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Investigating the relationship between eating habits with memory status and anthropometric indices of students

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ABSTRACT

Memory has an important role in human life, and any reduction causes many problems, and increasing it improves the quality of life. Research has shown that dietary intake is an important factor in brain function and development which might affect the level of memory. The aim of this study was to investigate the relationship between eating habits and memory status and anthropometric indices of local and non-local students of Islamic Azad University, Science and Research Branch of Tehran. In this descriptive cross-sectional study, 190 students, 97 boys and 93 girls (134 local and 56 non-local) 18 to 50 years old from the Science and Research Branch of Islamic Azad University were chosen randomly. The required data were collected by a general information questionnaire and memory was collected using Kim Karad Memory Questionnaire. Eating habits were also assessed using the IAUFHQ-82 questionnaire. Data were analyzed using SPSS software. Based on the present study no significant relationship was found between eating habits and memory status and body mass index. Furthermore, no significant difference was observed between the eating habits of local and non-local students. Surprisingly no insignificant relationship was observed between eating habits and memory status and body mass index; hence, it is necessary to conduct further studies with a large-scale sample size.

1. Introduction

Memory is a type of mental activity that allows a person to maintain and retrieve various types of sensory perceptions such as pleasure, pain, desire, feeling, thought, and judgment in their mind (1). Memory consists of three steps: encryption (memory storage), storage (memory retention), and recovery (memory recall). In the most common scientific grouping, memory can be divided into three parts: sensory memory, short-term memory, and long-term memory. For both short-term and long-term memory, there are three stages encryption, storage, and retrieval (2). Memory plays an important role in human life, and its reduction causes many problems that affect different aspects of a person's life. Therefore, it is very important to find the factors that can increase memory in some way (3). One of the factors that have been discussed for a long time is the role of people's eating habits on memory. Research

has shown that dietary status, including dietary patterns and types of foods consumed, are very important factors affecting brain function and, consequently, the level of memory (4, 5). The results of studies indicate that healthy nutrition is one of the most important and the most basic ways to achieve physical health and promote mental health (6). In addition, it has been shown that the lack of some foods in our dietary intake can also reduce memory (7). Unfortunately, many students especially those who are not living with their family or studying in non-local universities have many wrong habits including bad dietary habits. They may also experience various forms of mental disorders due to special circumstances, such as distance from family, career prospects, taking various exams, competing among peers for academic success, sexual problems, and personal expectations (8, 9). According to studies, this can cause changes in students' appetite, nutritional performance, and memory. Therefore, to establish a healthy,

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dynamic, and active society, this group must have a healthy eating pattern. Based on domestic and foreign database sources suggests that there are few studies on the relationship between eating habits and memory function and anthropometric indices, and a comprehensive study that considers all of these factors concurrently in the group. Considering the importance of the studentship period and this age group in the growth and prosperity of countries, the purpose of this study was to investigate the relationship between eating habits and memory function and anthropometric indices in students to examine and identify nutritional factors that lead to memory loss.

2. Materials and methods

2.1. Study design and participants

A descriptive-analytical cross-sectional study was performed on students of the Science and Research Branch of the Islamic Azad University of Tehran. Initially, 190 students aged 18 to 50 years old in the Islamic Azad University, Science and Research Branch, who wished to participate in the project, were selected by simple random sampling method. Of these, 97 were boys and 94 were girls who were divided into two groups based on their housing status (134 local and 56 non-local). To prevent the effect of contextual variables such as age, sex, year of study, field, and degree, the students were divided into two main groups, and both subgroups were matched as similarly as possible to prevent statistical differences. All the required data including questionnaires were collected by the research team members.

2.2. Measures

After a full explanation of the research objectives and obtaining informed consent, height and weight were measured directly. Weight and height were measured using the Seca 703 column scale (Hamburg, Germany) and body mass index was calculated using its formula (10). General information about individuals including age, gender, educational level, and local or non-local was collected through a general questionnaire through interviews. The IAUFHQ-82 questionnaire, which is an Iranian-validated tool with an 82-item, Likert-type

questionnaire, was used to assess eating habits. Cronbach's alpha score of this questionnaire is 0.78, which indicates the appropriate validity of this questionnaire (11). Kim Karad's visual questionnaire, which has been validated in Iran, was used to assess memory status. This test measures memory in three stages: short-term memory (immediate), medium-term memory (complete), and long-term memory (memory accuracy) (12).

2.3. Statistics

Statistical analysis was performed using IBM SPSS Statistics (SPSS Inc., USA). Kolmogorov-Smirnov test and histogram curve were used to evaluate the normality of the variables and the chi-square test was used to determine the relationship between qualitatively independent variables. Values less than 0.05 were considered significant.

2.4. Ethic of study

The present study met the ethical criteria of SRBIAU and was approved under the code IAU.1398.10.7 at the Department of Nutrition of the Faculty of Medical Science and Technology of SRBIAU.

3. Results

According to Table 1, no significant differences were observed in any of the variables of weight, height, and body mass index in local and non-local subgroups by gender, as well as all local and non-local students. Although mean weight, height, and body mass index were more significant in boys than girls (p<0.05). As shown in Table 2, the average score of eating habits in local and non-local students by gender and total of students was not significantly different and this difference was not statistically significant. Only local boys received higher eating habits score than non-local boys, which was significantly marginalized (p=0.05). As Fig. 1 illustrates, 78% of local students have a favorable nutritional status, 18.2% have a moderate nutritional status and 3.6% have a poor nutritional status. Also, 8.7% of non-local students have a favorable nutritional status and 31.3% have a nutritional status.

Table 1. Comparison of mean and standard deviation of age, weight, height and body mass index between local and non-local students of Science and Research Branch of Islamic Azad University.

		Number	Local	Non-local	Total	P*
Age (years)	Girl	93	24.9±6.6	25.6 ±6.8	25.2 ±6.6	**0.63**
	Boy	97	29.79±8.6	30.6±12.2	29.9 ±9.5	**0.67**
	Sum	110	27.5±8.1	27.9±9.8	-	**0.81**
Weight (Kg)	Girl	93	62.4±9.9	62.8±11.3	62.8±11.3	**0.87**
	Boy	97	81.1±12.5	81.7±10.0	81.2±11.9	**0.81**
	Sum	110	72.6±14.7	71±14.3	-	**0.51**
Height (cm)	Girl	93	165.6±6.1	163.9±6.8	165.1±6.4	**0.22**
	Boy	97	180.4±6.9	180.4±6.9	180.4±6.4	**0.97**
	Sum	110	173.7±9.8	171.1±10.2	-	**0.10**
Body Mass Index (Kg/m^2)	Girl	93	22.7±3.0	23.3±3.6	22.9±3.2	**0.37**
	Boy	97	24.9±3.8	25.2±2.9	25±3.6	**0.82**
	Sum l	110	23.9±3.6	23.1±3.4	-	**0.74**

*t-test was used to compare quantitative variables.

Table 2. Comparison of average eating habits between local and non-local students of Science and Research Branch of Islamic Azad University.

	Gender	Local (N=134)	Non-local (N=55)	Total (N=189)	P*
Food habits	Girl	160.3±29.4	164.4±24.3	161.6±27.2	0.51
	Boy	155.5±27.9	141.9±34.7	152.2±30.1	0.05
	Sum	157.7±28.6	154.6±31.2		0.65

*t-test was used for comparison between groups.

Table 3. Relationship between eating habits and memory status of local and non-local students of Science and Research Branch of Islamic Azad University.

Dependent variable		Gender	Weak and medium			Optimal			Total (%)	P *
			Local (%)	Non-local (%)	Sum (%)	Local (%)	Non-local (%)	Sum (%)		
Memory status	Weak and average	Girl	13 (61.9)	1 (25.0)	14 (25.0)	26 (66.7)	16 (61.5)	42 (75.0)	56 (29.7)	
		Boy	14 (70.0)	5 (55.6)	19 (25.3)	42 (79.2)	14 (82.4)	56 (74.7)	75 (39.7)	0.0001
		Sum	27 (81.8)	6 (18.2)	33 (100)	68 (69.3)	30 (30.7)	98 (100)	131 (69.3)	
	Strong	Girl	8 (38.1)	3 (75.0)	11 (32.3)	13 (33.3)	10 (38.5)	23 (67.7)	24 (17.9)	
		Boy	6 (30)	4 (44.4)	10 (41.6)	11 (20.8)	13 (17.6)	14 (58.4)	24 (12.7)	0.036
		Sum	14 (66.6)	7 (33.4)	21 (100)	24 (64.8)	13 (35.2)	37 (100)	58 (30.7)	
		Total	41 (75.9)	13 (24.1)	54 (100)	92 (68.1)	43 (31.9)	135 (100)	189 (100)	0.122

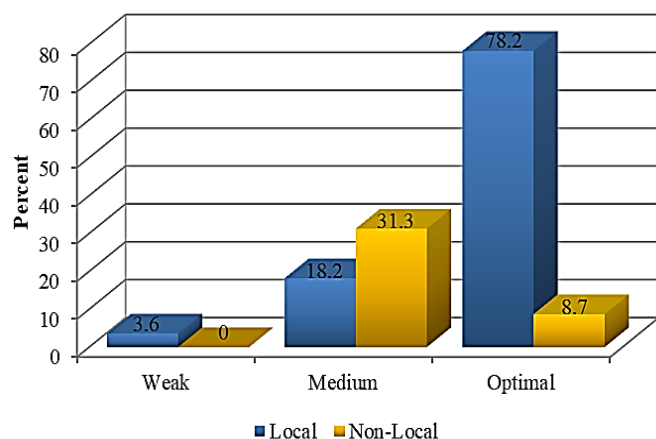*Chi-square test was used for the relationship between qualitative variables.

Table 4. Relationship between eating habits and body mass index of local and non-local students of Science and Research Branch of Islamic Azad University.

Dependent variable		Gender	Weak and medium			Optimal			Total (%)	P *
			Local (%)	Non-local (%)	Sum (%)	Local (%)	Non-local (%)	Sum (%)		
Body mass index status	Slim and normal	Girl	18 (85.7)	3 (75)	21 (29.1)	31 (79.5)	20 (76.9)	51 (21.9)	72 (38.5)	
		Boy	13 (61)	5 (71.4)	18 (35.2)	26 (49.1)	7 (43.8)	33 (64.8)	51 (27.2)	0.0001
		Sum	31 (79.4)	8 (20.6)	39 (100)	57 (67.8)	27 (32.2)	84 (100)	123 (65.7)	
	Overweight and obesity	Girl	3 (14.3)	1 (25)	4 (22.2)	8 (20.5)	6 (23.1)	14 (77.8)	18 (9.6)	
		Boy	8 (38.1)	2 (28.6)	10 (21.7)	27 (50.9)	9 (56.3)	36 (78.3)	46 (24.6)	0.0001
		Sum	11 (78.5)	3 (21.5)	14 (100)	35 (70.0)	15 (30.0)	50 (100)	64 (34.3)	

* Chi-square test was used for the relationship between qualitative variables.

As Table 3 shows, there was a significant relationship between eating habits and memory status, in students with poor and moderate memory and students with strong memory (p=0.0001). However, the relationship between diet and memory status was not overall significant.

Fig. 1. Comparison of eating habits between local and non-local students of the Science and Research Branch of Islamic Azad University.

According to Table 4, it is clear that the relationship between eating habits and body mass index status in overweight and obese students was significant (p<0.05). However, the relationship between eating habits and body mass index status was significant totally.

4. Discussion

In this study, it was observed that the mean of eating habits between local and non-local students was not significantly different from each other and the study hypothesis that this difference exists was rejected. However, in the subgroup of eating habits, most students were in a favorable status, which was in contradiction with a 2004 study by Karmer et al. (13). In their study, health-related differences between international students and local German students were examined on 201 international students and 193 local students. International female students with a residence history of more than 2 years and physical activity consumed less alcohol than German students. Among international students, people with longer stays had more cigarettes per day. Students with shorter stays perceived higher levels of stress and also had a healthier eating pattern compared to local students. Of course, it should be noted that the study of Karmer et al. (13) in Germany was

based on the difference between international and German students. Cultural-religious similarities largely prevent such differences. On the other hand, the consumption of fast food or similar items is common among almost all students, regardless of whether they are local or non-local, and since many local students usually eat with their non-local friends, this makes no significant difference in research. In the present study, no significant relationship was observed between different levels of memory and eating habits in all students. In a study of 317 Korean children and adolescents, Kim and colleagues examined the relationship between food intake and cognitive function. Consumption of noodles had a negative relationship with verbal memory, modality test, change of attention, and reasoning. Coca-Cola consumption also had a negative relationship with verbal memory and fast-food consumption had a negative relationship with reasoning tests and modality tests. Mushroom consumption was positively correlated with visual memory and reasoning test and brain consumption were positively correlated with modality tests (14). Osendarp and colleagues (15) also examined the effect of nutritional supplementation on cognitive function improvement in children during the 12-month intervention. This supplement contained iron, zinc, folate, vitamin A, vitamin C, B_6, B_{12}, or docosahexaenoic acid and eicosapentaenoic acid or a combination of both (vitamin supplement + docosahexaenoic acid + eicosapentaenoic acid. Docosahexaenoic acid + eicosapentaenoic acid increased plasma levels of these fatty acids in children in both countries. Nutrient interventions significantly increased verbal learning and memory in Australian and Indonesian children. But it did not affect general intelligence tests and their attention. Docosahexaenoic acid + eicosapentaenoic acid did not affect any of the cognitive tests. Gajre and colleagues (16) also studied the effect of breakfast eating habits on concentration, attention, instant memory, and school achievement. 379 students participated in this study and the results showed that regular breakfast consumption has a positive effect on memory. Likewise, O'Brien et al. (17) in a cohort study on older women on long-term nuts intake (5 years) with cognitive function observed that regular brain intake was associated with improved verbal memory. In a study of healthy women over the age of 60, Goodwin et al. also examined their cognitive status and cognitive function using the Wechsler Memory Scale (WMS) which has shown that people with low levels of vitamin C and B_{12} have lower memory. Also, people with low levels of B2 and B_9 showed lower psychological tests than the normal group (18).The most important reason for the discrepancies of the findings between studies might be due to different questionnaires in the present study with others. Also, in this study, the relationship between eating habits and body mass index status variables in all students was investigated. The results of the present study showed that there was no significant relationship between eating habits and body mass index status in all students. Unlike the present study, Bąk-Sosnowska et al. found a negative relationship between body mass index and eating habits. In such a way that with the improvement of the dietary pattern, the body mass index

decreases (19). In a study of Saudi student boys, Al-Rethaiaa et al. (1) found that eating habits (number of meals eaten by family) were negatively correlated with body mass index and visceral fat content. The number of snacks consumed had a positive relationship with body mass index However, in some studies, the existence of such a relationship has been ruled out. In a study conducted by Jääskeläinen et al. (20), no significant difference between body mass index and eating habits in the Bangladeshi adolescent population was found. Maruf et al. found that there was no relationship between fat, fruit, vegetable, and fiber intake and body mass index as well, while there is an inverse relationship between fat and fiber consumption with waist size and waist-to-hip ratio. However, the consumption of fruits, vegetables, and fiber was not related to waist size in this study (21). On the other hand, the results of some studies such as the study of Xie et al. (22) were in line with the present study has found a positive relationship between body mass index and eating habits in college students. Çıplak et al. (23) found that there was no relationship between eating habits regular meal intake, breakfast intake, and eating out in students with body mass index groups (underweight, normal, and obese). One of the most important strengths of the present study is the study of eating habits and eating behavior in local and non-local subgroups, all of which were representative of all students of the Azad University, Science and Research Branch, and this increases the accuracy of this study. Another strength of the study is the use of a specialized questionnaire by which we were able to assess the eating habits of the subjects. One of the weaknesses of the present study is its cross-sectional nature, which makes it impossible to observe the cause-and-effect relationship correctly.

5. Conclusion

In general, according to the research findings, no significant relationship was observed between eating habits and memory status, and body mass index. However, in order to have a better view of this issue and to have correct policies, that would be great to do this study in a large-scale cohort study in the whole of the country with the contribution of all the students from the beginning of their academic education till their graduation.

Authors' contribution

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