The prevalence of GERD symptoms was 25.9%. The most frequent symptoms were heartburn and acid regurgitation. High BMI, family history, energy drinks and fried food were found to be statistically significant risk factors of GERD (p<0.05) by univariate analysis. However, the logistic regression for the prediction of GERD symptoms among medical students showed that only family history had a significant correlation (p<0.05).

Conclusion: GERD symptoms were common in medical students of King Abdulaziz University, Saudi Arabia. Family history was found to be a significant predictor of GERD symptoms. Effective educational strategies for groups with significant risk factors of GERD need to be implemented.

Keywords: GERD, risk factors, medical students

Introduction
Gastroesophageal reflux disease (GERD) is a medical problem arising from the return of contents of the stomach to the esophagus leading to disturbing symptoms. The characteristic typical symptoms are heartburn and acid regurgitation. The prevalence in adults ranges from 30% in some Western countries to <10% in East Asian countries. 

On the other hand, overweight, defined according to the World Health Organization classification as body mass index (BMI) of ≥25 kg/m² is associated...
with reduced health-related quality of life, as well as several chronic diseases.\textsuperscript{10} So much so, it is considered as an important risk for the development of GERD. Moreover, the prevalence of GERD and obesity have increased significantly over the past 40 years in Western populations, suggesting a link between these two disorders.\textsuperscript{11} So, it is worthy to check the relation between GERD and BMI.\textsuperscript{12} Similarly, such relationship will be checked with other risk factors.

**Subjects and methods**

A cross-sectional study was conducted at the Faculty of Medicine, King Abdulaziz University, Saudi Arabia. The study included (197) male medical students from Rabigh and Jeddah branches. Verbal informed consent was obtained from medical students who volunteered to share in this study according to the regulations of Rabigh research ethics committee. Institutional review board of King Abdulaziz University approved this verbal consent of participants. The study included using a questionnaire which included two parts. The first part was the GerdQ Gastroesophageal Reflux Disease Questionnaire (GerdQ).\textsuperscript{13} The questionnaire consists of questions that depend on the type and frequency of symptoms experienced by the students. Respondents who get a score of 8 or more have a higher possibility to have GERD, while those who get <8 have low or no possibility to have GERD. The GERD questionnaire has a sensitivity of 65% and a specificity of 71% for GERD diagnosis.\textsuperscript{13} The second part includes questions about the risk factors of GERD, such as BMI, coffee, tea, and chocolate ingestion, energetic drinks, soft drinks, fried food, sports activities, smoking, and family history. Further, we measured students’ height and weight to determine the BMI.

Statistical analysis was performed using SPSS (version 24) software. Data were summarized as mean and SD. All “$p$” values at 95% CIs were calculated and $p<0.05$ was considered to be statistically significant.

The study proposal was approved by Rabigh research ethics committee, King Abdulaziz University, Saudi Arabia, date 24/1/2018, ethical approval no. FMR-04-39-H.

**Results**

Our study included 197 students of Medical College at KAU which consisted of 118 (59.9%) of Rabigh branch students and 79 (40.1%) of Jeddah branch students. Figure 1 shows that the prevalence of GERD is 25.9%; 19.3% of them had a score of 8–10 of GerdQ (79% likelihood of GERD), and 6.6% had a score of 11–18 of GerdQ (89% likelihood of GERD).

Classification of participants according to body weight is shown in Figure 2. The GerdQ score in students’ groups according to their BMI is shown in Figure 3.

The most common symptoms whether mild (once/week), moderate (2–3/week) or severe (4–7/week) were regurgitation (41.2%), and burning sensation (31.4%). However, if severity of symptoms was considered, the most common were burning sensation (8.1%), followed by regurgitation (6.1%) (Table 1).

![Figure 1](https://example.com/fig1.png) Classification of participants according to GERD score.

![Figure 2](https://example.com/fig2.png) Classification of participants according to body weight.
The association between risk factors and students with positive (8–18 score) and negative (0–7 score) GERD symptoms is shown in Table 2. BMI, family history, energy drinks and fried food were found to be statistically significant risk factors (p<0.05) in students who had the likelihood of GERD. However, there was no such relation between smoking and GERD score. The logistic regression for the prediction of GERD among medical students showed that only the family history had a significant correlation; p<0.05 (Table 3).

**Discussion**

GERD is a common gastrointestinal disease that is associated with variable complications. This study aimed at evaluation of the prevalence of GERD symptoms and associated risk factors among a unique population. The study employed a well-validated GERD score (GerdQ).

Worldwide, the prevalence of GERD varies for unknown reasons. In a systematic review, the prevalence of GERD ranged from 18–27% in North America, 8–25% in Europe, 2–7% in East Asia and 8–33% in the Middle East. One study done among Tunisian primary care population found a prevalence of 24%. In another study done among hospital employees in North India, GERD prevalence was found to be 16.2%. The reported prevalence of GERD in medical students from Syria and Iran was 14.8% and 21.2%, respectively.

Yet, in Asia, the prevalence of GERD has been increasing gradually, which may be attributed to the rapidly developing economy and consequent change in diet and lifestyle taking place in many Asian countries. In Saudi Arabia population, the prevalence of GERD varies from 28.7% to 45.4% based on two different studies.

In the current study, the prevalence of GERD symptoms in medical students was 25.9%. One more study on medical students in a medical college in India found a prevalence of 25%. However, another study done among medical students in Chennai, South India has shown a prevalence of GERD of 14.4%. The relatively high prevalence in the current study can be attributed to a rather luxury lifestyle that involves diet preferences and sedentary life habits.

Obesity is a well-known risk factor for GERD in both Asian and Western countries. Large epidemiological studies have demonstrated that obesity is an important risk factor of GERD. Further, a linear increase of reflux symptoms for each BMI category was found.

In the current study, univariate analysis had shown that GERD score was significantly associated with BMI, family history, energetic drinks and fried food. Likewise, higher BMI, use of NSAID or alcohol, inadequate sleep, sleeping within 1 hr of taking dinner, missing breakfast regularly and quick eating in final year medical students were significantly associated with GERD (p<0.05) in one study.
was not confirmed by other researchers; as no relationship between BMI and gastro-oesophageal reflux symptoms was found in a Swedish population-based study. On the other hand, the relationship between physical activity and GERD was found not significant in the current study. However, some studies revealed that regular physical exercise is associated with a decreased risk of symptoms of reflux. Also, the association between smoking and GERD was not found to be significant in this study. Yet, the reflux symptoms were found increased during smoking in one study.

Furthermore, the impact of drinks and food items in the induction of GERD symptoms is not clear. Similar to our results, tea and coffee were not associated with symptoms of GERD, while in another study, coffee increased symptoms of GERD. The decrease of oesophageal pH by soft drinks could induce symptoms of GERD, which could clarify the relation present in this study between GERD and energetic drinks. Moreover, the ingestion of fast food is a possible causal risk factor for reflux of acid. Similarly, in this study, a significant relation was found between fried food and symptoms of GERD (p-value ≤0.05).

Interestingly, symptoms of GERD were associated with symptoms of reflux in the patient near relatives or a close family member. Some studies concluded the increased symptoms of GERD in those with a positive family history. Our data were similar to such results. According to some studies, there was evidence of a genetic determinant of GERD. Genetic factors seem to have an important role in GERD-related disorders. This was verified through studies on twins. Multiple single-nucleotide polymorphisms have been

Table 2 Risk factors of GERD symptoms in participants

| Characteristics   | Score groups | n   | %     | p-value |
|-------------------|--------------|-----|-------|---------|
|                   | Negative     |     |       |         |
| BMI               | Underweight  | 24  | 88.9% | 0.000   |
|                   | Normal weight| 91  | 80.5% |         |
|                   | Overweight   | 25  | 71.4% |         |
|                   | Obese        | 6   | 27.3% |         |
|Coffee, tea, chocolate | None        | 41  | 91.1% | 0.18    |
|                   | Once/Day     | 61  | 98.4% |         |
|                   | 2–3/day      | 34  | 89.5% |         |
|                   | More than 3/day | 46  | 88.5% |         |
|Energetic drinks  | None         | 108 | 94.7% | 0.01    |
|                   | Once/Day     | 49  | 92.5% |         |
|                   | 2–3/day      | 15  | 75.0% |         |
|                   | More than 3/day | 10  | 100.0%|         |
|Soft drinks       | None         | 51  | 98.1% | 0.07    |
|                   | Once/Day     | 64  | 92.8% |         |
|                   | 2–3/day      | 38  | 92.7% |         |
|                   | More than 3/day | 29  | 82.9% |         |
|Fried food        | None         | 20  | 100.0%| 0.02    |
|                   | Once/Day     | 78  | 95.1% |         |
|                   | 2–3/day      | 55  | 93.2% |         |
|                   | More than 3/day | 29  | 80.6% |         |
|Smoke             | No           | 135 | 94.4% | 0.08    |
|                   | Yes          | 47  | 87.0% |         |
|Family history    | No           | 106 | 96.4% | 0.01    |
|                   | Yes          | 75  | 87.2% |         |
|Sport activities  | No           | 59  | 68.6% | 0.54    |
|                   | Yes          | 84  | 78.5% |         |
proposed in genome-wide association studies as potential factors in the appearance of reflux disease. Also, a relation between gene-encoding collagen type III alpha I and symptoms of reflux was detected. Moreover, it is to be noted that family members share the same environmental factors including dietary habits.

The limitations of this study included a relatively small sample size. These results reflect the high prevalence of GERD symptoms but cannot be applied to the entire Saudi population as the study was conducted in a governmental medical college. Moreover, confirmatory diagnostic tools including upper endoscopy were not employed in this study. Further studies are needed to validate these results and to explore the potential causes for such a high prevalence, as the public health implications of such disease are great and affect the well-being of a large segment of the community. Also, the group with severe GERD symptoms and/or positive family history are to be thoroughly investigated and followed up.

Conclusion
GERD symptoms are common in medical students of King Abdulaziz University, Saudi Arabia. In general, the most common symptoms were regurgitation and burning sensation, while, if severity of symptoms was considered, the most common were burning sensation, followed by regurgitation, and chest pain. Family history was found to be a significant predictor of GERD symptoms. Effective educational strategies for groups with significant risk factors of GERD need to be implemented.

Disclosure
The authors report no conflicts of interest in this work.

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