Original Article

Prevalence and risk factors of gastroesophageal reflux disease among Shaqra University students, Saudi Arabia

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ABSTRACT

Introduction: Gastroesophageal reflux disease (GERD) is one of the most common chronic gastrointestinal disorders in adults, it develops when the stomach contents reflux and rise up into the esophagus as a result from lower esophageal sphincter dysfunction. Stomach acid that touches the lining of the esophagus causes symptoms and complications. The classical symptoms of GERD include heartburn, usually after eating, chest pain, and regurgitation. **Aim:** To measure the prevalence of gastroesophageal reflux disease and determine its risk factors among the students of Shaqra University. **Methods:** A cross-sectional study was conducted using a structured questionnaire distributed among Shaqra University students after multistage stratification and random sampling technique to stratify students according to gender and the three main colleges in Shaqra city, Saudi Arabia. The sample size was determined to be 435 with the precision of ± 5% and a 95% confidence interval (CI). The questionnaire included demographic data like age, gender, height and weight, lifestyle, and dietary habits. Statistical data were analyzed using the Statistical Package for Social Sciences (SPSS) version 16. Results with a *P* value of <0.05 were considered statistically significant. **Results:** A total of 400 [227 (56%) male and 173 (43%) female] participants were evaluated. And 95 participants got a gastroesophageal reflux disease questionnaire score of ≥8 thus determining the prevalence of GERD to be 23.8%. Univariate analysis revealed that gender, smoking, familial history of GERD, high body mass index (>25 kg/m^2), fast food, tea, carbonated beverages consumption, quick eating, and sleeping within 1 hour of dinner are associated with symptomatic GERD (*P* < 0.05). **Conclusion:** The results show a high prevalence of GERD in Shaqra university students and the presence of many modifiable risk factors which merits the conduction of public health campaigns to raise awareness about the disease and its risk factors.

Keywords: Gastroesophageal reflux disease, prevalence, risk factors, Shaqra, University students

Introduction

Background

Digestive disorders and diseases are a significant cause of illness that affects millions of people over the world. According to the American Nutrition Association, 70 million people suffer from some form of digestive issues on daily basis.[1] Gastroesophageal reflux disease (GERD) is one of the most common chronic gastrointestinal disorder in adults,[2] it develops when the stomach contents reflux and rise up into the esophagus as a result from lower esophageal sphincter dysfunction and/or large hiatal hernia. Stomach acid that touches the lining of the esophagus causes either symptoms or complications. The classical symptoms of GERD include heartburn, regurgitation, occasionally sore throat and cough, and mucosal damage.

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Permanent acid reflux can induce more serious complications, such as esophagitis, esophageal strictures, and Barrett's esophagus.[3,4] Several risk factors have been associated with GERD, such as analgesics intake (e.g., nonsteroidal anti-inflammatory drugs (NSAIDs)), types of food, types of drinks, smoking, family history, high body mass index (BMI), physical activities, salt, or pickles consumption with meals and fast food. These risk factors are mostly related to the lifestyle of the patient.[5,6] A systematic review of longitudinal studies shows that the prevalence of GERD has increased during the past recent decades. If this trend continues, it could contribute to the rapidly increasing incidence of more serious complications associated with GERD, affecting the patient's quality of life as well as costs to healthcare systems.[7,8] A study was performed in Saudi Arabia in 2016 found the prevalence of GERD in the Saudi population to be slightly higher than Western countries and much higher than countries of East Asia.[9]

Study rationale and aims

Even though GERD is a major issue that can adversely affect the quality of life and daily tasks, there have been only a few published reports about the subject in Saudi Arabia, and to our knowledge as of writing this paper there are no studies done on higher education students which is a population that is more susceptible to known GERD risk factors such as inadequate sleep hours, stress, skipping breakfast, quick eating, and more. Also, college students are usually busy and too occupied with their academic education that they tend to ignore the symptoms or simply self-medicate which can worsen the case and leads to serious complications.

Considering the above, this study aims to determine the prevalence of GERD and its associated risk factors among undergraduate students at Shaqra University in Saudi Arabia.

Objectives

1. To measure the prevalence of gastroesophageal reflux disease among undergraduate students at Shaqra University
2. To determine the risk factors of gastroesophageal reflux disease among undergraduate students at Shaqra University.

Methods

Research design and setting

A cross-sectional study was conducted using a self-administered structured questionnaire at Shaqra University, Shaqra city, Kingdom of Saudi Arabia in the academic year 2018–2019. After obtaining the ethical approval from Shaqra University's research ethics committee, a multistage stratification method and random sampling technique were implemented to stratify students according to gender and three different specialty colleges at Shaqra University, College of Science, College of Education and Community College using proportional allocation to determine the sample from each stratum. Any Shaqra University student belonging to one of these colleges located in Shaqra city who

had fully completed all parts of the questionnaire in the study and has given an informed consent was included in the study. In contrast, those who study in different colleges outside of the city or have not completed the questionnaire or found unwilling to participate were excluded.

Sample size

We calculated the sample size relying on an established formula $n = (z^2 \times p \times q)/d^2$.

Where n = the minimum sample size. $Z = 1.96$, $p = 0.5$, and $q = (1 - p) = 0.5$.[10] After the calculations, we found that the minimum sample size to achieve a precision of ±5% with a 95% confidence interval (CI) is 384. After accounting for 10% nonresponse and incomplete data, we added a safety margin and set the sample size to 435.

Development and application of questionnaire

The questionnaire included demographic characteristics like age, gender, height, and weight, lifestyle habits (smoking, coffee intake, dietary and sleep behavior, and more). The questionnaire also included multiple lifestyle factors that were thought to have an association with gastroesophageal reflux disease. Gastroesophageal reflux disease questionnaire (GERDQ) was used for the diagnosis of GERD, it is a questionnaire that has been developed as a patient-centered self-assessment and to assist the health care providers in making the diagnoses of GERD and assessing the symptoms of the disease. Those with GERDQ score of ≥8 were considered to have GERD, while others who got a score of <8 were not considered diseased. This questionnaire has a sensitivity of 65% and a specificity of 71%.[11]

All parts from the questionnaire were explained to the participants and their informed consent was taken.

Procedure

The researchers distributed the questionnaire on students after the stratification process in randomly chosen classes. Any inquiry about the questionnaire from the participants was answered on the spot by the researchers. Participants were asked to give their consent and they have answered the questionnaire of their own volition.

Statistical analysis

After collection of data, the variables were checked and entered into a computer, and statistical analyses was conducted by appropriate methods using Statistical Package for Social Sciences (SPSS) version 16.0 (SPSS, Inc, Chicago, IL). Continuous variables were represented as mean ± standard deviation (SD). Frequency was used for categorical variables. Chi-square was also used to compare categorical variables. Univariate analysis was utilized to check the relation between GERD and each independent variable. A *P* value of <0.05 was considered statistically significant.

Results

Out of 435 questionnaires distributed, 400 were fully completed leading to a 92% response rate. The demographic characteristics and risk factors for these valid participants are presented in Table 1. The age mean was 19.9 ± 1.7 years and ranged from 18 to 27 years. Male students were 227 (56.8%) and females were 173 (43%). As for BMI, 123 (30.8%) had >25 kg/m². Smokers were 51 (12.8%). The family history of GERD was present in 27 (6.8%) students. While 82 (20%) exercise more than 30 minutes a day more than 3 days a week, 137 (34.3%) do not exercise at all. 186 (46.5%) participants sleep less than 7 hours a day.

Half of the participants 203 (50.8%) drink coffee regularly, 162 (40.5%) drink tea regularly, and 195 (48.8%) were carbonated drinks' consumers. Regular drinking was defined as more than once a day. More than half the participants 211 (52.8%) eat fast food, 195 (48.8) eat spicy food, and 200 (50%) eat fried food regularly; this defined as three or more meals a week. And 177 (44.3%) reported quick eating, a risk factor defined as finishing meals in 10 minutes or less, 238 (59.5%) skip breakfast

Table 1: Baseline characteristics of 400 students

Parameters	n (%)
Age (years) (mean [SD]) [range]	19.9 (1.8) [18-32]
Male	227 (56.8%)
Female	173 (43.3%)
University College	
College of science and arts	244 (61.0%)
College of education	93 (23.25%)
College of community	63 (15.75%)
BMI (>25 kg/m²)	123 (30.8%)
Smoking status	
Non-smokers	349 (87.3%)
Current smokers	51 (12.8%)
Positive family history	27 (6.8%)
Inadequate sleep	186 (46.5%)
Frequent consumption of	
Fast food	211 (52.8%)
Spicy food	195 (48.8%)
Fried food	200 (50.0%)
Coffee	203 (50.8%)
Tea	162 (40.5%)
Carbonated drinks	195 (48.8%)
Frequently between meals snack	226 (56.5%)
Quick eating	177 (44.3%)
Frequently skip breakfast	238 (59.5%)
Sleeping within one hour after dinner	92 (23.05)
Physical activity (per week)	
Non	137 (34.3%)
Once	110 (27.5%)
2-3 times	71 (17.8%)
>3 times	82 (20.5%)
Frequently use of analgesics	67 (16.8%)
Frequently use of antacids	18 (4.5%)
GERD symptoms	95 (23.8)

regularly, and 92 (23%) sleep within 1 hour of eating dinner. As for drugs, 67 (16.8%) reported as needed use of NSAID. Antacid users were 18 (4.5%).

Symptomatic gastroesophageal reflux disease prevalence

Students were diagnosed with GERD if they get a GERDQ score of ≥8. Out of the 400 participants, 95 (23.8%) had symptomatic GERD. While those who got a GERDQ score of <8 were 305 (76.3%) students.

Association of risk factors with GERD symptoms

Univariate analysis represented in Table 2 shows that gender, smoking, familial history of GERD, high BMI (>25 kg/m²), fast food, tea consumption, carbonated beverages consumption, quick eating, and sleeping within 1 hour of dinner showed statistical significance and association ($P < 0.05$) with symptomatic GERD. However, age, college, inadequate sleep, spicy and fried food consumption, eating snacks between meals, exercise, coffee consumption, skipping breakfast, and NSAIDS use did not show statistical significance in relation with GERD ($P > 0.05$).

Discussion

Gastroesophageal reflux disease (GERD) is one of the major gastrointestinal disorders affecting adults worldwide. Our study results revealed that GERD is a common problem in Shaqra University students with a prevalence of 23.8%. Moreover, previous reports have shown that college students, in particular, represent a population that has a higher prevalence of GERD when compared to the general population.[12,13] This is likely due to the fact that students are more exposed to various GERD risk factors, namely, stress and higher caffeine consumption.[14,15]

As for gender's association with GERD risk, we found in this study that male students have a higher risk of developing GERD compared to female students. Comparing our result to previous literature, there have been mixed reports. The majority of studies including a systemic review done in 2015 and a population-based study done in Arar Saudi Arabia in 2017 reflected no relation between the two.[16,17] However, a study in southern India conducted on 1072 participants reported a significant association of male gender and GERD.[18]

The population of this study consisted of university students only, with a small age group ranging from 18 to 27. Thus, it is understandable that age as a GERD risk factor was statistically insignificant in this study. However, reports of general population studies show that the prevalence of GERD is related to increasing age.[19,20] Regarding eating and smoking habits, our results showed a high prevalence of unhealthy habits compared to other previous studies in Saudi Arabia and Iran[21,22] This is likely due to the fact that our sample is comprised of college students, a large number

Table 2: Variables associated with GERD on univariate analysis			
Characteristic	GERD (*n*=95)	No GERD (*n*=305)	*P*
Age (years) mean [SD]	20.03 [1.8]	19.9 [1.7]	0.71
Gender - M:F (%)	70 (30.8%): 25 (14.5%)	157 (69.2%): 148 (85.5%)	0.000*
BMI >25 Kg/m²	37 (30.1%)	86 (69.9%)	0.04*
Current smokers	19 (37.3%)	32 (63.7%)	0.01*
Positive family history of GERD	18 (66.7%)	9 (33.3%)	0.000*
Inadequate sleep	50 (26.9%)	136 (73.1%)	0.17
Eating snacks between meals	49 (21.7%)	177 (78.3%)	0.26
Quick eating	54 (30.5%)	123 (69.5%)	0.005*
Frequently skips breakfast	62 (26.1%)	176 (73.9%)	0.19
Sleeping within 1 hour of dinner	31 (33.7%)	61 (66.3%)	0.01*
Frequent consumption of			
Fast food	61 (28.9%)	150 (71.1%)	0.01*
Spicy food	45 (23.1%)	150 (76.9%)	0.75
Fried food	53 (26.5%)	147 (73.5%)	0.19
Coffee	52 (25.6%)	151 (74.4%)	0.37
Tea	47 (29.0%)	115 (71.0%)	0.04*
Carbonated drinks	60 (30.8%)	135 (69.2%)	0.001*
Physical activity (per week)			0.39
Non	31 (22.6%)	106 (77.4%)	
Once	26 (23.6%)	84 (76.4%)	
2-3 times	22 (31.0%)	49 (69.0%)	
>3 times	16 (19.5%)	66 (80.5%)	
Frequent use of NSAIDs	22 (32.8%)	45 (67.2%)	0.05
Frequent use of antacid	10 (55.6%)	8 (44.4%)	0.001*

*Statistically significant (*P*<0.05)

of which is expected to be living alone in dormitory and are under higher stress due to exams than other populations making them prone to habits like smoking. Also, they usually do not have the time to practice healthy routines and they tend to develop irregular and unhealthy habits like delaying meals, skipping breakfast, quick eating, and sleeping within 1 hour of dinner. Moreover, because they live alone, they usually resort to fast food instead of home cooked meals because it is easily accessible and does not require time to make. Students consume carbonated drinks at a higher rate as well. All of these are risk factors significantly associated with symptomatic GERD (*P* < 0.05) according to our results and other previous studies in Iran and Syria.[22,23] Some of these risk factors were present in our sample in substantially higher numbers when compared to other studies, namely, fast food and carbonated drinks consumption. We can see clearly when comparing our results to a population-based study conducted in Altaif, on Saudi population.[21] Furthermore, these numbers are still high when comparing them to similar population studies, one of which was conducted on Damascus university students Syria[22] and the other in India[2] which signifies that, not only are these unhealthy habits present due to university students' lifestyle circumstances but also due to other factors which might be lack of awareness or students underestimation of the major complications of these unhealthy routines that could lead to GERD, esophagitis, bleeding ulcers, scarring, and eventually Barrett's esophagus and cancer.

High BMI showed significant relation to the disease in our results, other studies support that with a positive association to GERD

explained by the increase of thoracoabdominal pressure gradient and reduction in the lower esophageal sphincter pressure.[22-24] Use of NSAIDs was not a significant risk factor (*P* = 0.05); however, the results reported in different studies showed positive association.[25] Likely due to the small number of users. Cigarette smoking was found to be a significant factor which matches the results of multiple previous studies due to relaxation of ring muscles in the lower esophageal sphincter.[21,22] Positive family history was also significant in both our study and other literature.[21] Antacids were used by those with GERD symptoms as expected. Types of diet relating to fatty and spicy food did not show a significant relation, other studies have mixed results, and while some articles show significant relation,[21] others do not.[26] Physical activity was not related to GERD in this study and according to a Swedish study in 2012 physical activity did not show relation to GERD as well.[27] A high number of students tend to sleep within 1 hour of dinner which has a statistically significant relation to GERD, lying down in the supine position after meals have been hypothesized to cause reduce lower esophageal sphincter pressure which explains this relation.[28] Current epidemiological evidence suggests an increase in GERD prevalence which can be observed in this study.[29,30]

Conclusion

The results show a high prevalence of GERD in Shaqra University students and the presence of many modifiable risk factors which merits the conduction of public health campaigns to raise awareness about the disease and its risk factors.

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Conflicts of interest

There are no conflicts of interest.

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