

Nutritional Knowledge, Eating Habits, and Health Attitudes of Clinical Year Medical Students in A Private University in Malaysia

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ABSTRACT

The nutritional knowledge, health attitude, and dietary habits of medical students in their clinical year are important as adequate knowledge of nutrition is a positive influence on the healthcare of the community. Nutritional knowledge has a direct impact on the choice of food, health attitude, and beliefs towards health. This study aimed to assess the nutritional knowledge, eating habits, health attitudes, and factors affecting food choices among clinical year medical students in a private university in Malaysia. A cross-sectional study was conducted among clinical year medical students from May 2022 to July 2022. The respondents were recruited by purposive sampling and data was collected by using an online questionnaire. Data was analyzed by using Epi info software (version 7.2.5.0), and descriptive and inferential analyses were conducted using mean, standard deviation, Chi-square test, and Fisher's Exact test. A total of 139 students participated in this study.

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Among the respondents, 47.48%, 44.60%, and 62.59% had an adequate knowledge of nutrition, good eating habits, and good nutritional attitudes respectively. There is no significant association between age, gender, study year, body mass index (BMI), and a monthly allowance towards nutritional knowledge, eating habits, and health attitudes. However, data recorded shows that female respondents have better nutritional knowledge, eating habits, and health attitudes compared to males. Health promotion among medical students should be carried out as it will encourage healthier lifestyle practices, which will be implemented in their careers as doctors in the future.

INTRODUCTION

Nutritional knowledge is defined as knowledge of concepts and processes related to nutrition and health including knowledge of diet and health, health and disease, foods representing major sources of nutrients, and dietary guidelines and recommendations [1]. Nutrition knowledge is important as it directly influences the food choice, attitudes, and beliefs of a person towards health [2]. Moreover, knowledge of nutrition is important as individuals are able to make food choices that improve their lifestyles [3]. For example, by reading food labels and understanding the nutrition content, consumers are able to avoid food rich in unsaturated fats. Therefore, they can make a change to a healthier diet. Besides being aware of their dietary intake, people who have adequate nutrition knowledge are more likely to engage in physical activity as well. This could be explained by the fact that nutritional knowledge significantly influences the nutritional status and habits of individuals [4].

The importance of a healthy diet is highly relevant in the population of Malaysia as the prevalence of overweight adult population is 30.4% while 19.7% of the same are reported to be obese, based on the 2019 National Health and Morbidity Survey [5]. This is especially concerning as people who are obese have a higher risk of developing many non-communicable diseases (NCDs) such as Type 2 diabetes, cardiovascular disease, and carcinoma of the breast, large intestine, pancreas, and kidney [6]. Notably, men who are obese are seven times more likely to develop Type 2 diabetes while obese women are 12 times more likely to develop Type 2 diabetes compared to normal-weight individuals [7].

The lifestyle and personal habits of healthcare workers such as doctors are important as they can directly affect the care given to their patients [8]. For example, physicians who have a normal BMI prefer to provide lifestyle counseling to those who have a BMI in the overweight or obese ranges, compared to overweight physicians who prefer to prescribe weight loss medications as a way to lose weight [9]. Clinicians who monitor their diet and are conscious of the food they consume are more likely to counsel their patients to reduce the intake of foods high in cholesterol and sugar, as they are aware of the health hazards related to obesity [10,11]. Therefore, based on the findings of the study, they concluded that physicians who overcame their difficulties in maintaining a healthy lifestyle of eating healthy and regular physical exercise are more likely to provide effective counseling and

advice to their patients, as they put themselves in their patient's perspective when advising them to adopt a healthier lifestyle [12].

According to a study among medical students in the United States, the relevance of obtaining nutrition counseling declined in clinical year students, and reports of infrequent counseling of nutrition knowledge to their parents [13]. This is concerning as medical students in their clinical year who show less interest in counseling about nutrition is less likely to convince their future patients to change to a healthier diet. Knowledge of nutrition is also important as individuals with adequate knowledge of healthy eating are more likely to practice preventive measures to prevent disease [14]. Health prevention methods include any measures done to prevent disease or detect disease at an asymptomatic stage [15]. This could be done by practicing good eating habits and good health attitudes. Many factors influence an individual's nutrition knowledge, among them are gender, age, and educational background. Based on research done by Davy and Benes, there was a significant difference in the eating habits and nutrition knowledge between male and female college students in a large Midwestern university. Females agreed that they had a high intake of sugar in their diets, and it is important for them to limit their carbohydrate intake. A significant number of female students also admitted that it is important to limit their fat intake to lose weight [16].

It is assumed that medical students have greater knowledge about healthy lifestyle and dietary habits when compared to non-medical students, however, there is no substantive evidence that suggests greater knowledge of the above translates to the practice of good lifestyle and dietary habits [17]. This is concerning as healthy dietary habits should be emphasized especially in medical students who are to be future healthcare providers and advocates to the community for a healthy lifestyle. Therefore, they should set an example to the general population for better efficacy in providing advice in maintaining and practicing a healthy lifestyle. This could only be done by putting their 'self' in the doctor-patient relationship, as their influence on health-related behaviors is based on their attitudes, belief, self-efficacy, and an effective call to action as applied in their lives [18,19].

A study on the knowledge, attitude, and practice of university students in Selangor, Malaysia concluded that those who have good knowledge of nutrition did not necessarily have good eating habits. However, this study included university students with medical and non-medical degrees and diplomas. Hence, the factors that specifically affect the medical students in their clinical years could not be accurately determined [20]. Literature reviews of knowledge, attitude, and practice (KAP) on clinical students are very limited. Since clinical year medical students are soon to be doctors in the future, they should be aware of their eating habits during their medical student years as they experience doing clinical work and communicating with patients. Therefore, this study aimed to assess the nutrition knowledge, eating habits, and health attitude of the clinical year medical students in a private medical university and specifically to determine the factors which contribute to their food choices. The findings of this research could help improve the education on nutrition and healthy lifestyle promotion in medical universities. It would be beneficial for lifestyle medication that incorporates the evidence-based science of using behavior change for the prevention and management of chronic diseases [21]. Furthermore, the

incorporation of lifestyle medication into undergraduate medical education to improve patient healthcare and helps future doctors develop confidence in prescribing treatments to patients [22].

METHODS

Study design and setting

A cross-sectional study was conducted to assess health beliefs and lifestyles among clinical year medical students in a private medical university through an online questionnaire in English, from May 2022 to July 2022. The clinical year medical students from MBBS programs were included in this study. The purpose of the study was explained in the Google Form and consent was taken from the respondents. Confidentiality of the respondents was maintained.

Sample size and sampling

The sample size for this study was calculated using Epi Info software. The population was approximately 600 students, based on a 95% confidence interval and 8% margin of error, and the minimum sample size taken was 120 students. As there was no previous research done to assess the nutritional knowledge, habits, and health attitudes of clinical year medical students, the expected frequency is set as 50%. While taking into consideration the non-response rate of 10%, the final estimated sample size was 134 respondents. The sampling method used in this study was non-probability, purposive sampling. The inclusion criteria were medical students (MBBS) in the study institution from semesters 6-10 who voluntarily agreed to participate in the study and complete all the required parts of the questionnaire given after filling up the consent form. The exclusion criteria are non-clinical year MBBS students, BDS, and FIS students at the study university.

Data collection and analysis

The questionnaire consisted of four different components, which were demography, nutrition knowledge, eating habits, and health attitude. The demographic profile included age, gender, batch, semester, nationality, ethnicity, current height, weight, and monthly allowance. The nutritional knowledge questionnaire was measured by the Observed Knowledge about Nutrition (KNO) which consists of 11 dichotomies of "Yes/ No" items [23]. The eating habits section consisted of 10 questions that included the regularity of their meals, the type of foods they had in their diet, the intake of alcohol, and whether they usually eat alone or with friends or family [24]. The health attitude section consisted of 10 questions, including if they had been on a diet, consciousness of their diet, and factors

related to their food choice [24]. In addition, the respondents were asked if they were on a diet before, and if yes, the type of diet they had and the reason for being on a diet were enquired. Their opinion of the effectiveness and confidence of doctors in counseling on lifestyle changes if doctors practice healthy eating habits were included.

Data was analyzed using Epi Info version 7.2.4.0. The independent variables used in this study were age, gender, study year, monthly allowance, and BMI. Results were presented through frequency count and other descriptive statistics. The association between age, gender, study year, accommodation status, and monthly allowance with nutritional knowledge and eating habits of clinical year medical students was assessed with inferential statistics by using the Chi-square test. The significant level (p value) was set up at 0.05 with a 95% confidence interval.

Ethical considerations

Ethical approval was granted by the Research Ethics Committee, Faculty of Medicine, Manipal University College Malaysia (MUCM), Malaysia.

RESULTS

Table 1 shows the demographic characteristics of the respondents. As of age, it is divided into two categories which are younger or equal to 22 years old and older than 22 years old. Among the respondents, 64.03% respondents were younger or equal to 22 years old and 35.97% of respondents were older than 22 years old. For gender, 36.69% were males and 63.31% were females. For BMI, approximately half of them (46.04%) were normal weight (Table 1).

Table 1: Sociodemographic characteristics of respondents (n=139)

Variable	Frequency (%)
Age (years)	
≤22	89 (64.03)
>22	50 (35.97)
Gender	
Male	51 (36.69)
Female	88 (63.31)
Study Year	
Sem 6	43 (30.94)
Sem 7	73 (52.52)
Sem 8	14 (10.07)
Sem 9	5 (3.60)
Sem 10	4 (2.87)
BMI	
Underweight	19 (13.67)
Normal weight	64 (46.04)
Pre-obese	37 (26.62)
Obese I	19 (13.67)
Monthly Allowance	
< RM500	25 (17.99)
RM501-1000	74 (53.24)
>RM 1000	40 (28.78)

Table 2 shows the percentage of respondents who answered correctly for each item of nutrition knowledge. Percentage of respondents who answered correctly for Item 1 was 24 respondents (17.27%), Item 2 was 124 respondents (89.21%) , Item 3 was 122 respondents(87.77%), Item 4 was 125 respondents (89.93%), Item 5 was 135 respondents (97.12%), Item 6 was 67 respondents (48.20%) , Item 7 was 102 respondents(73.38%) , Item 8 was 101 respondents (72.66%) , Item 9 was 126 respondents (90.65%) , Item 10 was 127 respondents (91.37%) and Item 11 was 107 respondents (76.98%) . The overall correct answer scores were summed up and categorized as adequate and inadequate knowledge based on the median score. 47.48% of the respondents were found to have adequate nutritional knowledge (Table 2).

Table 2: Nutritional knowledge among the respondents (n=139)

No	Item	n (%) of correct answers
1	Whole milk is a better source of calcium than skimmed milk.	24 (17.27)
2	Removing the skin from chicken reduces the fat content.	124 (89.21)
3	Eating more bread helps to increase protein in the diet.	122 (87.77)
4	Any type of fat may damage health.	125 (89.93)
5	A high intake of salt may increase blood pressure.	135 (97.12)
6	Butter contains more cholesterol than margarine.	67 (48.2)
7	The daily calorie intake should not exceed in general 3200 calories	102 (73.38)
8	No more than a third of calories should come from fat.	101(72.66)
9	White bread is more nutritious than wholemeal bread.	126 (90.65)
10	Soya beans are a good source of proteins.	127 (91.37)
11	Cholesterol is found only in foods containing fat or oil.	107 (76.98)
Knowledge category based on median score		
Adequate knowledge		66 (47.48)
Inadequate knowledge		73 (52.51)

Regarding the nutritional habits among the respondents, approximately half of the respondents (53.96%) took their meals regularly and approximately one-third (34.53%) had breakfast daily. Most of the respondents had two and three meals per day with the frequency of 42.45% and 43.17% respondents respectively. As for balanced diet, 62.59% of the respondents selected meat, vegetables, and other variety of food to have a balanced diet, whereas 27.34% chose mainly vegetables in their diet, 5.75% chose mainly meat, and 4.32% chose others which was not specified (Table 3).

Table 3: Nutritional habits among respondents (n=139)

No	Nutritional habit	n (%)
1	Do you take your meals regularly?	
	Always regular	75 (53.96)
	Irregular	64 (46.04)
2	How often do you eat breakfast?	
	Daily	48 (34.53)
	3 - 4 times a week	24 (17.27)
	1 - 2 times a week	25 (17.99)
	Rarely	42 (30.21)
3	How many meals do you take in a day (except snacks)?	
	One time	12 (8.63)
	Two times	59 (42.45)
	Three times	60 (43.17)
	Four times	8 (5.75)
4	How often do you take snacks apart from regular meals?	
	Daily	30 (21.58)
	3 - 4 times a week	31 (22.30)
	1 - 2 times a week	43 (30.94)
	Rarely	35 (25.18)
5	How often do you eat green-, red- or yellow-coloured vegetables?	
	Daily	46 (33.09)
	3 - 4 times a week	48 (34.53)
	1 - 2 times a week	26 (18.71)
	Rarely	19 (13.67)
6	How often do you eat fruits?	
	Daily	17 (12.23)
	3 - 4 times a week	33 (23.74)
	1 - 2 times a week	53 (38.13)
	Rarely	36 (25.90)

7	How often do you eat fast food/fried food?	
	Daily	10 (7.19)
	3 - 4 times a week	21 (15.11)
	1 - 2 times a week	75 (53.96)
	Rarely	33 (23.74)
8	How often do you take alcohol?	
	Daily	2 (1.44)
	3 - 4 times a week	4 (2.88)
	1 - 2 times a week	12 (8.63)
	Rarely	59 (42.45)
	None	62 (44.60)
9	How often do you eat with friends and family?	
	Daily	64 (46.04)
	3 - 4 times a week	33 (23.74)
	1 - 2 times a week	33 (23.74)
	Rarely	9 (6.48)
10	What type of food do you think you should include in your current diet to have a balanced nutrition?	
	Mainly meat	8 (5.75)
	Mainly vegetables	38 (27.34)
	Meat, vegetables and other variety of food	87 (62.59)
	Others	6 (4.32)

Regarding health attitudes among the respondents, 61.87% reported of never been on diet and 38.13% reported of having been on diet previously. The reason for the students to be on diet is mainly to lose weight (49.64%), Whereas 41.01% of respondents were on diet to be healthier, 6.47% to have better energy levels, and 2.88% to have a better concentration. 68.34% of respondents wanted to learn more about health and diet. The majority of the respondents (77.7%) agreed that their eating habits changed after entering their clinical years and 46.76% reported stress increases their craving for unhealthy food. In addition, 87.05% of respondents stated doctors who practice good eating habits are more likely to be efficient in counseling a healthier lifestyle to their patients. The majority of the respondents (88.49%) agreed that doctors who practice good eating habits are more confident in counseling a healthier lifestyle to their patients. The details of the findings on health attitudes are reported in Table 4.

Table 4: Health Attitudes among respondents (n=139)

No	Health Attitude	n (%)
1	Have you ever been on a diet?	
	Yes	53(38.13)
	No	86(61.87)
2	What was the reason for you being on a diet?	
	To lose weight	69(49.64)
	To be healthier	57(41.01)
	To have better energy levels	9(6.47)
	For better concentration	4(2.88)
3	In general, how conscious are you of health and diets?	
	I want to learn more	95(68.34)
	I am not interested but it is better to know	41(29.50)
	I have absolutely no interest in this	3(2.16)
4	Do you consider changing your dietary habits?	
	I want to improve my dietary habits	117(84.17)
	I do not want to change my dietary habits as I think I am relatively healthy	17(12.23)
	I do not care about my diet	5(3.60)
5	Do you think healthy food options are accessible/ easy to obtain?	
	Yes	82(58.99)
	No	57(41.01)
6	Have your eating habits changed after entering clinical year?	
	Yes	108(77.70)
	No	31(22.30)
7	If yes, please indicate why? (Choose as much as possible)	
	Financial reasons (cheaper to make own food)	46(33.09)
	Shortage of time	90(64.75)
	Taste (Fast food/restaurant food tastes better)	47(33.81)
	Health (oats, boiled eggs, salads and other easy-to-make, homemade meals are healthier)	37(26.62)
	Physical and social environment (stress increases craving for unhealthy foods)	65(46.76)
	Weight control	31(22.30)
	Others: _____	14(10.07)
8	What do you think are the factors that influence your food choices: (Choose as much as possible)	
	Financial reasons (cheaper to make own food)	73(52.52)
	Shortage of time	96(69.06)
	Taste (Fast food/restaurant food tastes better)	78(56.12)

	Health (oats, boiled eggs, salads and other easy-to-make, homemade meals are healthier)	59(42.45)
	Physical and social environment (stress increases craving for unhealthy foods)	79(56.83)
	Weight control	48(34.53)
	Others: _____	6(4.32)
9	In general, would you say your health is...	
	poor	11(7.91)
	fair	52(37.41)
	good	65(46.76)
	very good	7(5.04)
	excellent	4(2.88)
10	Do you think doctors who practice good eating habits are more likely to be efficient in counseling a healthier lifestyle to their patients?	
	yes	121(87.05)
	no	6(4.32)
	don't know	12(8.63)
11	Do you think doctors who practice good eating habits are more confident in counseling a healthier lifestyle to their patients?	
	Yes	123(88.49)
	No	5(3.60)
	Don't know	11(7.91)

Table 5 shows the association between age, gender, study year, monthly allowance, and BMI towards nutritional knowledge among MUCM clinical year students. The findings revealed that there was no significant association between age, gender, study year, BMI, monthly allowance, and the respondents' nutrition knowledge (Table 5).

Table 5: Association between age, gender, study year, monthly allowance, and BMI towards nutritional knowledge among respondents (n=139)

Independent Variable	Frequency (%)	Knowledge (n%)		Odds Ratio	95% Confidence interval (CI)	P value
		Adequate	Inadequate			
Age						
≤ 22 years	89 (64.03)	42 (47.19)	47 (52.81)	Reference		
>22 years	50 (35.97)	24 (48.00)	26 (52.00)	1.03	0.52 - 2.07	0.927
Gender						
Male	51 (36.69)	18 (35.29)	33 (64.71)	Reference		
Female	88 (63.31)	48 (54.55)	40 (45.45)	0.64	0.34 - 1.23	0.182
Study year						
Semester 6	43 (30.94)	22 (51.16)	21 (48.84)	Reference		
Semester 7	73 (52.52)	33 (45.21)	40 (54.52)	0.79	0.37 - 1.68	0.535
Semester 8	14 (10.07)	7 (50.00)	7 (50.00)	0.95	0.03 - 2.31	0.940
Semester 9	5 (3.60)	1 (20.00)	4 (80.00)	0.24	0.01 - 2.75	0.350
Semester 10	4 (2.88)	3 (75.00)	1 (25.00)	2.86	0.21 - 157.36	0.611
BMI						
Obese I	19 (13.67)	9 (47.37)	10 (52.63)	Reference		
Underweight	19 (13.67)	6 (31.58)	13 (68.42)	0.51	0.14 - 1.99	0.319
Normal weight	64 (64.04)	32 (50.00)	32 (50.00)	1.11	0.40 - 3.10	0.840
Pre obese	37 (26.62)	19 (51.35)	18 (48.65)	1.17	0.39 - 3.55	0.778
Monthly allowance						
< RM 500	25 (19.99)	12 (48.00)	13 (52.00)	Reference		
> RM 1000	40 (28.78)	20 (50.00)	20 (50.00)	1.08	0.40 - 2.95	0.875
RM 501 – RM 1000	74 (54.24)	34 (45.95)	40 (54.05)	0.92	0.37 - 2.28	0.859

Table 6 shows the association between age, gender, study year, monthly allowance, and BMI towards nutritional habits among MUCM clinical year students. The findings revealed that there was no significant association between age, gender, BMI, monthly allowance, and the respondents' nutritional habits. Regarding the study years, respondents in Semester 8 were less likely to have good nutritional habits compared to Semester 6 respondents with an odd ratio of 0.24 (95%: 0.058 - 0.97, p = 0.037) (Table 6)

Table 6: Association between age, gender, study year, monthly allowance, and BMI towards nutritional habits among respondents (n=139)

Independent Variable	Nutritional Habits (n%)		Odds Ratio	95% Confidence interval (CI)	P value
	Good	Poor			
Age					
≤ 22 years	41(46.07)	48(53.93)	Reference		
>22 years	21(42.00)	29(58.00)	0.85	0.42 - 1.71	0.643
Gender					
Male	20(39.22)	31(60.78)	Reference		
Female	42(47.73)	46(52.27)	1.41	0.70 - 2.85	0.331
Study year					
Semester 6	23(53.49)	20(46.51)	Reference		
Semester 7	32(43.84)	41(56.16)	0.68	0.32 - 1.45	0.315
Semester 8	3(21.43)	11(78.57)	0.24	0.06 - 0.97	0.037
Semester 9	3(60.00)	2(40.00)	1.30	0.13 – 17.00	1.000
Semester 10	1(25.00)	3(75.00)	0.29	0.01 - 4.04	0.348
BMI					
Obese I	6(54.55)	5(45.45)	Reference		
Underweight	11(57.89)	8(42.11)	1.15	0.20 - 6.48	1.000

Normal weight	32(50.00)	32(50.00)	1.30	0.20 - 8.61	0.782
Pre obese	5(26.32)	14(73.68)	0.30	0.05 - 1.84	0.238
Monthly allowance					
< RM 500	11(44.00)	14(56.00)	Reference		
> RM 1000	14(35.00)	26(65.00)	0.69	0.25 - 1.91	0.468
RM 501 – RM 1000	37(50.00)	37(50.00)	1.27	0.51 - 3.17	0.604

Table 7 shows the association between age, gender, study year, monthly allowance, and BMI towards health attitudes among MUCM clinical year students. The findings revealed that there was no significant association between age, gender, study year, BMI, monthly allowance, and the respondents' health attitudes (Table 7).

Table 7: Association between age, gender, study year, monthly allowance, and BMI towards health attitudes among respondents (n=139)

Independent Variable	Nutritional Attitude (n%)		Odds Ratio	95% Confidence interval (CI)	P value
	Good	Poor			
Age					
≤ 22 years	58 (65.17)	31 (34.83)	Reference		
>22 years	29 (58.00)	21 (42.00)	1.35	0.66 - 2.76	0.402
Gender					
Male	27 (52.94)	24 (47.06)	Reference		
Female	60 (68.18)	28(31.82)	1.90	0.94 -3.87	0.074
Study year					
Semester 6	28 (65.12)	15 (34.88)	Reference		
Semester 7	46 (63.01)	27 (36.99)	0.91	0.42 -2.01	0.820

Semester 8	9 (64.29)	5 (35.71)	0.96	0.24 - 4.36	1.000
Semester 9	2 (40.00)	3 (60.00)	0.36	0.03 - 3.56	0.349
Semester 10	2 (50.00)	2 (50.00)	0.54	0.04 - 8.19	0.613
BMI					
Obese I	11 (57.89)	8 (42.11)	Reference		
Underweight	12 (63.16)	7 (36.84)	1.25	0.34 - 4.59	0.740
Normal weight	39 (60.94)	25 (39.06)	1.13	0.40 - 3.21	0.812
Pre obese	25 (67.57)	12 (32.43)	1.52	0.48 - 4.75	0.474
Monthly allowance					
< RM 500	15 (60.00)	10 (40.00)	Reference		
> RM 1000	25 (62.50)	15 (37.50)	1.11	0.40 - 3.10	0.840
RM 501 – RM 1000	47 (63.51)	27 (36.49)	1.16	0.46 - 2.94	0.754

Figure 1 shows the percentage of types of diet among respondents who answered that they had ever been on a diet. Intermittent fasting had the highest percentage which is 29.41%. The second highest percentage was the keto diet where it occupied 21.57%. Low carb diet carried 13.73 % of the overall percentage. Calorie deficit, water diet, and vegan were 11.76%, 7.84% and 1.96% respectively (Figure 1).

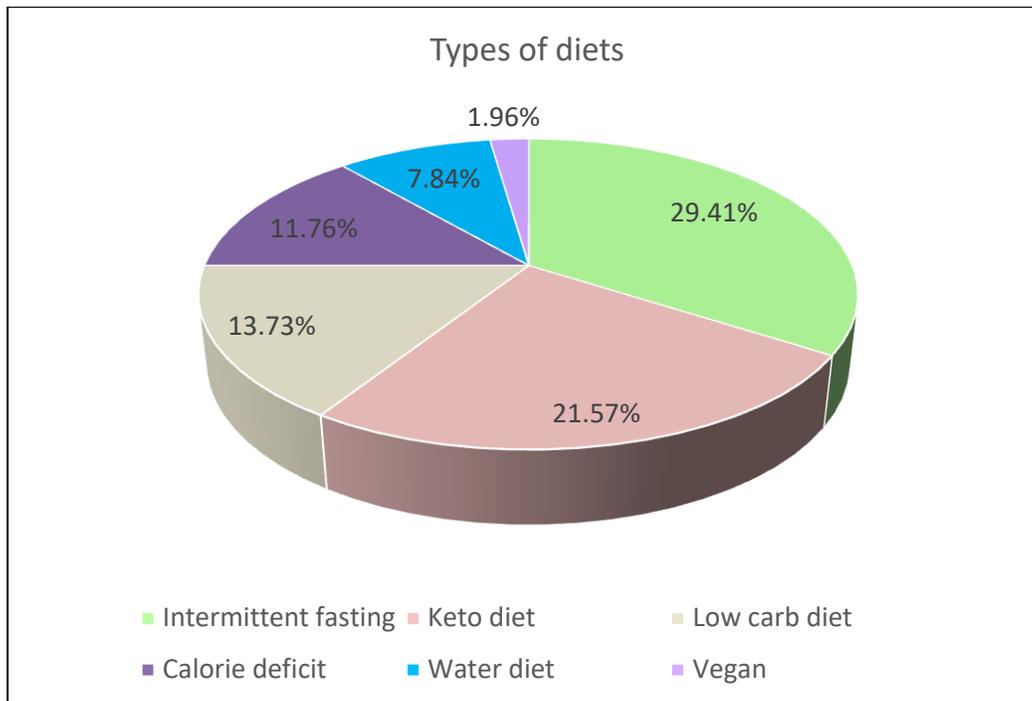


Figure 1: Types of diets among respondents who had been on diet (n=53)

DISCUSSION

This cross-sectional study was conducted among clinical year undergraduate students of a private medical university to assess their nutrition knowledge, eating habits, and health attitude and to specifically determine the factors which contribute to their food choices. Based on the BMI calculated from self-reported weight and height, the majority of the respondents were normal weight (64.04%) while 26% of the respondents were Pre-Obese and 16% of respondents were Obese-I. The BMI classification is based on the WHO BMI classification for Asian adults. As Asians have a lesser percentage of body fat compared to Whites, the BMI classification for Asians is used for better identification of diseases at risk based on the BMI cut-off points [25]. Our findings revealed that the total knowledge score of the percentage of students who responded correctly was higher compared to the study population in Romania. The mean total knowledge score of our respondents was 75.87 (SD \pm 23.76), while the total knowledge score of the respondents in Romania was 66.91 (SD \pm 19.38). This could be due to the educational background of medical students, as they were more knowledgeable about nutrition compared to the non-medical population [26]. The difference in nutritional knowledge scores could be due to the different socio-demography features of the population. For example, the general population of Romania mostly has low income and a low level of formal education. Additionally, it is interesting to note that the general population of Romania also perceived the presence of disease as a motivation to improve their health. Moreover, the mentioned study also expressed that

those with higher levels of knowledge about nutrition, higher levels of health motivation, and stronger beliefs that diet could prevent disease were more likely to perform Dietary Health Preventive Behavior, such as consuming lots of fruits and vegetables, food rich in fiber and products with low animal fat content, and also limit their alcohol intake [26]. The findings of this study could also be applied here in the context of medical education, as the nutritional knowledge of medical students could still be improved.

There was no significant association between age, gender, study year, monthly allowance, and BMI on nutritional knowledge in this study. In comparison, a study in several universities in Selangor found a significant association between gender towards nutritional knowledge ($p < 0.05$) which differed from this study. Although the finding was not significant in our study, females (54.55%) have better knowledge compared to males (35.29%). This finding was similar to university students in Selangor [20]. This could be justified by the fact that females have a stronger tendency to hold on to health beliefs as noted in the previous studies [16]. Females are more health conscious of their food and prioritize healthy eating more than males. It was reflected in our study as females showed better eating habits compared to males. Generally, literature has shown that females were more health conscious compared to males. This has its downsides as well because females have more anxiety regarding the unhealthiness of their diet, therefore they adhere strictly to 'diet culture' and fad diets proposed by the media-which might not be scientifically true [27]. Surprisingly, in another study of the Norwegian population, young women who studied in the field of Health Sciences, admitted that they were influenced by the information regarding diet and nutrition provided by the media, which might not be scientifically true. This number was significantly more than males (42% vs 27%) [28].

The findings of this study showed that many students ate regularly in a day, which had similar findings to the study conducted by Sakamaki [29]. However, only a few students reported of eating vegetables (33.09%) and fruits (12.23%) daily compared to the previously mentioned study population. Among those who had vegetables daily, females (71.74%) were reportedly more than males (28.26%). The majority of females (76.47%) ate fruits daily compared to males (23.53%). The respondents also rarely took (42.45%) or did not take alcohol at all (44.60%). Also, a majority of females (60.82%) reported that they ate with friends and family daily. These all were similar findings to a study by Sakamaki as well [29]. As regular meal intake is associated with better digestion, maintenance of a robust circadian rhythm, and prevents the development of obesity, Type 2 diabetes mellitus, and cardiovascular disease [30]. Meanwhile, skipping breakfast increases the risk of late-night eating to compensate for the lack of calories taken earlier in the day, higher daily intakes of fat, energy and cholesterol, and lower intakes of vitamins, minerals and fiber compared to breakfast eaters [31].

In this study, there was no significant association between age, gender, study year, monthly allowance, and BMI towards health attitude. Approximately one-third of respondents said they had been on a diet and the majority of them were females. Among those who wanted to lose weight by dieting, 69.57% were females. As women have a strong desire to attain a good physique and have greater anxiety towards their weight and hence control their diets

strictly compared to men [32]. Females also reported that they were conscious of their diets compared to males. This finding is similar to a study by Bärebring, in which women were more health conscious of their diet compared to males [27]. This could be due to many emerging diet fads.

Interestingly, 58.99% of students said they think healthy food options were easy to obtain and 77.70% of students said their eating habits changed after entering the clinical year. In which they gave reasons that there was a shortage of time to prepare their own food, outside food tasted better, and financial reasons which indicated the majority of students preferred to eat out as compared to making their meals. Additionally, a concerning factor is the influence of physical and social environment, such as stress. It is an indicator of poor eating habits as stress increases their craving for unhealthy foods, this is especially concerning as it is the second highest factor that determined the eating habits chosen by students. A previous study reported that the more stressful the respondents, the more they would practice an unhealthy diet [33]. Another study also pointed out that people living in a stressful society tend to eat more as a way of coping with stress [34].

The majority of the respondents in this study thought that doctors who practiced good eating habits were more likely to be efficient in counseling a healthier lifestyle to their patients, and doctors who practiced good eating habits were more confident in counseling a healthier lifestyle to their patients. A study by Bleich mentioned that physicians who were normal weight were more confident in counseling healthy lifestyle habits compared to overweight physicians. Based on the previous study that reported the physicians who had a normal BMI participated in regular physical activity and were more likely to counsel their patients to engage in regular physical activity as well [35]. Hence, awareness and practice of better eating habits should be encouraged among the medical student population so they will have improved health perception as future doctors.

Limitations

The findings of this study are limited as the sample population was from one university only. Hence, the findings might not be representative of all university students in Malaysia. During the data collection, height and weight data were collected as self-reported data. Therefore, there was the possibility of an inaccurate representation of overweight students. Since this was a cross-sectional study, the respondents' nutritional knowledge, eating habits, and attitudes change over time could not be observed.

CONCLUSION AND RECOMMENDATION

There was no statistically significant association between age, gender, study year, BMI, and a monthly allowance towards nutritional knowledge, eating habits, and health attitude. However, females had better nutrition knowledge and eating habits compared to males. As for health attitudes, the majority of females reported having been on a diet before, compared to males (71.70%), and the majority of females said the main reason for them dieting was to lose weight (54.55%). This could be viewed parallelly as beneficial and harmful to health, as dieting could maintain BMI within a healthy range but being obsessed with their diet had a negative impact on their mental and physical health. Moreover, the number of respondents who reported they found healthy food options easy to obtain was not convincing. Hence, the availability and affordability of healthy food options should be made available for the students. Health awareness programs and fitness clubs among medical students should also be encouraged by the universities. This is to educate and nurture healthy habits in future healthcare professionals, therefore building confidence in them to counsel on healthy lifestyles to their future patients.

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REFERENCES

1. Axelson & Brinberg, 1992; McKinnon, Giskes & Turrell, 2014; Moorman, 1996; Parmenter & Wardle, 1999
2. Fitzgerald, Damio, Segura-Perez, & Perez Escamilla, 2008; Satia, Galanko, & Neuhauser, 2005
3. Koch F, Hoffmann I, Claupein E. Types of nutrition knowledge, their socio-demographic determinants and their association with food consumption: Results of the NEMONIT study. *Frontiers in Nutrition*. 2021;8.
4. Akpene Amenya PC, Annan RA, Apprey C, Agleby EN. The relationship between nutrition and physical activity knowledge and body mass index-for-age of school-aged children in selected schools in Ghana. *Heliyon*. 2021;7(11).
5. Obesity in Malaysia is a ticking time bomb [Internet]. Department of Social and Preventive Medicine. 2021 [cited 2022Jun4]. Available from: <https://spm.um.edu.my/2021/03/05/obesity-in-malaysia-is-a-ticking-time-bomb/>

6. Health risks [Internet]. Obesity Prevention Source. 2016 [cited 2022 Jun 5]. Available from: <https://www.hsph.harvard.edu/obesity-prevention-source/obesity-consequences/health-effects/>
7. Algoblan A, Alalfi M, Khan M. Mechanism linking diabetes mellitus and obesity. *Diabetes, Metabolic Syndrome and Obesity: Targets and Therapy*. 2014;:587.
8. Frank E. Physician disclosure of healthy personal behaviors improves credibility and ability to motivate. *Archives of Family Medicine*. 2000;9(3):287–90.
9. Bleich SN, Bennett WL, Gudzone KA, Cooper LA. Impact of physician BMI on Obesity Care and beliefs. *Obesity*. 2012;20(5):999–1005.
10. Frank E. Correlates of Physicians' prevention-related practices: Findings from the Women Physicians' Health Study. *Archives of Family Medicine*. 2000;9(4):359–67.
11. Forman-Hoffman V, Little A, Wahls T. Barriers to obesity management: A Pilot Study of Primary Care Clinicians. *BMC Family Practice*. 2006;7(1).
12. Knight C. Therapeutic use of self: theoretical and evidence-based considerations for clinical practice and supervision. *Clin Superv*. 2012;31:1-24
13. Spencer EH, Frank E, Elon LK, Hertzberg VS, Serdula MK, Galuska DA. Predictors of nutrition counseling behaviors and attitudes in US medical students. *The American Journal of Clinical Nutrition*. 2006;84(3):655–62.
14. Alkerwi A, Sauvageot N, Malan L, Shivappa N, Hébert J. Association between Nutritional Awareness and Diet Quality: Evidence from the Observation of Cardiovascular Risk Factors in Luxembourg (ORISCAV-LUX) Study. *Nutrients* [Internet] 2015;7(4):2823–38. Available from: <http://dx.doi.org/10.3390/nu7042823>
15. Kisling LA, M Das J. Prevention Strategies. [Updated 2022 May 8]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK537222/>
16. Davy SR, Benes BA, Driskell JA. Sex differences in dieting trends, eating habits, and nutrition beliefs of a group of Midwestern College Students. *Journal of the American Dietetic Association*. 2006;106(10):1673–7.
17. Sakamaki R, Toyama K, Amamoto R, Liu CJ, Shinfuku N. Nutritional knowledge, food habits and health attitude of Chinese university students — a cross sectional study. *Nutr J* 2005; 4: 4.
18. Cepni, Aliye B., Cherine Hatem, Tracey A. Ledoux, and Craig A. Johnston. “The Importance of Health Values among Health Care Providers.” *American Journal of Lifestyle Medicine* 15, no.3 (2021): 224–26. <https://doi.org/10.1177/1559827621992271>.
19. Knight C. Therapeutic use of self: theoretical and evidence-based considerations for clinical practice and supervision. *Clin Superv*. 2012;31:1-24.
20. Hassan MR, Ghazi HF, Umar NS, Masri N, Jamil SM, Isa ZM, et al. Knowledge, attitude and practice of healthy eating and associated factors among university students in Selangor, Malaysia. *Pakistan Journal of Nutrition*. 2015;14(12):892–7.
21. Lianov L, Johnson M. Physician competencies for prescribing lifestyle medicine. *JAMA* 304: 202–203, 2010. doi:10.1001/jama.2010.903.

22. Pasarica M, Kay D. Teaching lifestyle medicine competencies in undergraduate medical education: Active collaborative intervention for students at multiple locations. *Advances in Physiology Education*. 2020;44(3):488–95.
23. Petrovici DA, Ritson C. Factors influencing consumer dietary health preventative behaviours. *BMC Public Health*. 2006;6(1).
24. . Sakamaki R, Toyama K, Amamoto R, Liu CJ, Shinfuku N. Nutritional knowledge, food habits and health attitude of Chinese university students — a cross sectional study. *Nutr J* 2005; 4: 4.
25. UpToDate. [cited 2022Jul9]. Available from: <https://www.uptodate.com/contents/image?imageKey=OBGYN%2F97661>
26. Kagan DM, Squires RL: Compulsive eating, dieting, stress and hostility among college students. *J Coll Stud Pers* 1984, 25(3):213–220.
27. Bärebring, L., Palmqvist, M., Winkvist, A. *et al.* Gender differences in perceived food healthiness and food avoidance in a Swedish population-based survey: a cross sectional study. *Nutr J* 19, 140 (2020). <https://doi.org/10.1186/s12937-020-00659-0>
28. Svendsen K, Torheim LE, Fjelberg V, Sorprud A, Narverud I, Retterstøl K, Bogsrud MP, Holven KB, Myhrstad MCW, Telle-Hansen VH. Gender differences in nutrition literacy levels among university students and employees: a descriptive study. *Journal of Nutritional Science*. Cambridge University Press; 2021;10:e56.
29. Sakamaki, R., Toyama, K., Amamoto, R., Liu, C.-J., & Shinfuku, N. (2005). Nutritional knowledge, food habits and health attitude of Chinese University Students –a cross sectional study–. *Nutrition Journal*, 4(1). <https://doi.org/10.1186/1475-2891-4-4>
30. Manoogian, E. N. C., Chaix, A., & Panda, S. (2019). When to Eat: The Importance of Eating Patterns in Health and Disease. *Journal of Biological Rhythms*, 34(6), 579–581. <https://doi.org/10.1177/0748730419892105>
31. Lopez-Minguez, J., Gómez-Abellán, P., & Garaulet, M. (2019). Timing of Breakfast, Lunch, and Dinner. Effects on Obesity and Metabolic Risk. *Nutrients*, 11(11), 2624. <https://doi.org/10.3390/nu11112624>
32. Cash TF, Brown TA: Body image in anorexia nervosa and bulimia nervosa. *Behav Modif* 1987, 11:487-521.] On the other hand, men have reported a desire for a heavier physique and muscularity [Pope HG Jr, Gruber AJ, Mangweth B, Bureau B, deCol C, Jouvent R, Hudson JI: Body image perception among men in three countries. *Am J Psychiatry* 2000, 157:1297-301.
33. Thawabieh, A.M. and L.M. Qaisy, 2012. Assessing stress among university students. *Am. Int. J. Contemporary Res.*, 2: 110-116.
34. Gower B, Hand CE, Crooks ZK: The relationship between stress and eating in college-aged students. *Undergraduate Research Journal for the Human Sciences* 2008, 7:ISBN1-929083-13-0. <http://www.kon.org/urc/v7/crooks.htm>.
35. Bleich, S. N., Bennett, W. L., Gudzone, K. A., & Cooper, L. A. (2012). Impact of physician BMI on obesity care and beliefs. *Obesity (Silver Spring, Md.)*,20(5), 999–1005.