WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Relationship between Nutritional Status, Academic Achievement and IQ Test of Undergraduate Medical Students at Benghazi University, Benghazi, Libya

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ABSTRACT:

Background: Intelligence is a skill to perceive meaningful relationships between things that includes perceiving, knowing, reasoning and remembering. The mechanism by which health and nutrition affect educational attainment is still unknown, but poor health and malnutrition in early life may affect cognitive abilities, necessary for learning process and consequently educational achievement. The study was done to know the relationship between nutritional status and academic achievement and IQ of the student at medical faculties of Benghazi University.

Methods: A cross sectional study done on 275 medical students using structured questionnaire derived from I Q test.com. and advanced I Q test. Data collection and appropriate statistical test were applied considering p value ≤ 0.05 as significant.

Results: Most of the students form medical faculty branches had mean IQ score low average (12.2). The IQ was examined between male and female and found that, male have higher IQ score than female (P< 0.05). Furthermore, Academic achievement have shown had positive relationship with IQ. Food pattern of the student revealed lack of midmorning snacks and IQ scores have been increased with consumption of certain foods. Although obese students shown higher IQ score than non-obese. There was relationship between time spent for study at home and IQ scores (P< 0.05).

Conclusion: IQ score has positive relationship with certain food consumption and also with increased body weight (obesity).This result has important implications for education, particularly with respect to nutritional status and intervention.

Key words: IQ; BMI; food intake; food pattern; WHR.

Introduction

Intelligence is a skill to perceive meaningful relationships between things that includes perceiving, knowing, reasoning and remembering (1).
Working memory, is linked to a range of cognitive activities from reasoning tasks to verbal comprehension (2). Working memory alsoconsists of multiple components whose coordinated activity is liable for the temporary storage and manipulation of information (3). Furthermore, individual differences in the capacity of working memory have important consequences for children's ability to acquire knowledge and new skills (4).
There is strong links between working memory and learning (5), However, opposing positions concerning the theoretical relationship between working memory and IQ. An alternative justification is that working memory shares psychometric properties with IQ (6).
The development of the community depends largely on the quality of education of such population (7). It has been suggested that health is an important factor for academic achievement at school and in higher education (8). Therefore, in the context of universities encouraging the health and well-being of all members means promoting effective learning (9). Long term imbalance in nutritional status and malnutrition experienced during childhoodled to retards mental development, and reduces motivation and energy level, causing a decline of educational attainments and delay learning outcomes (12).
The mechanism by which health and nutrition affect educational attainment is still unknown, but poor health and malnutrition in early life may affect cognitive abilities, necessary for learning process and consequently educational achievement(13). There are a numbers of studies have been points correlation between poor nutrition and lowered school performance. For instances, Iron deficiency has been linked to the students poor concentration and has also been shown low scores on a concentration test corresponded with lowered levels of iron in the bodies of the subjects (14,15). Zinc as well was the another nutrient that had a role with cognition, specifically with memory and scientists have found that volunteers' decreased their abilities to

remember everyday words significantly only after three weeks of a low-zinc diet (16,17). Furthermore, lack of protein, led to poor school performance (18).

In A cross sectional study done on medical students using structured questionnaire derived from I Q test.com. found that most of the medical students had near average intelligence (88.3%) and students with near average IQ work hard and their academic performance was similar to students with higher IQ (19). Conduct of the this research could provide new insight toward IQ of the students and possible trigger factors such as nutrition, diet, sleeping and time spent for studies. The aim of the present study was to investigate the relationship betweennutrition status, academic performance and IQ test.

Materials and methods

Study design:

This is a cross sectional study done in faculties of medicine at Benghazi university which comprise 5 faculties include medicine, dental, pharmacy, public health and medical technology from beginning of January 2020 to end of March 2020. A total number of students enrolled in the study was 275 in which 38 male and 237 female aged 18-26 year. All the students from first to fourth year were included.

Study tool:

All the selected students were informed about the purpose of study and verbal consent was taken. A structured questionnaire derived from the I Q test.com (20) and from advanced IQ test (21), with other semi-structured questionnaire about personal profile and study profile was and food intake, anthropometric measurements and students complication . First of all questionnaire of personal profile was administered which was to be completed in 10 minutes. After this IQ test questionnaire was administered and time taken by each individual to complete this questionnaire was recorded. The scoring of IQ level is given below (20):

Scores between: Rating

27–30 Very highly exceptional
24–26 High expert
21–23 Expert
19–20 Very high average
17–18 High average
13–16 Middle average
10–12 Low average
6–9 Borderline low
3–5 Low
0–2 Very low

Measurements of nutrition status

Include anthropometric measurements and assessing food intake.

1-Waist circumference (WC):

WC measure the abdominal circumference passing through the umbilicus as viewedfrom the front in nearest centimeter. Waist circumference (WC) was measured with a flexible but inextensible measure tape to nearest 0.1cm. The WHO classification WC as following (Normal: WC<94 for male or WC<80 for females,Android Obesity: WC ≥ 94 for males or WC ≥ 80 for females) (22).

2-Waist-hip ratio (WHR):

The hip circumference (HC) was measuredto the nearest 0.1 cm, using a flexible but inextensible measuring tape by using the point of greatest circumference aroundthe hips and the WC as described above. The WHO classification for WHR as following (Normal: WHR<0.9 for male or WHR<0.8for females, Android Obesity: WHR ≥ 0.9 for males or WHR ≥ 0.8 for females) (22).

3-BMI:

Weight and height were measured after completion of the questionnaires and hand in by two investigators. Height was measured to the nearest 0.1 cm using standard calibrated scale attached to the balance against a wall. Weight was measured to the nearest 0.2 kg using weighing machine. All measurements were collected with participants in either thin socks or barefoot and with heavy clothing items taken away. Body mass index (BMI) was computed as weight in kilograms divided by the square of height in meters and categorized according to the World Health organization (18). BMI between 18.5 and 24.9 is considered normal, between 25.0 and 29.9 is overweight, and 30.0 or above is obese. Morbid obesity is defined as being 100 % over the ideal body weight or having a body mass index (BMI) > 40Kg/m2 (22).

4-Food pattern and Dietary history

Food intake was recorded by short form food frequency questionnaires. Food frequency questionnaire, have had modified and specified in short form include major food stuff intake which will indicate dietary pattern of the subjects. Modified short form of food frequency questionnaire (MFFQ)

analyzed accordingly food intake daily weekly and monthly and etc.

Statistical analysis

The data were analyzed using SPSS. Continuous variables are summarized using number (frequency), mean, and standard deviation while categorical variables are summarized using frequency and percentage. Means were compared across groups using ANOVA, liner regression was also used and proportions were compared with Chi-square test and considered a significant at $\alpha \leq 0.05$.

Results

The study was done on 275 students from medical faculties branches in which 38 (13.8%) male and 237 (86.2 %) female and male to female ratio was 1: 6 (Table 1). The mean age of the subjects was 22.3 years in which the highest ages presented in the study was between 21-23 (49.1%) (Table 2).

Table 1: Gender distribution of the students:

		N	N %
gender	male	38	13.8%
	female	237	86.2%
	Total	275	100.0%

Table 2: Age distribution of the students:

		N	N %
age categories	18-20	77	28.0%
	21-23	135	49.1%
	≥ 24	63	22.9%
	Total	275	100.0%

The faculty of medicine at Benghazi University consist of five faculties include medicine, dentistry, pharmacy, public health and medical technology. More students participant in the study was from public health (31%) followed by students from medicine faculty (20.7%) whereas the other faculties presented less number as the following 17.1 %, 16. 7% and 14.5% for dentistry, pharmacy and medical technology respectively (Table 3). In further analysis of medical faculties found that more students were derived from first and fourth class 36% and 32% respectively while the second being the least students (10.2%) (Table 3).

Table 3: Branches of faculty of medicine:

		N	N %
faculty	medicine	57	20.7%
	dentistry	47	17.1%
	pharmacy	46	16.7%
	public health	85	30.9%
	medical technology	40	14.5%
	Total	275	100.0%
year	first	99	36.0%
	second	28	10.2%
	third	60	21.8%
	fourth	88	32.0%
	Total	275	100.0%

In regarding students activities that presented in table 4, approximately 45% of the students were spent 4-6 hours for studies followed by those study in period of 1-3 hours (40.4%), less time reported for the study those less than 1 hour (2.2%) and more than 10 hours daily (2.5%). Furthermore, sleeping

hours significantly reported among the students were between 4-6 hours (48%) followed by 6-10 hours (36.7%) less time for sleeping reported less than 1 hour 0.4 % and more than 10 hours 4.4% sleeping hours (Table 4). I reading working of students, majority of the students did not involve in daily work (77.5%) (Table 4).

Table 4: Students activities

		N	N %	P values
Studyhours/ day	<1 hour	6	2.2%	
	1-3 hours	111	40.4%	
	4-6 hours	123	44.8%	
	6-10 hours	28	10.2%	
	>10 hours	7	2.5%	
	Total	275	100.0%	
Sleepinghours	<1 hours	1	0.4%	
	1-3 hours	29	10.5%	
	4-6 hours	132	48.0%	0.048
	6-10 hours	101	36.7%	
	>10 hours	12	4.4%	
	Total	275	100.0%	
working	yes	62	22.5%	
	no	213	77.5%	
	Total	275	100.0%	

Chi-square test was performed between groups at $\alpha < 0.05$ which considered significant.

In the table 5, the mean ± SD of body weight of the students were 59.64 kg ± 11. The overall BMI shown student fall in normal or health body weight. Furthermore, waist and waist hip circumferences found in normal ranges 71.72 cm and 0.78% cm respectively. BMI, WHR classification shown that approximately 70% and 51% of the students have normal body weight and waist hip ratio. Obesity and underweight both were represent by 4.7% and 8.4 % respectively. Students who At risk of waist hip ratio have presented by 11.3% (Table 5).

Table 5: anthropometric measurements of the students:

		Mean ±SD	N	N %
weight		59.64± 11		
BMIvalue		22.62± 3.75		
waist		71.72± 11		
WaistHipRatio		.78± 0.09		
BMIclass	under weight		23	8.4%
	normal		191	69.5%
	overweight		48	17.5%
	obese		13	4.7%
	Total		275	100.0%
waistHipClass	excellent		140	50.9%
	good		58	21.1%
	average		46	16.7%
	at risk		31	11.3%
	Total		275	100.0%

All signs , symptoms and complication reported by the students did not show statistically differences and only slightly increased number of the students reported of vitamin D deficiency 50.5% (Not significant) (Table 6).

Table 6: sign , symptoms and complication reported by the students:

		N	N %
VitaminDdeficiency	yes	139	50.5%
	no	136	49.5%
	Total	275	100.0%
CalciumDeficiency	yes	37	13.5%
	no	238	86.5%
	Total	275	100.0%
Anemia	yes	60	21.8%
	no	215	78.2%
	Total	275	100.0%
Thyroid disease	yes	4	1.5%
	no	271	98.5%
	Total	275	100.0%
CVD	yes	3	1.1%
	no	272	98.9%
	Total	275	100.0%
HT	yes	8	2.9%
	no	267	97.1%
	Total	275	100.0%
DM	yes	3	1.1%
	no	272	98.9%
	Total	275	100.0%
CNS Problems	yes	18	6.5%
	no	257	93.5%
	Total	275	100.0%
Rheumatoid	yes	0	0.0%
	no	275	100.0%
	Total	275	100.0%
Arthritis	yes	8	2.9%
	no	267	97.1%
	Total	275	100.0%
KidneyDisease	yes	2	0.7%
	no	273	99.3%
	Total	275	100.0%
GITdisease	yes	30	10.9%
	no	245	89.1%
	Total	275	100.0%

On application of IQ test 81 (29.5%) of students had low average IQ, 63 (22.9%) students had middle average IQ and only 1 (0.4%) had above average/high experts / very high exceptional IQ (Table 7). The academic performance of students during the study period from premedical to the third year found between 10-14 which was below high average IQ among all (Table 8). The academic performance had no differences in the mean IQ scores but significant differences in grade withliner regression ($P< 0.05$) in which high average or very high average among all.(Table 8).

Table 7: I Q scores and classes:

		Mean ± SD	N	N %
IQscores		12.20± 4		
IQclass	very highly exceptional		1	0.4%
	high expert		1	0.4%
	expert		6	2.2%
	very high average		20	7.3%
	high average		27	9.8%
	middle average		63	22.9%
	low average		81	29.5%
	breadline low		50	18.2%
	low		22	8.0%
	very low		4	1.5%
	Total		275	100.0%

Table 8: Academic performance of the student and IQ scores:

University grades		IQscores Mean± SD	R	P values
premedical	Grade (excellent)	18.60± 4	0.123	0.023
Firstyear	Grade (excellent)	18.20± 2	0.172	0.004
Secondyear	Grade (excellent)	19.20±3	0.24	0.000
Thirdyear	Grade (Pass)	15.42±2	0.166	0.005

Liner regression test has been performed.

Further investigation of food intake pattern, found that, all students consumed the three main meals (P< 0.05). In regard to the snacks, significantly lack consumption the midmorning snacks (Yes 42.5% vs No 57.5%) (P< 0.05) and mid night one (P< 0.05) (Yes 39.3 % vs No 60.7%)(Table 9).

Table 9: Food intake pattern:

		N	N %	P values
breakfast	yes	208	75.6%	0.000
	no	67	24.4%	
	Total	275	100.0%	
midmorning	yes	117	42.5%	
	no	158	57.5%	0.013
	Total	275	100.0%	
lunch	yes	250	90.9%	0.000
	no	25	9.1%	
	Total	275	100.0%	
midafternoon	yes	136	49.5%	0.085
	no	139	50.5%	
	Total	275	100.0%	
dinner	yes	231	84.0%	0.000
	no	44	16.0%	
	Total	275	100.0%	
night	yes	108	39.3%	
	no	167	60.7%	0.000
	Total	275	100.0%	

Chi-square test was performed between groups at $\alpha < 0.05$ which considered significant

Meat, eggs vegetable, fruits , bread, milk, cheese , sugar, biscuits, chocolate, coffee, tea, canned fruit juices were consumed on daily regular basis. While other food listed in table 10 either consumed weekly or monthly (Table 10 A-F).

Table 10 A: food frequency questionnaire short form:

		N	N %
meat	never	27	9.8%
	day	158	57.5%
	week	80	29.1%
	month	9	3.3%
	year	1	0.4%
	Total	275	100.0%
fish	never	61	22.2%
	day	4	1.5%
	week	24	8.7%
	month	137	49.8%
	year	49	17.8%
	Total	275	100.0%
egg	never	27	9.8%
	day	155	56.4%
	week	90	32.7%
	month	3	1.1%
	year	0	0.0%
	Total	275	100.0%
vegetables	never	10	3.6%
	day	224	81.5%
	week	39	14.2%
	month	2	0.7%
	year	0	0.0%
	Total	275	100.0%
FreshFruits	never	14	5.1%
	day	151	54.9%
	week	99	36.0%
	month	11	4.0%
	year	0	0.0%
	Total	275	100.0%

Table 10 B: food frequency questionnaire short form

		N	N %
lentils	never	60	21.8%
	day	19	6.9%
	week	121	44.0%
	month	71	25.8%
	year	4	1.5%
	Total	275	100.0%
peas	never	102	37.1%
	day	18	6.5%
	week	73	26.5%
	month	76	27.6%
	year	6	2.2%
	Total	275	100.0%
beans	never	44	16.0%
	day	26	9.5%
	week	132	48.0%
	month	73	26.5%
	year	0	0.0%
	Total	275	100.0%
bread	never	10	3.6%
	day	258	93.8%
	week	4	1.5%
	month	3	1.1%
	year	0	0.0%
	Total	275	100.0%
rice	never	13	4.7%
	day	63	22.9%
	week	189	68.7%
	month	10	3.6%
	year	0	0.0%
	Total	275	100.0%
pasta	never	33	12.0%
	day	60	21.8%
	week	176	64.0%
	month	5	1.8%
	year	1	0.4%
	Total	275	100.0%

Table 10 C: food frequency questionnaire short form

		N	N %
potatoes	never	7	2.5%
	day	70	25.5%
	week	187	68.0%
	month	11	4.0%
	year	0	0.0%
	Total	275	100.0%
milk	never	43	15.6%
	day	195	70.9%
	week	33	12.0%
	month	4	1.5%
	year	0	0.0%
	Total	275	100.0%
yogurt	never	59	21.5%
	day	87	31.6%
	week	108	39.3%
	month	21	7.6%
	year	0	0.0%
	Total	275	100.0%
cheese	never	26	9.5%
	day	175	63.6%
	week	73	26.5%
	month	1	0.4%
	year	0	0.0%
	Total	275	100.0%
Oliveoil	never	129	46.9%
	day	55	20.0%
	week	59	21.5%
	month	30	10.9%
	year	2	0.7%
	Total	275	100.0%

Table 10 D: food frequency questionnaire short form

		N	N%
butter	never	107	38.9%
	day	27	9.8%
	week	87	31.6%
	month	52	18.9%
	year	2	0.7%
	Total	275	100.0%
mayonnaise	never	96	34.9%
	day	29	10.5%
	week	89	32.4%
	month	52	18.9%
	year	9	3.3%
	Total	275	100.0%
sugar	never	47	17.1%
	day	218	79.3%
	week	9	3.3%
	month	1	0.4%
	year	0	0.0%
	Total	275	100.0%
chocolate	never	14	5.1%
	day	155	56.4%
	week	96	34.9%
	month	9	3.3%
	year	1	0.4%
	Total	275	100.0%
cakes	never	27	9.8%
	day	97	35.3%
	week	137	49.8%
	month	14	5.1%
	year	0	0.0%
	Total	275	100.0%

Table 10 E: food frequency questionnaire short form

		N	N %
biscuits	never	21	7.6%
	day	134	48.7%
	week	111	40.4%
	month	9	3.3%
	year	0	0.0%
	Total	275	100.0%
water	never	2	0.7%
	day	273	99.3%
	week	0	0.0%
	month	0	0.0%
	year	0	0.0%
	Total	275	100.0%
coffee	never	53	19.3%
	day	187	68.0%
	week	29	10.5%
	month	6	2.2%
	year	0	0.0%
	Total	275	100.0%
tea	never	73	26.5%
	day	145	52.7%
	week	46	16.7%
	month	10	3.6%
	year	1	0.4%
	Total	275	100.0%

Table 10 F: food frequency questionnaire short form

		N	N %
Canned fruits juices	never	43	15.6%
	day	138	50.2%
	week	80	29.1%
	month	13	4.7%
	year	1	0.4%
	Total	275	100.0%
Fresh fruits juices	never	30	10.9%
	day	53	19.3%
	week	151	54.9%
	month	39	14.2%
	year	2	0.7%
	Total	275	100.0%
Soft drinks	never	74	26.9%
	day	56	20.4%
	week	116	42.2%
	month	27	9.8%
	day	2	0.7%
	Total	275	100.0%

The IQ level of male and female students was significant difference (P< 0.05) in which male has higher ID score than female. (Table 11).

Table 11:IQ scores and gender distribution:

		IQscores	
		Mean± SD	P values
gender	male	14.27± 4 (middle averages)	0.004
	female	11.86± 4.8 low averages	

T test was performed among the groups and considered significant at $\alpha < 0.05$.

The relation of between IQ and anthropometric measurement presented in table 12. Found that with increased body mass index IQ score increased (P< 0.05), while there is no difference in IQ and waist hip ratio (Table 12).

Table 12: IQ scores and anthropometric measurements:

		IQscores	
		Mean± SD	P values
BMIclass	under weight	11.16±4	
	normal	12.30±5	
	overweight	11.94±4	
	obese	13.50±3.4	0.03
WaistHipClass	expellant	12.45±5.09	
	good	11.59±4	
	average	12.88±4.6	
	at risk	11.18±4.22	

ANOVA test has been used for statistically differences between groups at $\alpha < 0.05$

Increased IQ score with some foods consumed yearly such as fish , pasta, oliveoil. In addition increased IQ score for monthly consumption of egg, vegetable. Particularly consumption of cheese monthly led to shift IQ score to high averages (> 16 score) and consumption tea yearly result in IQ score shift to 23 which is considered experts (Table 13 A -.F).

Table 13 A:IQ scores and types of food intake:

		IQscores	
		Mean ± SD	P values
meat	never	12.13±5	
	day	12.12±4	
	week	12.56±4.5	
	month	11.07±4.24	
	year	8.00±1	
fish	never	11.14±5.1	
	day	9.80±4.4	
	week	10.90±4.14	
	month	12.27±4.5	
	year	14.15±4	
egg	never	10.94±3	
	day	12.07±3	
	week	12.70±2	
	month	15.00±3	0.02
	year	.	.
vegetables	never	10.37±6	
	day	12.15±4	
	week	12.86±4.1	
	month	14.10±2.7	
	year	.	
FreshFruits	never	12.49±3.44	
	day	11.97±3.66	
	week	12.65±4.7	
	month	10.77±2.5	
	year		

ANOVA test has been performed between groups at $\alpha < 0.05$.

Table 13 B. IQ scores and types of food intake:

		IQscores	
		Mean± SD	P values
lentils	never	12.07±6	
	day	12.21±4	
	week	11.88±5	
	month	12.83±6	
	year	12.45±4	
peas	never	12.34±3	
	day	12.22±3.5	
	week	12.15±2.9	
	month	11.95±3.4	
	year	13.43±4	
beans	never	11.32±5	
	day	12.61±4.7	
	week	12.45±3.6	
	month	12.11±2.8	
	year	.	
bread	never	12.96±3	
	day	12.16±4	
	week	12.45±3	
	month	12.83±2	
	year	.	
rice	never	12.40±4	
	day	12.34±5	
	week	12.16±4	
	month	11.84±4	
	year	.	
pasta	never	10.85±4	
	day	12.25±3	
	week	12.48±2	
	month	10.16±3	
	year	14.00±3	

Table 13 C: IQ scores and types of food intake:

		IQscores	
		Mean± SD	P values
potatoes	never	12.99±4.04	
	day	12.05±5.4	
	week	12.19±4.5	
	month	12.65±4.9	
	year	.	
milk	never	11.67±4.01	
	day	12.44±4	
	week	11.50±5.25	
	month	11.80±5.9	
	year	.	
yogurt	never	10.73±4	
	day	11.79±4	
	week	13.22±5	
	month	12.76±3	
	year	.	
cheese	never	11.45±3.7	
	day	12.64±4.5	
	week	11.32±2.7	
	month	17.00±6	0.001
	year	.	
Oliveoil	never	11.72±4	
	day	12.53±3	
	week	12.60±3	
	month	12.71±2	
	year	14.00±1.2	

ANOVA test has been performed between groups at $\alpha < 0.05$.

Table 13 D: IQ scores and types of food intake:

		IQscores	
		Mean± SD	P values
butter	never	11.62±4.8	
	day	13.14±5.6	
	week	11.74±4.44	
	month	13.52±4.7	
	year	15.50±2.2	
mayonnaise	never	12.23±3	
	day	12.14±5	
	week	11.56±4.66	
	month	12.78±4.5	
	year	14.96±4.88	
sugar	never	11.36±5.15	
	day	12.27±4.7	
	week	14.22±4	
	month	18.40±4	
	year	.	
chocolate	never	11.35±5	
	day	12.21±5	
	week	12.42±3	
	month	10.18±4	
	year	18.40±5	
cakes	never	11.81±4	
	day	11.70±4	
	week	12.54±3	
	month	13.01±5	
	year	.	

Table 13 E: IQ scores and types of food intake:

		IQscores	
		Mean± SD	P values
biscuits	never	11.80±5.15	
	day	12.55±4.8	
	week	11.76±4.6	
	month	13.24±5	
	year	.	
water	never	9.20±3	
	day	12.22±4.8	
	week	.	
	month	.	
	year	.	
coffee	never	12.69±4.9	
	day	12.08±5	
	week	12.03±4.55	
	month	12.33±3.22	
	year	.	
tea	never	11.22±4	
	day	12.18±4	
	week	13.21±3	
	month	13.85±3.5	
	year	23.40±2.8	0.000.

ANOVA test has been performed between groups at $\alpha < 0.05$.

Table 13 F: IQ scores and types of food intake:

		IQscores	
		Mean± SD	P values
Canned fruits juices	never	12.23±4.33	
	day	11.91±4.7	
	week	12.82±5.1	
	month	11.77±4.8	
	year	6.00±4	
Fresh fruits juices	never	12.05±3	
	day	11.59±4	
	week	12.04±5	
	month	13.78±4	
	year	11.10±3	
Soft drinks	never	11.88±5	
	day	11.81±5	
	week	12.51±4.87	
	month	12.57±5.3	
	day	11.70±3.9	

The relation between IQ and pattern of food intake shown in the table 14 and no significant differences have been determined in which overall IQ score similar in main daily meals and snacks (low averages IQ).

Table 14: IQ and daily food pattern:

		IQscores
		Mean± SD
breakfast	yes	12.37±4
	no	11.65±3
midmorning	yes	12.07±3.4
	no	12.29±2.9
lunch	yes	12.22±3
	no	11.94±4
midafternoon	yes	12.28±4
	no	12.12±2
dinner	yes	12.54±5
	no	10.40±3.4
night	yes	12.40±3.8
	no	12.06±4.7

There was a relationship between IQ scores and study hours by which increased study hours > 10 hours led to slightly significant increased IQ score from low average to high average score. While sleeping hours and working of the student did not changes IQ scores. (Table 15).

Table 15: IQ and student activities

		IQscores	
		Mean± SD	P values
Studyhours	<1 hour	12.17± 3	
	1-3 hours	12.70±4	
	4-6 hours	11.47±4	
	6-10 hours	13.00±3.2	
	>10 hours	13.77±2	0.04
Sleepinghours	<1 hours	10.20±4	.
	1-3 hours	11.86±5	
	4-6 hours	12.37±4.6	
	6-10 hours	12.34±4.7	
	>10 hours	10.06±5.9	
working	yes	12.26±4.18	
	no	12.18±3.9	

ANOVA test has been performed between groups at $\alpha < 0.05$.

Discussion

IQ scores had been used as predictors of educational outcomes or special needs, by social researchers who study the distribution of IQ scores in populations and the relationships between IQ score and other variables, and as predictors of job performance and income (1, 15,16).

Similarly in this study the food intake academic performance, the anthropometric and time spent on studies by medical students was analyzed in association with their IQ.

In the study all the students (medical faculties students) had an mean IQ / intelligence interval about 12.20 which was low average. This value was different from other studies (1, 19) in which their finding indicated that medical students have higher IQ than that in the present study.A retrospective review referred to medical infraction carried out by William et al in which IQ test preformed in medical students was found to be average. The study also mentioned declining in the intellectual capacity of the entering medical student (23) . Other studies have suggested that the mean I.Q. of individuals with medical degrees is 125 (24, 25), in our study most of the students had IQ in between 12 to 14 i.e. low average and middle average IQ. The possible explanation for this could be types of questions in IQ test and also score itself.

Academic performance of the students have positive regression in which high grade shown have high average score.

There was a significant gender difference by which male shown have higher IQ score than female and this was disagree with study conducted by

Santanu et al (26) in which Santanu in his work found that no statistical differences in IQ between male and female.
Nutritional status of the students have been investigated by anthropometric measurements and food intake.
The net of body mass index found that students were located at normal body mass index (22.6 kg/m2).Similarly in study by Yesikaret al (19), and Ghosh et al (26). Further classification of body mass index shown that 70% of the student have normal body weight, 8.4% underweight and 4.7% obese. The result of our study inconsistent with the previous work (27). However, the present study found that mean of WC and WHR were normal and this finding disagree with work of Yesikar et al et al (19) Thaana et al (28)in which high WC and WHR have been determined.
The food intakeof the students revealed that midmorning snack was missing in here the time spent of the student at the university ranging between 4-7 hours in which this snack considered to be very essential to the student (1, 28). One of the reason could answer why students have had low IQ score. In addition, the food consumption were noticed have had intake regularly all types of food stuffs on daily basis this also reported by Yesikar et al (19) but the difference in here some food less consumed. Some foods have been identified increase IQ score which include consumption of cheese monthly led to shift IQ score to high averages (> 16 score) and consumption tea yearly result in IQ score shift to 23 which is considered experts and this is new finding postulated in our study.
The regular time for students spent for study at university between 5-7 hrs. The relationship between IQ score and studying hours in which longer time spent for study at home led to increased IQ. This also found by Yesikar(19, 27) but the increment slightly less (after 6 hours study). The overall grades of the student found positive with IQ score.
In conclusion, IQ scores have affected by certain types of foods and with increase body weight. This data suggested that, academic performance might altered by types of food intakes. One of the limitations was lack of resources. The test applied on students was only an indicator of IQ, examination and testing which would have yielded more definitive results. There were chances of recall bias by subjects regarding past information. Number of study hours on a daily basis; regularity in the classes were taken from the students response only. This study also need to be validated in large sample sizes. Because of low score of IQ test, its highly recommended that student should be advice to increased consumption of particular foods that enhance the cognitive.

Conclusion

The present study revealed that food patterns did not influences the IQ score rather type of food intakes by certain foods have found strongly shift the IQ from low averages to experts these include monthly consumption of cheese and tea. Obese students had have higher IQ score than non-obese. Furthermore, midmorning snack was commonly missing among the students. Our result also demonstrated that the net mean of IQ score of the students were low average. Our result also revealed that male has higher IQ than female. All of these data suggested that nutrition and foods patterns might improve IQ scores.

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