Original Research Article

Assessment of nutritional status and its effect on academic performance in school children of Jazan, Kingdom of Saudi Arabia

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ABSTRACT

Background: Adolescence is the tender and vital period in the life of a person. It is a transitional stage of physical and psychological development that generally occurs during the period from puberty to legal adulthood. Nutrition is the prime requirement of the adolescents for their physical and mental growth. The aim of the study was to assess the nutritional status of the primary school going children in Jazan, KSA and to analyze the association of nutrition status with academic performance of school going children in Jazan, KSA.

Methods: This study involved 4 schools chosen randomly from the government schools of Jazan. 7th and 8th class children were considered for the study. Required ethical approval bearing reference number 28943 dated 20/6/1440 was taken from the Institutional ethical committee. Study sample: 200 collection of the data: data collected from the schools of Jazan selected randomly in the school working hours.

Results: 60% of the sample is in the age group 17-18 years. 30% of the sample were having more than 5 siblings. 16% of the parents were illiterates. The proportion of students taking milk products more than 3 times in the week (79.1%) were found to be performing well in the schools than the students consuming less than 3 days week. Strong association was found between performance of the students and parent's education as the educated parents' children were performing well.

Conclusions: Good nutrition for the growing kids was found to be associated with academic performance of the students.

Keywords: Nutritional status, Academic performance, Jazan, Diet

INTRODUCTION

Adolescence is the tender and vital period in the life of a person. Guardians of the children should pilot this highly turbulent period.[1] It is a transitional stage of physical and psychological development that generally occurs during the period from puberty to legal adulthood.[2] Nutrition is the prime requirement of the adolescents for their physical and mental growth. Proper and quality nutrition affects the academic performance of the students. Nutritional status is the health condition which is influenced by intake of the nutrients and its utilization in the body.[3]

Proper diet and nutrition are always related to the academic performance. Many studies done in the past showed the academic performance is affected by hunger, malnutrition, and micronutrient deficiency.[4-6] Undernourished children have been shown to have reduced attendance, attention span, and academic

performance and also were found to have experiencing more health problems compared to well-nourished children.[4,7] Few studies represented that breakfast is very essential for the cognition, behavior, and academic performance of school-age children.[4,8] Consumption of proper breakfast seems to have direct impact on specific cognitive tasks for the school going children.[4,8]

For better academic performance proper cognitive development of the brain is required and it is influenced by the nutrition from outside (dietary intake) sources in order to maintain the amount of neurons and functioning of neurotransmitters.[9]

Lacunae still exist in the knowledge regarding the performance in the school in relation to the proper diet.

Rationality from community perspective

Adolescence is the developmental period in which physical psychosocial and sexual growth occurs in the human being. Students will be entitled various academic activities warranting enhanced cognitive ability so it is the pressing need for taking care of dietary and nutritional status of the adolescent otherwise which the children may enter into malnutrition hampering the physical growth and academic performance in the schools. It was proved that children who don't take quality food suffer physically. At the age ranging 10- 14 years tremendous physical and cognitive growth occurs and approximately 90% of the brain development occurs before attaining 13 years.[10] Brain development slows down in severe malnutrition and cerebral cortex reduces in size with decreased number of neurons.[11] As there is direct effect of malnutrition on brain development implies the direct effect on academic performance of primary school children[12]. The present study was done to advise the students, teachers and guardians regarding healthy and quality diet for the children such that kids grow as effective and prosperous citizen of the country.

The objective of the study was to assess the nutritional status of the primary school going children in Jazan, KSA and to analyze the association of nutrition status with academic performance of school going children in Jazan, KSA.

METHODS

This study involved 4 schools picked randomly from the Government schools of Jazan. 7th and 8th class children were considered for the study. Required ethical approval taken from the Institutional ethical committee.

For convenience all the schools were divided into 4 zones (Eastern, western, northern and southern).

By using random number generator and applying random sampling method in each zone, one school was selected from the zone

Al-Andalus Middle school–Northern region. Mohammed bin Ali Al-sunoosi high school-eastern region. Mua'th bin Jabal Middle School-western region. Mua'th bin Jabal high school- southern region.

Data collected from the selected 4 schools

School based cross-sectional study. Study Sample: 200. Study period: August 2018.

Inclusion criteria

Male students belonging to higher class 7th and 8th considered for the study.

Exclusion criteria

Students were informed prior and consent taken from the school authority. Students who are unwilling to participate in the study were excluded.

Collection of the data

Data collected from the schools of Jazan selected randomly in the school working hours.

Anthropometry

Anthropometric indices recorded as per WHO Anthropometric standards.[13] The weight recorded approximated to the nearest 0.1 kg by bathroom weighing scale and the height to 0.5 cm using a SECA 284 height measuring scale.

Operational definition of nutritional status

BMI calculated by the formula: BMI = weight (kg)/height (m^2). All children weighed and height will be taken in standing position Based on the BMI of the children nutritional status assessed. A pre-designed and pre-validated questionnaire administered to collect information.

Investigators

A team of 3 students were re-oriented in techniques of taking anthropometric measurements. After discussion pilot project done to learn and correct the logistics and practical liabilities.

Collection of data was done in school hours, as permitted by the authorities for not disturbing the routine schedule of the students. Each participant examined by one investigator in order to remove inter-observer variations. After interview the anthropometric measurements were

taken. All the data entered into the questionnaire simultaneously.

Evaluation of the quality of the feed

The choice of foods guided by their potential impact on food quality, their different effects on nutritional status, their presence in the school environment and their popularity among schoolchildren Questions were asked to students for 7 days like how many days you eat these foods. These different foods concerned vegetables, fruits, meat, fish, liver, tofu and caramel, candy and chewing gum, biscuits and chocolates, yoghurt, dairy products and sweetened beverages. Mid semester total marks considered for academic performance.

Data entry and analysis

The data entered in microsoft excel 2010 and analyzed. Descriptive statistics (mean, standard deviation and percentiles) utilized to explore the data. Results with p<0.05 are taken as significant.

RESULTS

60% of the sample size belongs to the age group 17-18 years. 90% of the sample size were residing in urban area of Jazan province. 78% of the sample's household size is less than 5.30% of the mothers were post graduates and 9% were illiterates. 17% of the fathers were post graduates and 24.5% were illiterates.

Average age of the sample size was 16.35 years ±1.75, Average BMI of the students was found to be 26.6±7.8 (pre obese).

Students consuming non veg diet more than 3 times were found to perform low in academics when compared to students consuming non veg diet less than 3 times and this association was statistically significant (p=0.03). Legumes (p=0.000) and cookies (p=0.000) ingestion was associated positively with performance and found to be highly statistically significant.

Table 1: Socio-demographic characteristics of the study sample.

Variables		N	%
Age group (in years)	11-13	10	5
	14-16	70	35
	17-18	120	60
Residential area	Urban	180	90
	Rural	20	10
Household size	<5	156	78
	≥5	44	22
Number of siblings	<5	140	70
	≥5	60	30
Mother`s education	Illiterate	18	9
	Primary	32	16
	Secondary	37	18.5
	Graduate	53	26.5
	Post graduate	60	30
Father`s education	Illiterate	49	24.5
	Primary	42	21
	Secondary	47	23.5
	Graduate	28	14
	Post graduate	34	17

Students consuming milk products more than 3 times per week were found to have performed well in academics. Fast food consumption was associated with poor performance in schools. Fruits, cereals and vegetables and juices consumption was not found to be associated with performance.

Mother`s education was found to be significantly associated with academic performance of the students. Parent's education is found to be associated directly to the performance of the students.

Table 2: Assessment of nutritional status by Anthropometry (n=200).

Variable	Total population Mean±SD
Age (in years)	16.35±1.75
Height	162.4±7.4
Weight	71.15±1.85
BMI (kg/m²)	26.6±7.8

Table 3: Assessment of diet per week and its effect on academic performance.

Variables	Frequency	Poor performance (%)	Good performance (%)	Total	P value
Non veg	<3	86 (56.3)	69 (43.7)	155	
	>3	34 (75)	11 (25)	45	0.03
	Total	120 (60)	80 (40)	200	
Fruits and vegetables	<3	81 (59)	56 (41)	137	
	>3	39 (61.9)	24 (38.1)	63	1.00
	Total	120 (60)	80 (40)	200	
Cookies	<3	70	20	90	
	>3	50	60	110	0.000
	Total	120	60		
Cereals	<3	60 (60)	40 (40)	100	
	>3	60 (60)	40 (40)	100	1.00
	Total	120 (60)	80 (40)	200	
Milk and dairy products	<3	61 (70.09)	25 (29.01)	86	
	>3	25 (21.9)	89 (79.1)	114	0.005
	Total	86	114		
Legumes	<3	110 (68.7)	50 (31.3)	160	
	>3	10 (25)	30 (75)	40	0.000
	Total	120 (60)	80 (40)	200	
Juices	<3	70 (53.8)	60 (46.2)	130	
	>3	50 (71.4)	20 (28.6)	70	0.15
	Total	120 (60)	80 (40)	200	
Fast foods	<3	100 (66.6)	50 (33.3)	150	
	>3	20 (40)	30 (60)	50	0.0001
	Total	120	80	200	

Table 4: Effect of parent education on academic performance of the students.

Variable		Poor performance (%)	Good performance (%)
Mother education	Illiterate	14 (7)	6 (3)
	Primary and more	19 (9.5)	161 (80.5)
Father education	Illiterate	38 (19)	11 (5.5)
	Primary and more	28 (14)	123 (61.5)

Approximately 30% of the sample was found to be obese when examined for general appearance. 23.5% were found to have yellowing of teeth and 11% have dental caries and were advised to approach dentist. School authority was also informed about the same. 10.5% of the sample size were having bleeding gums.

Table 5: Clinical examination of the students.

Variable		Percentage (%)
General appearance	Thin built	15.5
	Normal	55
	Obese	29.5
Hair	Normal	78
	Pigmented	22
Teeth	Normal	65.5
	Yellowing of teeth	23.5
	Dental caries	11
Gums	Normal	89.5
	Bleeding gums	10.5

DISCUSSION

Assessment of nutritional status of the students and assessing its influence on the academic performance would predict and can be helpful in generating insights on useful nutritional programs and strategies to improve health status of the children accounting to the healthy future of the nation. On an average, age of school children was 16.35±1.75 years in the current study.

Assessment of nutritional status showed that average BMI for the school students was in pre obese category. In the study done by Alswat et al in Taif it was found significant association between obesity and poor academic performance.[14] World health organization states that pre obesity and lack of physical activity is associated with non-communicable diseases in adult and middle age. Obesity and academic performance have robust negative association. Few studies documented decreased cognitive function coupled with loss of abstract reasoning and attention span with increased weight of child.[15]

Parents education was found to be influencing the academic performance of the students and the similar results were obtained in the study done by Alswat et al and Lee et al, so it can be inferred that family environment influences the academic performance of the students.[14,16] Mothers education had more influence on the academic performance of the students when compared with father`s education status. This solidifies the need of female literacy.

With the average BMI of the school children in the current study in the pre-obese category, it was always preferable to give healthy and nutritious diet to the children and parents need to be cautious about fast-food consumption by the school children. In the study it was found that healthy foods like legumes (p=0.0001), cookies (p=0.0001) and milk products (p=0.005) consumption was associated with good academic performance of the students.

In the present study Fast- food consumption was found to be inversely related to the academic performance (p=0.0001). similar results were shown in the study done by Zhang et al.[17] Increased intake of poly unsaturated fatty acids and decreased intake of cholesterol were associated with good academic performance. Increased consumption of fast foods in the tender adolescent age may lead to obesity and non-communicable diseases in adult age.

Fruits, vegetables and juices were not found to be associated with performance however in the study done in Gaza fruits and vegetables consumption was significantly associated with academic performance.[18]

Upon clinical examination of the students it was found that approximately 30% are obese and 15% are undernourished. similar results were noted in the study done by Hazmi et al.[19] In this study it was found that occurrence of obesity is increasing by age. As it is a known fact that obesity at an earlier age may predispose to non- communicable diseases, it is always advisable to restrict the consumption of fast foods, sweetened beverages, oil rich foods etc. Proper training for the students regarding the physical activity is a pressing need now in the kingdom. However, in the current study undernourishment was also found to a considerable percentage of 15%.

Approximately one third of the sample size witnessed dental problems including yellowing of teeth and dental caries. Foods and drinks with a pH below 5.0-5.7 (acidic) known to trigger dental erosion effects. Low calcium and fluoride ion concentration with low pH indicate high erosive potential.[20] To avoid dental caries dietary restrictions are required.

Limitations of the study

The study was done in the limited sample so generalization of the results may not be possible. The study was done in male school going children only as the investigators (male) were not allowed in to girl schools.

CONCLUSION

Average BMI for the school students is in the category of pre-obese and fast food consumption also was found to be high in the adolescents. The most successful schoolchildren were those who consumed more fruits and vegetables and more milk and dairy products. Parent`s education seems to be influencing education. Quality food is lacking in the diet of children affecting the academic performance. So proper awareness is required for the guardians regarding the diet of the children.

Recommendations

Baseline assessment of nutrition in the schools should be made mandatory. Every school have to be informed to develop a food and nutrition policy. Awareness of good and bad nutrition need to be given to the students.

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