13(9.6)	18(13.3)	0(0.0)	9(14.3)	1(1.6)	10(15.9)	0(0.0)	8(19.0)	10(23.8)
Total	10(7.4)	16(11.9)	109(80.7)	135(100)	12(19)	38(60.3)	13(20.6)	63(100)	5(11.9)	25(59.5)	12(28.6)	42(100)

Chi Square value for 6 degrees of freedom at 5% level of significance is 19.683 and P-value is 0.03 (significant)

Table 4: Body Weight and Academic Performance.

	Excellent (%)	Very good (%)	Good (%)	Pass (%)	Total (%)
Under Weight	9(13.64)	5(7.58)	51(77.27)	1(1.52)	66(100)
Normal	82(82.83)	10(10.10)	6(6.06)	1(1.01)	99(100)
Over Weight	4(10.81)	2(5.41)	30(81.08)	1(2.70)	37(100)
Obesity	4(10.53)	1(2.63)	5(13.16)	28(73.68)	38(100)
Total	99(41.25)	18(7.50)	92(38.33)	31(12.92)	240(100)

Chi Square value for 9 degrees of freedom at 5% level of significance is 279 and P-value is 0.00 (Highly Significant)

Table 5: Distribution of Socio Demographic Variables.

Items		Abo Arish (%)	Jazan (%)	Al Dayer (%)	Total (%)	P-Value
Father Education	High	59(62.11)	20(21.05)	16(16.84)	95(100)	0.08*
	Moderate	22(70.97)	5(16.13)	4(12.90)	31(100)	
	Low	54(47.37)	38(33.33)	22(19.30)	114(100)	
	Total	135(56.25)	63(26.25)	42(17.50)	240(100)	
Mother Education	High	50(75.76)	9(13.64)	7(10.61)	66(100)	0.02**
	Moderate	24(66.67)	7(19.44)	5(13.89)	36(100)	
	Low	61(44.20)	47(34.06)	30(21.74)	138(100)	
	Total	135(56.25)	63(26.25)	42(17.50)	240(100)	
Family Size	≤ 5 Persons	43(53.09)	21(25.93)	17(20.99)	81(100)	0.894*
	6 - 9 Persons	69(57.50)	32(26.67)	19(15.83)	120(100)	
	> 9 Persons	23(58.97)	10(25.64)	6(15.38)	39(100)	
House Rooms	1: 2 Rooms	135(56.25)	63(26.25)	42(17.50)	240(100)	0.046**
	3: 5 Rooms	23(52.27)	12(27.27)	9(20.45)	44(100)	
	> 5 Rooms	64(46.04)	45(32.37)	30(21.58)	139(100)	
	Total	48(84.21)	6(10.53)	3(5.26)	57(100)	
		135(56.25)	63(26.25)	42(17.50)	240(100)	

*Not significance, **significant

Table 6: Effect of Social Variables on Academic Performance.

Sociodemographic Variable		Academic Performance					P-Value
		Excellent	Very good	Good	Pass	Total	
Father Education	Low	90(78.9)	7(6.1)	15(13.2)	2(1.8)	114(100)	0.619*
	Moderate	25(80.6)	3(9.7)	2(6.5)	1(3.2)	31(100)	
	High	74(77.8)	6(6.3)	15(15.8)	0(0.0)	95(100)	
	Total	189(78.8)	16(6.7)	32(13.3)	3(1.3)	240(100)	
Mother Education	Low	106(76.8)	10(7.2)	20(14.5)	2(1.4)	138(100)	0.311*
	Moderate	33(91.7)	1(2.8)	1(2.8)	1(2.8)	36(100)	
	High	50(75.8)	5(7.6)	11(16.7)	0(0.0)	66(100)	
	Total	189(78.8)	16(6.7)	32(13.3)	3(1.3)	240(100)	
Family Size	≤ 5	73(90.1)	5(6.2)	3(3.7)	0(0.0)	81(100)	0.010**
	6 to 9	88(73.3)	9(7.5)	22(18.3)	1(0.8)	120(100)	
	> 9	28(71.8)	2(5.1)	7(17.9)	2(5.1)	39(100)	
	Total	189(78.8)	16(6.7)	32(13.3)	3(1.3)	240(100)	
House Rooms	1-2 Rooms	33(75.0)	3(6.8)	8(18.2)	0(0.0)	44(100)	0.287*
	3-5 Rooms	115(82.7)	8(5.8)	13(9.4)	3(2.2)	139(100)	
	> 5 Rooms	41(71.9)	5(8.8)	11(19.3)	0(0.0)	57(100)	
	Total	189(78.8)	16(6.7)	32(13.3)	3(1.3)	240(100)	

*Not significance, **significant

the study conducted by Hassan Mazher Bukhari on anthropometric Measurements and the Effect of Breakfast Sources in School Achievement, Physical Activity and Dietary Intake for 6-13 Years Old Primary School Children Girls in Makkah City, kingdom of Saudi Arabia [9].

Present study results are co-inside with study by Mouzan, et al. stated that obesity prevalence between Saudi Arabia students in different ages was 9.3% and present study stated that obesity prevalence among female school children aged from 6 to 12 years in rural and urban area of Jazan region was 15% [15].

Present study results depict academic performance varied widely with body mass index. Academic performance is strongly associated with the body mass index. 82% of the participants with normal body weight are shown to have excellent academic performance followed by 10% of very good performance. In the overweight

participants 80% were found to have good academic performance in contrast to the normal participants with 82% of excellent academic performance. Approximately 74% of obese participants have settled with just pass status showing the strong association of nutrition with academic performance. Nike SR, et al. reported that, under nutrition is associated with lower academic achievement of primary school students [4]. Anonymous stated that good nutrition status is needed to high academic performance because nutrition affects intellectual development and learning ability.

In the current study parent education level shows no significant effect on student's academic performance and most of the students with low level of father and mother education. The current findings same as the study conducted by Zeru, et al. stated that highly educated parents have a better knowledge of children requirements for good academic performance [3].

Conclusion

Academic performance is strongly associated with the body mass index. Participants with normal body weight are shown to have excellent academic performance and obese participants have settled with just pass status showing the strong association of nutrition with academic performance. Parent education has no significant effect and family size has significant effect on academic performance of children. Great effort is still needed to improve the nutritional status of primary school female students in South Western area of Saudi Arabia Kingdom.

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