

Effect of Diet Quality on Academic Performance of Medical Students in Lahore

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Disclaimers

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ABSTRACT

Background: Diet quality plays a crucial role in cognitive function and academic performance among students. Understanding the impact of nutrition on academic outcomes can help promote healthier eating habits in educational settings.

Objective: To evaluate the effect of diet quality on the academic performance of medical students at Fatima Memorial College of Medicine and Dentistry, Lahore.

Methods: This cross-sectional study included 323 undergraduate students aged 17-24 years. Diet quality was assessed using a Food Frequency Questionnaire (FFQ) and the Diet Quality Score (DQS). Academic performance was evaluated through a self-designed performa comprising eight questions, each scored out of five. Data were analyzed using SPSS version 25, with Chi-square tests applied to assess the association between diet quality and academic performance.

Results: Of the participants, 59% had high diet quality and 41% had average diet quality. A significant association was found between diet quality and academic performance ($p < 0.001$). Students with high diet quality were more likely to achieve excellent academic performance (33.8% females, 14.8% males) compared to those with average diet quality.

Conclusion: Higher diet quality is significantly associated with better academic performance among medical students, highlighting the importance of nutrition in educational success.

INTRODUCTION

The relationship between diet quality and academic performance has garnered increasing attention in recent years, particularly within populations such as university students, whose cognitive demands are substantial. A healthy diet, characterized by an appropriate balance of macronutrients and micronutrients, is essential for maintaining optimal physiological functions, including cognitive processes that underpin academic success (1). Diet quality encompasses the assessment of an individual's overall dietary intake, reflecting how well it aligns with recommended healthy eating patterns. These evaluations, which utilize various Diet Quality Indices (DQIs) like the Healthy Eating Index (HEI) and the Alternative Healthy Eating Index (AHEI), provide insights into how food choices impact nutritional adequacy and influence health outcomes, including cognitive performance and academic achievement (2-4). Diets that are rich in plant-based foods, fresh fruits, vegetables, antioxidants, and omega-3 fatty acids are considered high in quality and have been associated with a reduced risk of chronic diseases such as hypertension, cardiovascular disease, and diabetes (1, 5-6). Globally, there is a growing concern about diet quality due to the widespread consumption of energy-dense, nutrient-poor foods, particularly among adolescents and young adults. These dietary patterns contribute to the dual burden of malnutrition, characterized by both undernutrition and overnutrition, leading to a significant proportion of the

population being either underweight or overweight (5-7). In Pakistan, dietary habits among university students mirror these global trends, with a notable percentage consuming food that are high in calories but low in essential nutrients, potentially impairing their cognitive and academic performance (7, 8). The link between diet and cognitive function is well-documented, with evidence suggesting that poor diet quality can adversely affect various aspects of brain function, including memory, attention, and processing speed. For instance, diets high in saturated fats and refined carbohydrates have been shown to negatively impact the hippocampus, a key brain region involved in memory and learning, while nutrient-rich foods like fruits, vegetables, and whole grains are associated with better cognitive outcomes (9-11).

The negative impact of unhealthy dietary patterns extends beyond cognitive impairment; it also contributes to the development of metabolic disorders such as obesity and diabetes, which further exacerbate cognitive decline and increase the risk of neurodegenerative diseases like Alzheimer's (9). Conversely, the intake of foods rich in n-3 polyunsaturated fatty acids has been linked to improved attention and cognitive function, although the evidence is less robust for other cognitive domains across different age groups (10).

Dietary habits, such as skipping meals or consuming foods with a high glycemic index, have also been found to impair cognitive performance, emphasizing the importance of regular and balanced meals, particularly breakfast, which

has been shown to enhance memory and academic performance (12). This study aims to explore the association between diet quality and academic performance among medical students, a population particularly vulnerable to the cognitive demands of their education. The findings are expected to contribute to the growing body of literature advocating for the promotion of healthy dietary habits as a means to enhance academic success. By understanding the specific dietary patterns that correlate with academic performance, this research seeks to provide evidence-based recommendations for improving the diet quality of students, potentially leading to better educational outcomes and overall well-being.

MATERIAL AND METHODS

This cross-sectional study was conducted at Fatima Memorial College of Medicine and Dentistry, Lahore, over a period of four months following ethical approval from the Institutional Review Board (IRB) of Fatima Memorial College of Medicine and Dentistry. The study targeted undergraduate medical students aged between 18 and 23 years. Participants with any chronic diseases were excluded from the study to maintain a homogenous sample that accurately reflects the general student population. A random sampling technique was employed to recruit eligible participants, ensuring an unbiased selection process. All participants provided written informed consent before participating in the study, in accordance with the principles outlined in the Declaration of Helsinki regarding human research ethics.

A sample size of 371 participants was calculated using a 5% level of significance, with an anticipated prevalence of the desired outcome of 41% (13). Data were collected using a structured questionnaire, which included a Food Frequency Questionnaire (FFQ) and a self-designed academic performance assessment performa. The FFQ comprised 35 food items to evaluate the diet quality of the participants. The Diet Quality Score (DQS) was calculated by assigning one point for each food item consumed, resulting in a total score out of 35, reflecting the overall diet quality. Participants were categorized into different diet quality groups based on their DQS scores, facilitating the analysis of associations between diet quality and academic performance. Academic performance was assessed using a self-designed performa, consisting of eight questions, each

scored out of five marks. This scoring system allowed for a comprehensive evaluation of participants' academic achievements, categorized into low, average, and excellent performance levels. Data on participants' demographic characteristics, including age, gender, height, weight, and Body Mass Index (BMI), were also collected to describe the study sample and explore potential confounding factors. Data analysis was performed using SPSS version 25. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were calculated for demographic variables and other relevant study measures. Chi-square tests were conducted to determine the association between diet quality and academic performance, with statistical significance set at a p-value of less than 0.05. The results indicated a significant association between diet quality and academic performance, with a p-value of less than 0.001, demonstrating that students with higher diet quality scores performed better academically compared to those with lower scores.

All data were managed confidentially, and participants' anonymity was maintained throughout the study. The research complied with all relevant ethical standards for conducting human research, as stipulated by the IRB guidelines and the Declaration of Helsinki. The study's findings contribute to the growing body of evidence linking diet quality to academic performance, providing valuable insights for future research and potential interventions aimed at improving dietary habits among medical students.

RESULTS

The study included a total of 323 participants, with a majority being female (62%) and 38% male. The age range of the participants was 17 to 24 years, with a mean age of 22.1 years. The average height and weight of the participants were 1.59 meters and 61 kilograms, respectively, resulting in a mean BMI of 23.8 kg/m². In terms of BMI categories, 46% of the participants were of healthy weight, 35% were overweight, and 10% were underweight. The dietary habits of participants revealed that 55.4% consumed three meals per day, while 35.3% had two meals, and a minimal 0.3% had only one meal daily. Notably, 78.6% skipped breakfast, while 16.4% skipped lunch, and 5% skipped dinner. About 47.1% of participants reported frequent snacking, while 52.9% did not snack regularly.

Table I Academic Performance

Low	Average	Excellent Academic	Total
0.0	104.0	18.0	122.0
2.0	131.0	68.0	201.0
2.0	235.0	86.0	323.0

59% of participants had high diet quality, while 41% had average diet quality. Academic performance was categorized into low, average, and excellent. Only 0.6% of participants exhibited low performance, 72.8% had average performance, and 26.6% achieved excellent performance.

There was a statistically significant association between diet quality and academic performance, as shown in the table below. Regarding hydration, 41.8% consumed 4-6 glasses of water daily, 35.9% drank 6-8 glasses, and only 11.8% consumed 8-10 glasses per day. Diet quality assessment showed that Participants with higher diet

quality demonstrated better academic outcomes, with a p-value of less than 0.001, indicating a strong correlation

between dietary habits and academic success. The results indicate that a higher quality

Table: Effect of Diet Quality on Academic Performance

Academic Performance	Average Diet Quality	High Diet Quality	Total	P-value
Low Academic Performance	2	0	2	<0.001
Average Academic Performance	125	110	235	
Excellent Academic Performance	7	79	86	
Total	134	189	323	

diet is significantly associated with higher academic performance, reinforcing the importance of nutritional quality in supporting academic success among medical students.

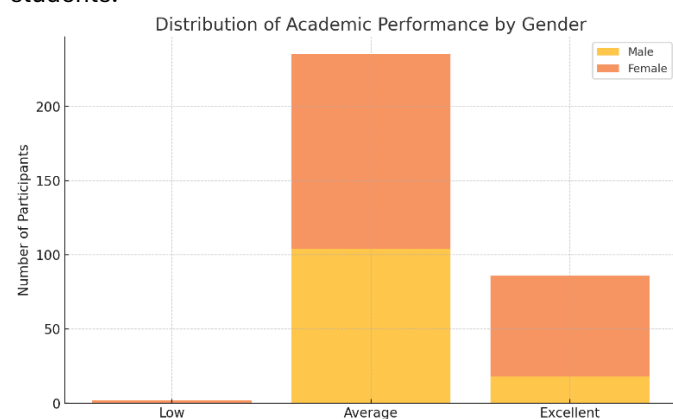


Figure 1 Distribution of Academic Performance by Gender

DISCUSSION

The findings of this study demonstrated a significant association between diet quality and academic performance among medical students, aligning with the broader literature that underscores the impact of nutrition on cognitive function and educational outcomes. The results revealed that students with higher diet quality were more likely to achieve excellent academic performance compared to those with lower diet quality, supporting the notion that optimal nutrition plays a critical role in enhancing cognitive abilities and academic success (20). This is consistent with previous research, which has shown that diets rich in fruits, vegetables, whole grains, and healthy fats contribute positively to cognitive function, memory, and overall academic performance (9, 10). The significant relationship between specific food groups, such as bran bread, oats, lentils, fresh fruits, fresh milk, yogurt, olive oil, and coffee, with academic performance highlights the importance of a balanced diet that provides essential nutrients for brain health and cognitive function (22).

The study's demographic profile, which included a majority of female participants with a mean BMI of 23.8 kg/m², is comparable to other studies examining dietary patterns and health outcomes in young adults. Similar BMI distributions were reported in global studies, indicating that the sample's characteristics are reflective of broader young adult populations (14). The prevalence of breakfast skipping observed in this study aligns with findings from previous research, which has documented high rates of meal

skipping among university students, particularly breakfast, which is often linked to poorer academic outcomes (17). The detrimental effects of breakfast omission on cognitive performance, such as memory and attention deficits, have been well-documented, further reinforcing the importance of regular, balanced meals for academic success (12).

The strengths of this study include its focus on a specific population of medical students, which provides valuable insights into the dietary habits and academic performance within this high-stress, cognitively demanding group. The use of a standardized dietary assessment tool, the Food Frequency Questionnaire (FFQ), and a comprehensive Diet Quality Score (DQS) allowed for a detailed evaluation of participants' diet quality, enhancing the reliability of the findings. Moreover, the study's large sample size and random sampling technique contributed to the generalizability of the results within the context of medical education. However, the study also had several limitations that should be acknowledged. The cross-sectional design precludes any causal inferences about the relationship between diet quality and academic performance, and the reliance on self-reported data may introduce recall bias or inaccuracies in reporting dietary intake and academic outcomes. Additionally, the study did not account for potential confounding factors such as physical activity, sleep quality, or socioeconomic status, which may also influence academic performance.

Despite these limitations, the study provides compelling evidence for the positive association between diet quality and academic performance among medical students, highlighting the importance of promoting healthy eating habits within this population. Future research could benefit from a longitudinal approach to better understand the causal pathways between diet and academic success, as well as interventions aimed at improving diet quality and evaluating their impact on cognitive and academic outcomes. It is recommended that universities and educational institutions implement nutrition education programs that emphasize the benefits of a balanced diet and provide access to healthier food options on campus. Addressing dietary habits through targeted interventions could play a pivotal role in enhancing not only the academic performance but also the overall well-being of students, ultimately contributing to their long-term professional success.

CONCLUSION

This study concluded that there is a significant association between diet quality and academic performance among

medical students, with higher diet quality linked to better academic outcomes. These findings underscore the importance of promoting balanced dietary habits to support cognitive function and academic success. The implications for human healthcare are substantial, as fostering healthy eating patterns in students can contribute to improved cognitive abilities, reduced risk of chronic diseases, and overall better quality of life. Encouraging optimal nutrition in educational settings could enhance students' academic achievements and long-term health, ultimately benefiting society by cultivating a more informed and healthier future workforce.

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