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Journal of General Medicine and Clinical Practice
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Research Article

Nutrtional Knowledge and Dietary Habit of Medical Students: A Systematic Review

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Received date: June 24, 2023; Accepted date: July 06, 2023; Published date: July 20, 2023

Citation: Brindaban (2023), Nutrtional Knowledge and Dietary Habit of Medical Students: A Systematic Review, *J. General Medicine and Clinical Practice.* 6(5); **DOI:10.31579/2639-4162/099**

Abstract

Background: There is a general perception amongst the common masses that the medical students have a greater knowledge about the dietary habits and healthy lifestyle. Here we present a systemic review that aims to evaluate nutritional knowledge, eating habits and overall satisfaction regarding nutritional education of medical students.

Methodology: A literature search was done between October 1, and December 1, 2019 with the help of computer-based search of MEDLINE, PubMed, Scopus and allied health Literature. Medical term related headings were used in the execution of PubMed and MEDLINE searches, for such, medical student nutrition, nutritional knowledge etc. The search was restricted to studies published since 2012.

Findings: 34 studies were selected which included quantitative studies, qualitative studies, and curriculum initiatives from India, Pakistan, Malaysia, Ghana, Lithuania, Iran, Albania but in rich countries UAE, Saudi Arabia including in western ones (Canada, USA, etc.). Our analysis showed decreased level of satisfaction regarding nutritional education and also, medical students susceptible to irregular dietary habits and unhealthy lifestyle.

Conclusion: It is evident that their knowledge regarding nutrition and balanced diet has an impact on their lifestyle and dietary practices. Besides, their curriculum should be revised and awareness on healthful practices should be encouraged to adopt a healthy lifestyle that will promote individual health as well as of the society.

Kew Words: infection; diabetes mellitus; periodontitis

Introduction

Diet pattern of young adults has become an important issue of research worldwide. In recent times, with the increasing burden caused by the lifestyle diseases on the health sector, there has been a renewed interest in the relationship between food and health.[1] Cultural transition, social changes, westernization, family environment, exposure to mass media, and globalization all have a significant impact on eating attitudes and behaviors among young people.[2] More specifically, these characteristics can mold the eating habits and establish a certain food culture during adolescent years, which ultimately may lead to a strong or a poor diet in adulthood.[3] College students are in the emerging adulthood period, which is critical as because these young people establish independence to adopt life-long patterns of health and behavior. It is the time when they may get accustomed with unhealthy lifestyle characteristics and increased risk of obesity and chronic diseases.[4,5] There is a general perception amongst the common masses that the students of health sciences have a greater knowledge about the correct dietary habits and healthy lifestyle as compared with non-medical students. This is significant as they are the future physicians and the students who personally adopt a healthy lifestyle are likely to positively influence their patients. However, studies have shown that medical and paramedical students especially who stay in hostels away from their home are susceptible to irregular dietary habits, lack of exercise, and addiction.[1] Risk factors for the development of serious chronic diseases in later life can be altered by adaptation of healthy lifestyle, behavior or health hazards during adolescence and young adulthood.[6] Previous studies about barriers to healthy eating and physical activity showed that the most frequently reported barriers to healthy eating were the lack of time and stress, which is associated with poor diets and inactivity, convenience and lower cost of less nutritious fast food, lack of availability and high cost of healthier food, taste preferences (e.g. for fast foods) and lack of nutritional knowledge and skills.[2] These poor eating habits acquired during this period can lead to serious diseases later in life.[7] Literature suggests that those medical students who do not adopt healthy lifestyle, fails to provide effective health care to community in future as well.[8] Delivering knowledge about health amongst medical students is essential because in addition to requiring it for themselves, as future physicians they shall promote health awareness and wellness amongst societies.[6,9] This study was aimed to evaluate nutritional knowledge, eating habits and overall satisfaction regarding nutrition education of medical students.

Methods:

Search strategy and selection criteria: This systematic review critically synthesizes literature on nutritional education and dietary pattern provided to medical students. To make sure that all relevant studies were included, a literature search was conducted between October 1 and December 1 2019 using computerized searches, ancestry searches, and hand searching of journal articles. This same search technique was used once more on March 10, 2020 to find any pertinent research that has been released since October 1, 2019. Computer-based search of MEDLINE, PubMed, Scopus and allied health Literature was conducted to find out both quantitative and qualitative studies on dietary pattern and nutritional education of medical students. The studies included quantitative studies, qualitative studies, and curriculum initiatives from India, Pakistan, Malaysia, Ghana, Lithuania, Iran, and Albania but in rich countries UAE, Saudi Arabia including western ones Canada, USA, etc. Medical terms were used for PubMed and MEDLINE searches. Search terms related to medical students included "nutrition in medical education" and "undergraduate medical nutrition education", "dietary pattern", "dietary habit". Search terms for the topic of interest included "nutrition", "knowledge", "skills", "nutrition counseling", "confidence", "nutrition care", or "nutrition education", "diet", "food habit". Google Scholar was used to obtain additional articles identified by journal hand searching. Studies published since 2012 were the only ones allowed in the search. Included studies are those study that are related to medical nutrition education, published after 2012 if they met any of the following criteria: examined any aspect of recently graduated or current medical students' dietary pattern, nutrition knowledge, attitudes, skills, or confidence in nutrition or nutrition counseling; evaluated nutrition curriculum initiatives for medical students; or assessed current medical students' perceptions of nutrition education.

Data analysis: The outcomes of every database search were imported into EndNote. Prior to screening, duplicate entries were eliminated. Data were extracted by using a table. Author, year, country, aim, research design, sample, participants, and relevant findings were among the data retrieved. Results that were pertinent to the inclusion criteria included information on students' eating habits, nutritional knowledge, attitudes, skills, and confidence in their ability to provide nutrition care, as well as their perceptions of the nutrition education they received during their medical education. Another researcher used the full-text study to cross-check the retrieved data from all included studies to guarantee accuracy.

Research in context:

Evidence before this study: Adequate nutrition is of great importance for every individual. Unbalanced diet is a modifiable risk factor for cardiovascular disease, cancer, diabetes etc. and so on. Usually, doctors are considered the one to apply nutrition knowledge among the patients to protect them from chronic disease and other health conditions. Many oversees literature are available online. All of them have established the fact that the diet pattern of medical students has to be improved, followed by minimizing the gap between the nutrition knowledge and attitudes necessary for the doctor to provide effective care to the patients. We did a systematic review of studies published since 2012 that investigated dietary pattern and nutrition education provided to medical students to come up with a new idea to approach the evidence-practice gap in medical nutrition education

Added value of this study: It has been a matter of argument in the past that although the doctor has a little influence over the myriad structural causes of diet related disease, poorly trained medical personnel can be itself as one structural risk factor. Hence, it is of concern that medical students should follow a balanced diet pattern and healthy lifestyle along with sufficient knowledge and skills to provide necessary health-care to the population. Through comparing with previous published articles we came to the conclusion that nutrition knowledge and training is a must to include into the curriculum and steps should be taken to incorporate student engagement having nutritional balanced food.

Implications of all the evidence available: Despite the centrality of nutrition to a healthy lifestyle, medical students are not supported to provide high-quality, effective nutrition care. To ensure graduating medical students are supported throughout their education to provide optimal nutrition care to patients, health awareness programs and training on nutritional education should be arranged for the promotion of balanced diet and healthy lifestyle among the medical students. A curriculum initiative is an important part of alleviating students' knowledge and skills on proper nutrition. Also, students' engagement in cooking and food preparation and availability of low-cost healthier food in the school campus has to be ensured. Counseling sessions, seminars on time management, stress relaxation and meditation workshops have to be arranged from the authority time to time. Moreover, outdoor recreational activities for all academic years should be arranged for having a healthy lifestyle.

Results:

SL No	Surveys	Design & Participants	Outcomes assessed	Relevant findings
1.	Vibhute et al, 2018, India [1]	130 students of a medical college	Dietary habit among medical students	The knowledge and practice regarding healthy diet and nutrition does not bode well. Only 10% had fruit daily, and only 68% ate breakfast every day.
2.	Eapen et al, 2006, UAE[2]	495 adolescent girls	Eating attitude and symptomatology of adolescent girls	Age, BMI, internalization of the thin ideal, the desire for thinness, and other factors are linked to high Eating Attitudes Test (EAT) scores. Of individuals, 50% were found to show a tendency toward anorexia, while just 2% had the whole clinical illness.
3.	Daniels et al, 2006 [3]		The consequences of overweight and obesity in childhood	Demonstrates how childhood obesity exacerbates the harm done by adult obesity. Childhood obesity increases the risk of developing heart disease in the future.
4.	Deshpande S, Basil MD, Basil DZ, 2009[4]	194 Canadian undergraduate university students	Factors influencing healthy eating habits along with an application of health belief model	It demonstrates the effect of gender, the value of a healthy diet, one's dietary status, and food characteristics. HBM has also made it possible to comprehend the relative influence of different elements.

5.	Nelson et al, 2008[5]	Emerging adulthood and college-aged youth	Age for weight related behavior change	Discusses the impact of food and beverages on adults and the importance of health promotion while illustrating evidence from negative changes in diet, physical activity, and weight.
6.	Shireen et al, 2018[6]	233 female students between 1 8–25 years of age, from first two years of medical college	study is aimed to explore perception of students about health risk behaviors; eating routines, life style and stress handling practices	The study's overall findings showed that medical students generally practiced healthy habits. Compared to the senior class, the first-year MBBS had a better understanding of stress management techniques, lifestyle patterns, and healthy eating habits.
7.	Badiger et al, 2017, Karnataka, India[7]	175 students of Nitte University with 93 Medical, 49 Dental, 33 nursing students	Dietary patterns among students of health sciences and its association with morbidity	14 (8%) students skipped lunch, and 14 (8%) students skipped dinner, totaling 87 (49.71%) students. 9.1% of participants were overweight, 85.2% had a normal BMI, and 5.7% of participants were underweight.
8.	Sajwani et al, 2009, Karachi, Pakistan[8]	350 students between aged 17-24 years from 6 private universities of Karachi--three medical and three non-medical Institutions	Compare the differences in knowledge and practices regarding healthy lifestyle among medical and non-medical students of Karachi	On a scale of 1 to 10, students gave themselves an average knowledge score of 5.7 (+/- 1.51) for general nutritional knowledge and 4.4 +/- 1.77 for clinical nutritional knowledge. The most frequent excuse given for skipping meals and as a reason not to exercise was found to be a lack of time.
9.	Abrar et al, Saudi Arabia,2017[9]	207 students between ages 19-24 years from basic and clinical levels in the faculty of medicine.	To assess the knowledge, attitude and practices on healthy lifestyle (healthy	Although the majority of students (84.5%) do not calculate their calories, 15.5% do, just 54.1% of students knew how many calories they needed to consume each day. A little over 35.3% of students base all of their meals on starchy foods, while 28% eat just one. Just 11.0% of men and 10.4% of women consume a balanced diet.
10.	Škėmienė et al, 2007, Lithunia[10]	349 first- and third-year students of the Faculties of Medicine and Pharmacy at Kaunas University of Medicine	To compare the dietary habits between first-year and third-year students, to compare male and female students' nutrition, and to evaluate the tendencies of its change.	The majority of students did not adhere to the diet plan and devoured the majority of food items in the afternoon. Fruits, vegetables, fish products, and vegetable fats were insufficiently ingested by students.
11.	Garipağaoğlu et al, 2012, Istanbul[11]	The population in this study included two groups of students: one had taken nutrition course, and the other was engineering students who had not taken such a course.	Aimed to validate a questionnaire on dietary fibre (DF)-related knowledge in a Turkish student population.	One-fifth of the students were found to be unsure of the right response for any question, and 52.5% of them did not know that the DF needed to be consumed every day. Additionally, only 36.4% of pupils correctly identified the DF's dietary source.

12.	Sivashunmugam et al, 2017, Malaysia[12]	93 second year medical students	Aims to determine the prevalence of overweight and obesity among the preclinical students, correlate the relationship of BMI and WC and evaluate the knowledge and perception of obesity of obese and overweight students	23 (25%) and 21 (22%) of the 93 students that took part in the study were respectively overweight and obese. According to a study, there is a knowledge gap and an increase in the incidence of obese and overweight people.
13.	Khan et al, 2016, India[13]	244 medical students conducted at four medical colleges of Lahore, Pakistan	The prevalence of obesity among students of medical colleges of Lahore and to study its correlation with high-caloric diet intake and physical inactivity.	While a BMI >25 was not associated with central obesity, a higher daily calorie intake was. Only 28.7% of students regularly walked or ran.
14.	Ackuaku-Dogbe EM, Abaidoo B,2014 Ghana[14]	154 pre-clinical and 163 clinical medical students	To assess the level of breakfast skipping and its effect.	71.92% of people skip breakfast, which affects their ability to concentrate and leaves them feeling worn out.
15.	Emine et al, 2018[15]	1537 medical students studying in 1,2,3 and 6th grade students at Ege University Faculty of Medicine.	Smoking prevalence and related factors	The average age of beginning to smoke was 16.5 2.3 years. Males were more likely to smoke than females were (24.3% vs. 11.7%, p0.001). 27.4% of those who smoke now did so while in medical school.
16.	Simth, Leggat, 2007[16]	66 manuscripts from India, the US, Australia, Japan, Pakistan, Turkey and the UK	A systematic international review of tobacco smoking habits among medical students.	Australia and the United States had low smoking rates, whereas Spain and Turkey had relatively high rates.
17.	Nathalie et al, 2017, California[17]	A total of 200 students across 10 California pharmacy and medical schools	To assess dietary and lifestyle practices and investigate whether they adhered to behaviors consistent with current dietary and exercise guidelines.	Only 50% of students had a saturated fat intake of less than 10% of total calories, 13% reached their fiber intake targets, 10% had less than eight servings of fruit and vegetables per day, and 41% exercised less than 150 minutes per week. The majority of students consumed sodium and dietary cholesterol in amounts of 300 mg and 2300 mg, respectively, per day.
18.	AL Otaibi et al, Saudi Arabia[18]	960 female students at King Faisal University in AL-Hasa, Saudi Arabia	To investigate the daily consumption of fruits and vegetables and the psychosocial factors related to the consumption	Only 22% of students consume more than 5 servings of fruit and vegetables per day, and the bulk of them fall within the normal BMI range. 78% of students consume 5 servings per day. The greater consumption group is more aware of the daily intake of fruit and vegetables in terms of psychosocial aspects.
19.	Sorhaindo A, Feinstein L, 2008[19]		A review of the literature on the relationship between aspects of nutrition and physical health, mental health and behavioral or social outcomes in children.	Dietary deficiencies are risk factors for disease and illness increases morbidity and mortality. The timing, frequency, composition, and quality of the food consumed are linked to behavioral, cognitive, and developmental outcomes that affect quality of life.

20.	Khademalhossini Z, Ahmadi J, Khademalhosseini Z, 2015, Iran[20]	A total of 1020 students, from 4 different districts and 10 different schools in Shiraz, Iran,	To investigate prevalence of tea, coffee and Nescafe consumption among high school students in Shiraz, Iran and find out whether there is a relationship between these three beverages with depression and anxiety	To assess one's understanding, outlook, and activities about a healthy lifestyle: High school students consumed tea, coffee, and Nescafe at rates of 79.5%, 54%, and 54%, respectively. These three drinks' usage had a negative, statistically significant connection with both depression and anxiety.
21.	Mackus et al, 2016[21]	A total of 800 Dutch university students	To examine the knowledge of caffeine content of a variety of caffeinated beverages	Coffee (50.8%) and tea (34.8%) were the most common sources of caffeine, followed by energy drinks (9.2%), cola (4.7%), and chocolate milk (0.5%). They overestimated the amount of caffeine in cola and energy drinks while underestimating it in coffee drinks.
22.	Frantz D et al. US, 2016[22]	122 recent medical graduates	To assess interns' perception of clinical nutrition education during medical school.	Only 29% of interns said they had received enough dietary training.
23.	Hyska J et al,2015, Albania[23]	347 medical and allied health professional students	Perceptions of knowledge, attitudes and practices in public health nutrition	About one-third of the students expressed dissatisfaction with the nutritional education they got, both in terms of its quality and quantity.
24.	Perlstein et al, 2017, Australia[24]	Surveys of first-year medical students across four consecutive cohorts, 2013–16 (n=555	Medical students' knowledge of dietary guidelines and self-reported dietary practices	Between 59% and 93% of students correctly identified the recommended daily servings for fruit and between 61% and 84% knew the vegetable recommendations; 40-46% of students met the fruit intake criteria and 12-19% of students met the vegetable intake guidelines.
25.	Schoendorfer et al, 2017, Australia[25]	Survey of first-year to fourth-year medical students (n=928)	Medical students' attitudes towards nutrition, and intention to do nutritional assessment with patients	Despite overall student support for nutritional counseling (70%) and assessment (86%), students were reluctant to complete dietary assessments, and only 38% said that asking for a food diary or other measure of dietary intake was crucial. 87% of respondents said that "high risk patients should be routinely counselled in nutrition."
26.	Hargrove et al, 2017, USA[26]	Survey of first-year and second-year medical students (n=257)	Medical students' nutrition knowledge and confidence in nutrition	The average nutrition knowledge score was 70% and 51% scored below the pass rate of 73%; most participants (n=143, 56%) felt comfortable counselling patients on nutrition recommendations, yet only 30 (12%) were aware of the current dietary reference intakes
27.	Perlstein et al, 2016; Australia[27]	Survey of first-year to fourth-year medical students (n=197)	Medical students' perceptions of providing nutrition care	The majority of participants (n=143, 56%) felt comfortable advising patients on nutrition recommendations, but only 30 (12%) were aware of the current dietary reference intakes; the average nutrition knowledge score was 70%, and 51% scored below the pass rate of 73%.

28.	Crowley et al, 2015; New Zealand[28]	Survey of fifth-year medical students (n=183)	Medical students' perceptions of providing nutrition care and nutrition training	Although the students thought it was crucial to include nutrition care in clinical practice, they were less certain that patients' diets improved as a result of this treatment. Most students (60%) said they received an excellent or very good amount of nutrition education, and more (83%) thought they received a good or very good amount of nutrition education
29.	Schoendorfer N, Schafer J,2015[29]	1037 medical students of first four years	Perception of nutrition and the use of blended learning technique to engage student's engagement and clinical practice development in relation to nutrition education in first year	Nutrition was deemed vital in general practice by 82% and in healthcare by 91%. Only (45%) thought they could speak with patients about nutrition.
30.	Connor et al, 2015, USA[30]	Survey of first-year to fourth-year medical students (n=312	Medical students' perceptions of competency and use of nutrition resources	The majority of students (70%) stated that they felt confident in their capacity to give patients basic nutrition information, with professional nutrition resources being the most often used nutrition resources according to 42% of respondents.
31.	Fiore et al, 2015; Italy[31]	Survey of first-year to sixth-year medical students (n=1038)	Medical students' adherence to the Mediterranean diet	Dietary adherence was reported as poor (21%), average (57%), and good (23%); sex significantly affected adherence scores (female>male; $p<0{\cdot}01$)
32.	Mogre et al, 2018, Ghana[32]	Qualitative interviews with fifth-year medical students (n=23)	Medical students' perceptions of providing nutrition care	Medical students believe doctors play a vital role in assisting patients with nutrition education. The idea that doctors are not responsible for providing nutrition care, inadequate communication with nutrition professionals, and a lack of curriculum for nutrition education are some of the challenges.
33.	Cooke et al, 2017, USA[33]	Qualitative interviews with third-year and fourth-year medical students (n=78)	Medical students' perceptions of providing nutrition care for managing childhood obesity	Medical students requested greater instruction on how to prevent and treat childhood obesity, knowledge gaps, and time constraints during consultations as hurdles.
34.	Danek et al, 2017, USA[34]	Focus groups and qualitative interviews with medical students (n=48), residents (n=14), and doctors (n=10	Medical students' perceptions on nutrition training received	The residents said they felt less secure providing nutrition counseling and that they would like to take more educational sessions in this area since they thought that nutrition was not well integrated into the curriculum.

Discussion:

The importance and benefits of healthy food cannot be over-emphasized. Food provides the body with necessary amount of energy, vitamins, minerals and antioxidant which are involved in processes that promote neuronal survival[35], by synthesizing neurotransmitters responsible for the efficient flow of information across synapses all over the body. Research has provided exciting evidence for influence of dietary factors not only in building the body or preventing disease but also on specific molecular systems and mental function.[36] Any imbalance in the micronutrients can lead to alteration in brain function, impaired memory, minimizing ability to solve problem, also may lead to chronic diseases.[37]

A study by Badiger et al showed that 5.7% of subjects were underweight, 85.2% of subjects had a normal BMI and 9.1% were overweight[7] which is consistent with the results found in the study conducted at West Bengal by Sarkar et al wherein the prevalence of normal BMI was 72.7%, the proportion of underweight and overweight were 16% and 11.4% respectively.[38]

A study carried out among medical students in Lithuania cited that their diet was not balanced, consuming insufficient vegetable fats and fish products, fruits and vegetables and thus their food may lack in vitamins and dietary fibers or nutrition.[10]

In the study conducted by Yadav et al it was found that 214 (53.5%) were vegetarians and 186 (46.5%) consumed a mixed diet.13 Sharma et al in their

study found that 50.5% of the subjects were vegetarian and 49.5% were non-vegetarian (N=200).[39] A study conducted among 1000 healthy young female students aged 11-28 years in Mysore by Omidvar et al found that there were 332 (33.7%) vegetarians, 88 (8.9%) regular non-vegetarians and 564 (57.3%) were occasional nonvegetarians.[40]

In Maharastra, India, 2014, 75% of the participating students had only 1–2 portions per day.[1] The same goes with medical students in California, 2017 which shows only 10% of students met recommendations for daily fruit and vegetable intake.[17]

In a similar study carried out amongst 207 undergraduate students at the University of Hail, Saudi Arabia in 2017, only 11.1% admitted that they eat fruits and vegetables daily.[9] However; this dissimilarity is due to the difference of feeding habit in different culture. The same goes with medical students in California,2017 which shows only 10% of students met recommendations for daily fruit and vegetable intake.[17] All these figures are falling short of the five daily servings of fruit and vegetables as recommended by the World Health Organization. Vitamins and minerals are very essential in humans even though they are needed in small accounts.[19] They help in collagen synthesis, energy production, bone formation, and have antioxidant functions.[41] Minerals also play a role in maintaining water balance, protein structure stability, bone strength and immune responses.[37]

Lack of time was also cited in a study by Sajwani *et al*.[8] Similar findings were found among the medical students of Ghana, where 71.92% skipped breakfast, resulting in fatigue and poor attention.[14] In a study carried out among medical students in Lithuania was cited that 49.6% of female and 63.2% of male first year students most of the time ate in a hurry.[10]

The study in medical students of Ege University, Turkey, where smoking was more prevalent in males compared to females (24.3% vs. 11.7%, $p<0.001$).[15]

High caffeine intake in adolescents has been linked with difficulty in sleeping, feeling tired in the morning and with high blood pressure.[42, 43] Measures should be taken to educate students on the harmful effects of caffeine consumption in an effort to curtail this habit.

Eight studies[24-31] reported on medical students' perceptions of nutrition education in medical training. The studies indicated that the nutrition education received by medical students is insufficient to develop confidence in providing nutrition care. Students perceived that they should understand nutritional issues related to specific conditions and chronic lifestyle diseases[27] and that incorporating nutrition care into practice is important,[28] especially as routine practice among high-risk patients.[25] Students perceived that their nutrition education was inadequate because of their current limited nutrition knowledge and the ongoing poor integration of nutrition into curricula,[23,33] absence of priority for nutrition education, absence of faculty to provide nutrition education, poor application of nutrition science to clinical practice[32] (such as witnessing little or no nutrition counseling during shadowing experiences),[33,34] absence of scientific rigor in the teaching curriculum,[19] and poor collaboration with nutrition professionals.[32-34]

Financial Statement: No funding was associated with this study.

Conflict of Interest: Nil

Conclusion

This survey provided a unique insight into both healthful and unhealthful dietary practices among the medical undergraduates. However, it is evidenced that their knowledge regarding nutrition and balanced diet has an impact on their lifestyle and dietary practices. Besides, their curriculum should be revised and awareness on healthful practices should be encouraged to adopt a healthy lifestyle that promotes individual health as well as of the society.

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DOI:10.31579/2693-7247/099