The effects of dietary habits on Iranian students-school performance, a pilot cross-sectional study

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Abstract

Objective: To determine whether dietary habits in Iranian secondary school students have any effect on an individual's performance in school.
Methods: The observational, cross-sectional study was conducted in Tehran during the 2010-11 academic year. Standardised Graduate Point Average was used as school performance. A validated nationalised nutritional questionnaire, designed by an expert committee, was filled by each student. Data was analysed using SPSS 16.
Results: The age of the 96 male high school students ranged betweeen 16 and 17 years, with the mean of16.65±0.3 years. Of the total, 50 (52.1%) students had negative and 46 (47.9%) had positive standardised GPA. The average score of the questionnaire for the students in the positive group was significantly higher than the others (26.3 vs. 21.04) ($p<0.05$).
Conclusions: Poor school performance in Iranian secondary school students was in relation with poor dietary habits.
Keywords: Dietary habits, School performance, Students, Health. (JPMA 64: 20; 2014).

Introduction

Dietary habits can be defined simply as a regular food pattern which an individual often follows. It includes unique eating patterns for breakfast, lunch and dinner separately. Researches on the relationship between dietary habits and school performance have mainly focussed on breakfast and its influence on school health. But there are some other fields related to this topic, such as the effects of insufficient food intake, the effects of micronutrients like omega-3 fatty acid or iodine or zinc on learning and memory and the effects of anaemia and iron deficiency on learning.
According to earlier studies, omitting breakfast can affect children's appetite ratings, but not their energy intake at subsequent meals.[1] Children who do not eat breakfast have lower grades in mathematics, shorter attention spans and worse school performance.[2-4] Recent studies show that long-term zinc or iron supplementation cannot make significant differences in mental health outcomes like cognitive function, learning and memory.[5,6] Recent researches also demonstrated that prenatal omega-3 fatty acid intake affects child's memory function at school age.[7] On the other hand, a randomised clinical trial showed that using these micronutrients together can improve verbal learning and memory.[8]
Insufficient daily intake of protein sources such as meat, fish, eggs and dairy products or long-term starvation is positively associated with problems in children's school performance.[9-12] Students with iron deficiency anaemia can have poorer learning outcomes, especially in mathematics.[13-15]
As can be understood, almost all of the studies mentioned above have focussed only on extreme nutritional deficiencies, and few research studies have examined the effects of overall dietary habits on school performance.
In 2010 we conducted a cross-sectional survey of high school students and tried to measure the effects of dietary habits on school performance using a scoring system of an appropriate food questionnaire in the field of food meals, eating junk foods, eating fruits and using supplemental nutrients. Since the Iranian nutritional patterns and dietary habits are affected by cultural and religious issues, it was

difficult for the authors to use any global questionnaire to evaluate the dietary habits. The pilot study, as such, was designed to develop a nationalised dietary questionnaire by the expert committee. A more comprehensive investigation will be designed and run on the basis of findings of this pilot study.

Patients and Methods

The pilot cross-sectional study was conducted in Tehran during the 2010-2011 academic year, and involved all the male students 16 to 17 years of age studying at a high school. These teenagers were matched socioeconomically and medical records were checked to screen out those with any serious health issue. No such issue, however, was found.

In order to investigate students' dietary habits, the expert committee was established to design a nationalised nutritional questionnaire under the supervision of the Endocrinology and Metabolism Research Centre (EMRC) to evaluate Iranian Students' Dietary Habits (ISDH). The committee included a psychologist, nutrition dietitian, family medicine professional, a statistician and a school manager. The group evaluated worldwide nutritional questionnaires and designed a nationalised questionnaire to clarify the pattern of dietary habits in students in Iran. The validity of the questionnaire was approved by the committee for using in Iranian culture.

The data about dietary habits were collected through the questionnaire in the field of food meals, eating junk foods, eating fruits and using supplemental nutrients. The questionnaire included 30 phrases in which some are related to "good" and some are about "bad" dietary habits. The subjects were requested to score each phrase according to how much a phrase is compatible with their conditions. If a phrase was "always" true about his dietary habits, it was scored 4. If it was "Usually" true, it was scored 3. If it was true "to some extent", it was scored 2, and if a phrase was NOT true about his dietary habits, it was scored 1.

Each phrase was scored in the range of -2 to +2 according to the quality of habit which was good or bad and the mark assigned by the students. For example, if a phrase was a good habit and was scored 4 by the teenager, it was marked +2. If a phrase was a bad habit and scored 4, it was marked -2. The sum of the scores from all the phrases was considered as the final score which was in the range of -60 to +60.

For the assessment of each student's school performance, at first the Grade Point Average (GPA) of current semester for each student was calculated. The GPAs were standardised and students were divided into positive and negative groups according to these standardised GPAs.

The project was approved by the Ethical Board Committee of the Endocrinology and Metabolism Research Institute in accordance with Helsinki Declaration and the guidelines of the Iranian Ministry of Health and Medical Education. All the students voluntarily agreed to participate in the study and signed an informed consent form.

The data collected from observations and examinations were analysed using SPSS v 16.0 and statistical comparisons of mean scores were performed using non-parametric tests.

Results

The age of the 69 boys ranged between 16 and 17 years, with a mean of 16.65±0.3 years (Table-1).

Table-1: Demographic characteristics.

Index	Rate
Number of students	96
Mean age of students	16.65±0.3
Time spent in school (Hours per day)	8.5±0.17
Time spent in school (Hours per week)	51±1.02
Average family income (USD per month)	2080.4±108.6

The average time spent in school was 8.5±0.17 per day for the students.
The average standardised GPAs in all students was 0.472±1.01 and ranged from -2.45 to 2.71.

Table-2: Descriptive data of Questionnaire and Standardized GPA.

	Total score	Score in food meals	Score in eating junk foods	Score in eating fruits	Score in using supplemental nutrients	Standardised GPA of students
Average	23.5670	7.6495	8.2268	0.8763	5.6701	-0.0472
Standard Deviation	9.67590	5.50386	4.81859	3.25723	0.81294	1.01387
Range	47.00	31.00	24.00	16.00	4.00	5.16
Minimum	-1.00	-10.00	-7.00	-8.00	2.00	-2.45
Maximum	46.00	21.00	17.00	8.00	6.00	2.71

(Table-2). Fifty (52.1%) students had negative standardised GPA and 46 (47.9%) had positive standardized GPA (Table-3).

Table-3: comparison of scores between positive and negative Standardised GPA group.

	Group according to Standardized GPA of	Sample Size	Mean	Standard Deviation	P value
Total score of the Questionnaire	1*	50	21.0400	8.77371	0.007
	2**	46	26.3478	10.04261	
score of the Questionnaire in food meals	1	50	6.7400	6.01295	0.065
	2	46	8.8043	4.65532	
score of the Questionnaire in eating junk foods	1	50	7.4000	4.57589	0.084
	2	46	9.1087	5.01654	
score of the Questionnaire in eating fruits	1	50	.3200	2.93772	0.112
	2	46	1.3696	3.47281	
score of the Questionnaire in using supplemental nutrients		1	50	5.6000	.83299
	0.047				
	2	46	5.7391	.80097	

*Students with negative Standardized GPAs
**Students with positive Standardized GPAs
GPA: Grade Point Average.

ISDH questionare consisted of 17 phrases about food meals; 8 related to eating junk foods, 3 related to

eating fruits and 2 phrases were about using supplemental nutrients.
The score of the questionare ranged from -1 to 46 with an overall mean score of 23.57±9.6 for both the groups.
The average score of the questionnaire for the students in positive group was significantly higher than the negative group (26.3±10.04 vs. 21.04±8.77) ($p<0.05$).
Alsough the questionnaire score of each field of dietary habits in the positive group was higher than the other group, no significant differences were found in separate fields between the groups.

Discussion

Our results showed that students who had good dietary habits had better school performance. According to the questionnaire used in this study, the total score gained by positive group was significantly higher than the other students. Although some differences were seen in scores of each field separately between the two groups, but the differences were not statistically significant. It suggests that there is a close relationship between quality of dietary habits and school performance. In other words, the lower the quality of dietary habits, the higher the risk for poor school performance. School performance can be affected by many factors, including gender, ethnicity, nutrition, child health, quality of school, school experience and socioeconomic factors.[16] In this study we tried to adjust all confounding factors known to us.
Previous studies showed that nutritional deficiencies can affect school performance. Some authors have focussed on single nutrients such as zinc, iodine etc in this regard.[17,18] Also the effect of multiple nutrients on learning and memory is the main concern in some investigations.[8] Undernourished children have decreased attention, school attendance and a lower level of academic performance compared to well-nourished children.[19,20] It can be due to the effects of undernourishment on cognition and behaviour which is still an interesting research field in clinical nutrition.[21]
As a new step for a comprehensive attitude to dietary habits, many studies have examined the effects of breakfast on cognition and school performance and revealed that fasting had a negative effect on work memory capacity and visual perception.[20,22,23] As breakfast is only one section of human daily dietary habits, recent studies have tried to consider overall dietary habits as a probable factor affecting cognition and school performance. A study which is not restricted to breakfast showed that there is a positive association between dietary behaviours and school performance.[24] A recent investigation showed that there is an independent relationship between overall diet quality and academic performance.[25] Another research in Taiwan showed that poor overall school performance may be explained by students' unhealthy eating patterns.[26]
According to above mentioned studies, it could be concluded that overall daily nutritional habits can affect students' school performance. Our results are now another considerable body of evidence in support of this hypothesis.

Conclusion

The pilot study in one high school demonstrated that poor school performance in Iranian secondary school students was related to poor quality of dietary habits. School programmes which train children in order to have healthy eating can help them to improve their learning and memory function and of course develop their exceptional talents. Since the participants in this research were in the same socioeconomic level and same school setting, hence complementary studies are needed in this field according to the results of this pilot study in order to investigate the relation between dietary habits and school performance in students in other social and cultural patterns.

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