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Original article

Symptoms and Risk Factors of Gastroesophageal Reflux Disease Among Medical Students in Oman

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Abstract

Background: There is a lack of studies related to the prevalence of gastroesophageal reflux disease (GERD) symptoms in Oman. The presence of the risk factors like consumption of caffeine-containing drinks, energy drinks, bad eating habits that contribute to the development of GERD were reported to be at a higher rate among medical students. This study was conducted to calculate the prevalence of GERD-related symptoms and the risk factors among medical students at the College of Medicine and Health Science, National University, Oman. ***Materials and methods:*** A questionnaire was circulated among the students of different study years which was based on the GERD Q-validated questionnaire. Additional questions were included regarding the presence of some of the risk factors of GERD. ***Results:*** Around 10.3% of the participants (43 out of 417) have satisfied the criteria of GERD Q with a statistically significant association ($p>0.05$) between high scoring GERD symptoms and body mass index (BMI), smoking, and the consumption of energy drinks. The most common symptoms reported were abdominal pain (59.7%), nausea (55.4%), burning sensation (47%), and regurgitation (45.6%). ***Conclusions:*** Due to the lifestyle of medical students and the high level of risk factors involved in the student's daily life; the possibility of developing GERD symptoms is high. Further confirmation of diagnosis by endoscopy will be needed.

Keywords: ***Gastroesophageal reflux disease, medical students, risk factors***

Introduction

Gastroesophageal reflux disease (GERD) is a digestive disorder affecting the lower esophageal sphincter and the stomach which can cause the reflux of stomach acid to the esophagus causing a burning sensation [1]. Due to the symptoms of GERD, patients can suffer to do their daily routine, enjoy their time, have a good night's sleep, and complete the tasks they are expected to do [2].

The prevalence of GERD worldwide was recorded to be the highest in North America (18.1%-27.8%), and the lowest was recorded in East Asia (2.5%-7.8%). When it comes to the Middle East, the prevalence recorded was 11.6% [1]. The prevalence recorded in Saudi Arabia ranged between 15% to 45.4% which is a close estimate of the prevalence of GERD in Oman due to similar cultural and food habits [2].

The most common modifiable risk factors of GERD are increased body mass index (BMI), high alcohol consumption, smoking, lack of regular exercise, consumption of fatty food, spicy food, coffee, tea, and some eating habits like large quantities of food per meal or sleeping within one hour of eating dinner. The non-modifiable risk factors are mainly age, gender, and genetic factors [3].

The association between GERD and BMI has been mentioned in many different studies. It was proved that people with a BMI of 25 kg/m^2 or more are more susceptible to having more severe and frequent symptoms of GERD and have a higher possibility of developing complications of GRED such as erosive esophagitis and Endoscopy Negative Reflux Disease (ENRD) [4,5].

Caffeine has also been noted to be causing reduction of pressure and the contractility of the lower esophageal sphincter and could cause triggering of the symptoms of GERD in some people, also due to the acidity of the beverage itself can make the patient feel heartburn after consuming it [6]. The study of the effect of caffeine is an important factor seen due to the high consumption of caffeine-containing beverages among medical students as a way to maintain a high level of attention.

Genetic factors are playing an important role in the development of GERD. Different studies have shown that multiple single-nucleotide polymorphism variations in different genes are associated with a high risk of having GERD [7].

Complications of GERD can be esophagitis or ulceration and narrowing in the esophagus that will cause dysphagia. In the long run, esophageal inflammation can lead to gastrointestinal bleeding and even peptic strictures. Due to the exposure of the esophageal tissue to gastric acids; the patient might be susceptible to developing Barrett's esophagus which can end with adenocarcinoma[8].

In this study, we are aiming to acquire more knowledge regarding GERD symptoms in addition to the risk factors related to this disease among medical students in Oman.

Materials and Methods

A cross sectional study was carried out in the College of Medicine and Health Sciences (COMHS), National University, Suhar to assess symptoms related to GERD and associated risk factors of such problems among medical students. Data collection and analysis were done from December 2022 to March 2023, after getting approval from the Ethics and Biosafety Committee (EBC). The sampling frame included all the medical students of COMHS; thus, no sample size was calculated. Informed consent was taken from the students and their participation deemed voluntary; data anonymity and confidentiality were maintained.

A structured pretested questionnaire adapted from available literature, (Gerd-Q questionnaire, Jones et al) [9], was used to collect data from all the medical students from first year to the sixth year who gave informed consent to participate in the study. Independent variables were the demographic characteristics of students like age, gender, and year of study. The dependent variable was the Gerd-Q questionnaire and risk factors for the disease. The questionnaire had closed-ended questions on all domains in the form of none, once a day, 2-3 times a day, and more than 3 times a day. The questionnaire was pilot tested with a few students (10 students for each year) before the actual data collection to verify the validity of the content, grammar, and language used. Students who participated in the pilot study were excluded from the actual study. Weight and height were taken to calculate the BMI of the participants. Data were filled in by the students in person in the college. Data entry and analysis were done using Statistical Package for Social Sciences (SPSS) software program, version 23.0. After data entry, thorough data filtering was carried out; incomplete responses in 2 or more items were discarded. The descriptive statistics was used to summarize the demographic data and risk factors in the form of frequencies and percentages, while mean and standard deviation was used to summarize the age of the participants. Chi-square test was used as a test of significance. A p-value less than 0.05 was used for statistical significance.

Results

This study involved 428 students from the College of Medicine & Health Sciences, National university who agreed to participate, gave informed consent and filled in the questionnaire. Out of total responses, 417 were complete and thus were analyzed.

The data on socio-demographic variables were collected for the participants that included age, gender, medical year and BMI. The percentage of the male participants was 12% whereas female participants were the majority of the sample with 88%. The mean age of the participants was 21 years. The responses were higher in 1st and 2nd medical years 22.7% and 24.2% respectively. The least responses were from the year 5th medical year 5.3%, and this is due to the poor communication with the students of this year. Most students had a normal range of BMI (53.7%), around 19.7% were underweight, 19.9% were overweight and 6.7% were obese, as seen in Table 1.

The proportion of medical students with GERD symptoms base on GERD score was 43 which represents 10.3% of the medical students included in this study, where 6.7% had 79% likelihood of GERD and 3.6% had 89% likelihood of GERD, as seen in Table 2.

In this study, the Most common GERD symptom was stomach pain (59.7%) followed by nausea (55.4%), burning sensation (47%) and regurgitation (45.6%), as seen in Table 3.

The risk factors of developing GERD symptoms were studied the consumption of caffeine containing drinks, bad eating habits such as sleeping within one hour of dinner, spicy food family history of GERD, lack of regular exercise, and habit of smoking. The most common habit among medical students was the consumption of spicy food (91.1%), and consumption of caffeine containing drinks (69.8%) followed by bad eating habits (58.8%). Positive family history of GERD was found in 27.6% of students. Most of the medical students (54%) did not report routine exercise. Only 1% of students replied yes when asked if they were smokers, as seen in Table 4.

The participants with high GERD score (43 students) were analyzed for the GERD risk factors and comparison was made across males and females. All the males had a BMI of either overweight or obese whereas females were mostly having normal or underweight BMI ($p<0.01$). Males consuming high energy drinks was higher (57.1%) when compared to females (13.9%) and this difference was statistically significant ($p<0.05$). 14.3% male students reported smoking along with high GERD score ($p<0.05$). Coffee consumption was almost a similar high-risk factor across both genders. More females with GERD had a regular habit of consumption of spicy food (41.7%) when compared to males (28.6%). Similarly, more female students with high GERD score had a positive family history of GERD (36.1%) compared to males (14.3%). Females also reported more bad eating habits (58.3%) than males (42.9%). However, these differences were not statistically significant ($p>0.05$), as seen in Table 5.

Table 1: Socio-demographic variables of the study participants

Variables		Number (417)	Percentage (%)
Gender	Male	50	12
	Female	367	88
Medical year	1st	95	22.8
	2nd	101	24.2
	3rd	64	15.3
	4th	72	17.3
	5th	22	5.3
	6th	63	15

Body mass index	Underweight	82	19.6
	Healthy	224	53.7
	Overweight	83	20
	Obese	28	6.7
Age (years)	Mean	21	
	Stander deviation	2.186	
	Range	17 to 30	

Table 2: Prevalence of gastroesophageal reflux disease (GERD) symptoms base on GERD score

Classification of GERD	Number (417)	Percentage (%)
No likelihood of GERD	374	89.7
79% likelihood of GERD	28	6.7
89% likelihood of GERD	15	3.6

Table 3: Symptoms of gastroesophageal reflux disease

Characteristic	Frequency	Number (417)	Percentage (%)
Burning sensation	Never	221	52.99
	Once / a day	117	28.05
	2-3 / a day	65	15.6
	> 3 / a day	14	3.35
Regurgitation	Never	227	54.4
	Once / a day	135	32.3
	2-3 / a day	47	11.3
	> 3 / a day	8	1.92
Stomach pain	Never	168	40.3
	Once / a day	154	36.9
	2-3 / a day	74	17.7
	> 3 / a day	21	5.03
Nausea	Never	186	44.6
	Once / a day	130	31.17
	2-3 / a day	82	19.66
	> 3 / a day	19	4.55
Difficulty in sleep	Never	302	72.42
	Once / a day	75	17.98
	2-3 / a day	35	8.4
	> 3 / a day	5	1.2
Over counter medications	Never	375	89.92
	Once / a day	25	5.99
	2-3 / a day	10	2.39
	> 3 / a day	7	1.7

Table 4: Risk factors for gastroesophageal reflux disease

Risk factors		Number (417)	Percentage (%)
Tea/ Coffee consumption	No	126	30.2
	Yes	291	69.8
Energy drinks	No	196	47
	Yes	221	53
Spicy food	No	37	8.9
	Yes	380	91.1
Bad eating habits	No	172	41.24
	Yes	245	58.76
Family history	No	302	72.42
	Yes	115	27.58
Regular exercise	No	225	53.9
	Yes	192	46.1
Smoking	No	413	99.05
	Yes	4	0.95

Table 5: Gender profile and risk factors for students with gastroesophageal reflux disease symptoms

Variables		Male (7)		Female (36)		p value
		Number	Percentage%	Number	Percentage%	
Body mass index	Not Overweight	0	0	29	80.6	0*
	Overweight	7	100	7	19.4	
Energy drinks	No	3	42.85	31	86.1	0.01*
	Yes	4	57.15	5	13.9	
Smoking	No	6	85.7	36	100	0.022*
	Yes	1	14.3	0	0	
Tea/Coffee consumption	No	2	28.6	10	27.8	0.644
	Yes	5	71.4	26	72.2	
Spicy foods	No	5	71.4	21	58.3	0.419
	Yes	2	28.6	15	41.7	
Bad eating habits	No	4	57.15	15	41.7	0.365
	Yes	3	42.85	21	58.3	
Family history	No	6	85.7	23	63.9	0.255
	Yes	1	14.3	13	36.1	

**Significant according to Chi-square test*

Discussion

Gastroesophageal reflux disease (GERD) is a digestive disorder affecting the lower esophageal sphincter and the stomach with a lot of risk factors and complications [1]. In this study, we were looking for the prevalence and risk factors of GERD symptoms among medical students at the National University of Science and Technology using a valid GERD questionnaire (GERD Q).

For unknown reasons, the prevalence of GERD varies globally. According to a review of the literature, GERD prevalence in the Middle East ranged from 8 to 33% [1]. In our study, the prevalence of GERD symptoms among medical students was 10.3%, which was within the Middle East range. It was approximately similar to a study done among medical students in South India where they reported the prevalence of GERD symptoms around 14.4% [10]. In comparison to other studies, the prevalence of GERD symptoms among medical students was 25%, 25.9% and 26.3% in studies done in India, Saudi Arabia and Nigeria, respectively [11-13].

Based on the GERD Q score, the result of our study showed that 10.3% of the 417 participants have a likelihood of having GERD, and 89.7% have no likelihood of having GERD. Such a result almost similar to Afandi et al. study, which reported that 14.8% of the 385 participants were diagnosed with GERD using the GERD Q score [14]. On the contrary, the study by Atta et al. has shown that 25.9% of 197 participants have a high likelihood of developing GERD based on the GERD Q score [12]. Furthermore, a study by Hemdi et al., using the same scoring system, found that out of 365 medical students who participated in the study, 31.8% had a high possibility of developing GERD [15]. This variation can be related to the sample size, sedentary life habits and diet preferences.

Our study shows that the BMI category of the female participants with a high GERD Q score was mostly in the non-overweight category. On the other hand, the high-scoring male participants are either obese or overweight suggesting that the association between BMI and GERD symptoms depends also on the gender factor. The fact that higher BMI is associated with higher GERD score was found also in different studies, where Atta et al study found 50.9% of participants with positive GERD scoring have a high BMI [12]. Also, Arivan et al study reported that there is a great association between BMI and the frequency of GERD symptoms [16]. In comparison to these studies, the study done by the University of Nigeria's reported no correlation between BMI and GERD scoring suggesting that the factor of race can also play a role in this association [13].

Regarding the results of the most common symptoms related to GERD, our study reported abdominal pain, nausea, and burning sensation to be the most frequent. On the other hand, the results of the Atta et al and Arivan et al studies both reported a burning sensation to be the most common symptom followed by regurgitation [12,16].

The risk factors that were significant in our study were BMI, smoking, and the consumption of energy drinks. This association is also supported by other different studies [12,13,16].

The limitations encountered in our study were, firstly, the sample size was small when compared to the prevalence of the disease, thus the analysis of data was more complicated. We cannot reflect the prevalence of the GERD in the entire Omani population because the study done in one medical college. Secondly, the symptoms can be misleading for GERD in comparison with confirmatory investigations, as we were no using upper gastro-intestinal endoscopy to confirm the diagnosis of GERD. Also, we did not do follow-up or investigations for those students with a high likelihood of GERD symptoms.

Conclusion

This prevalence of GERD symptoms among medical students falls within the range of the prevalence of the disease in the Middle East. Our study supports the great association between BMI, energy drinks consumption, and smoking with the occurrence of symptoms of GERD. The most common presenting symptoms were abdominal pain, nausea, and burning sensation. Further studies are to be conducted for more precise identification of the prevalence among the Omani population.

Informed Consent

A signed consent was taken by the researchers before recruitments of the students into the study.

Ethical Approval

Ethical approval was obtained from the Ethics and Biosafety Committee, college of Medicine and Health Sciences with reference number NU/COMHS/EBC0040/2023.

Conflict of Interest

The authors report no conflicts of interest in this work.

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Nil.

Authors' Contributions

Mazin Al-rudaini conceptualized the topic. All authors were involved in data collections and literature review. Sanam Anwar analyzed the data and wrote the results. All authors wrote the final draft and approved the final manuscript.

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