

# Gastro-oesophageal reflux disease symptoms and associated risk factors among medical students, Saudi Arabia

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Mohamed Magdi Atta<sup>1,2</sup>  
Mohamed Hisham Sayed<sup>3,4</sup>  
Mohamed A Zayed<sup>5,6</sup>  
Sultan A Alsulami<sup>1</sup>  
Ahmed T Al-Maghrabi<sup>1</sup>  
Abdulhfeez Y Kelantan<sup>1</sup>

<sup>1</sup>Department of Medicine, Rabigh Faculty of Medicine, King Abdulaziz University, Jeddah, Kingdom of Saudi Arabia;

<sup>2</sup>Department of Hepatology, Gastroenterology and Infectious Diseases, Faculty of Medicine, Benha University, Benha, Egypt; <sup>3</sup>Department of Pediatrics, Rabigh Faculty of Medicine, King Abdulaziz University, Jeddah, Kingdom of Saudi Arabia; <sup>4</sup>Department of Pediatrics, Faculty of Medicine, Cairo University, Cairo, Egypt; <sup>5</sup>Department of Physiology, Rabigh Faculty of Medicine, King Abdulaziz University, Jeddah, Kingdom of Saudi Arabia; <sup>6</sup>Department of Physiology, Faculty of Medicine, Menoufia University, Shibīn Al Koum, Egypt

**Background and aims:** Gastro-oesophageal reflux disease (GERD) is a common gastro-intestinal disease worldwide that is associated with impaired quality of life and higher risk of complications. The identification of risk factors is necessary for preventive measures. The aim of this study is to evaluate the prevalence of GERD symptoms as well as its relation to body mass index (BMI) and other risk factors among medical students of Jeddah and Rabigh branches, King Abdul-Aziz University, Saudi Arabia.

**Subjects and methods:** A cross-sectional study was conducted at the Faculty of Medicine in Rabigh, King Abdul-Aziz University, Saudi Arabia. The study included 197 medical students from Rabigh and Jeddah branches of the university. The study employed a Gastroesophageal Reflux Disease Questionnaire which is derived from a self-administered validated GERD questionnaire (GerdQ).

**Results:** The prevalence of GERD symptoms was 25.9%. The most frequent symptoms were regurgitation and burning sensation. High BMI, family history, energy drinks and fried food were found to be statistically significant risk factors ( $p < 0.05$ ) 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.<sup>1</sup> It is associated with impaired quality of life<sup>2</sup> and a higher risk of oesophageal carcinoma.<sup>3</sup> The pathophysiology of GERD included defects at the gastroesophageal junction, transient relaxations of the lower esophageal sphincter and formation of hiatal hernia.<sup>4-6</sup> In Saudi Arabia population, the prevalence of GERD varies from 28.7% to 45.4% based on two different studies.<sup>7,8</sup>

On the other hand, overweight, defined according to the World Health Organization classification as body mass index (BMI) of  $\geq 25$  kg/m<sup>2,9</sup> is associated

Correspondence: Mohamed A Zayed  
Faculty of Medicine in Rabigh, King  
Abdulaziz University, building 13, P.O.  
BOX 80205, Jeddah 21589, Saudi Arabia  
Tel +966 56 260 3213  
Fax +966 12 640 0000  
Email mazayed@kau.edu.sa

with reduced health-related quality of life, as well as several chronic diseases.<sup>10</sup> 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.<sup>11</sup> So, it is worthy to check the relation between GERD and BMI.<sup>12</sup> 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).<sup>13</sup> 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.<sup>13</sup> 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

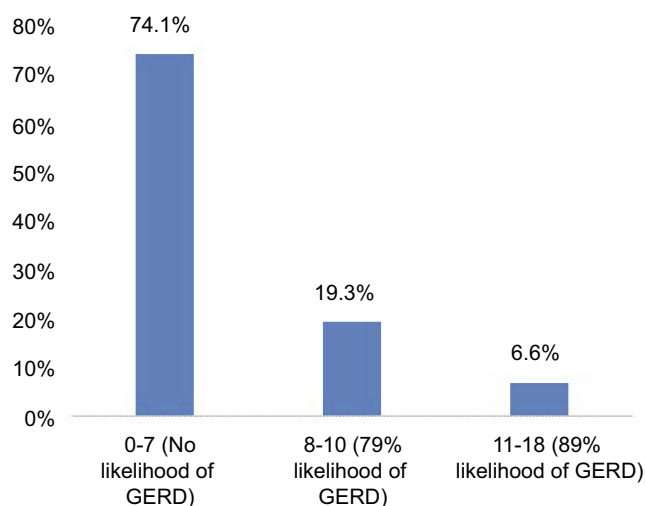


Figure 1 Classification of participants according to GERD score.

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).

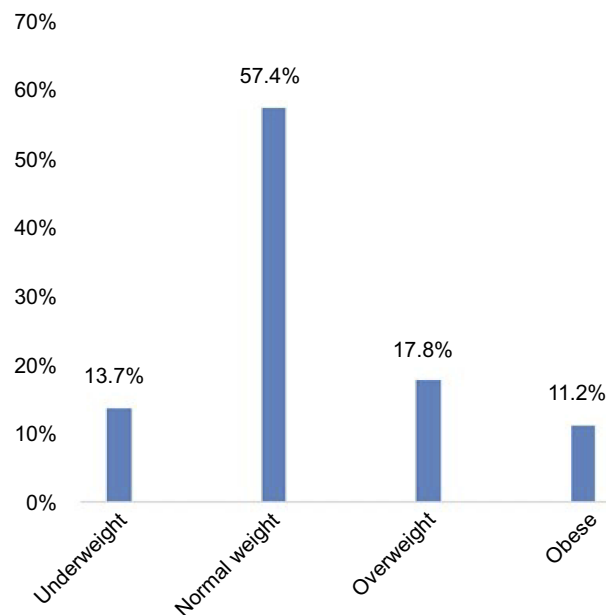
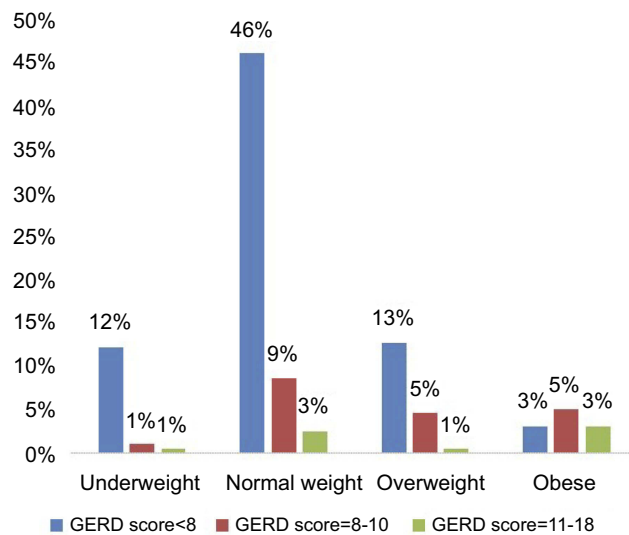


Figure 2 Classification of participants according to body weight.



**Figure 3** The GerdQ score in participants according to their BMI.

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

**Table 1** The frequency of GERD symptoms among the participants

		No	%
<b>Burning sensation</b>	None	135	68.5%
	Once	40	20.3%
	2–3/week	6	3.0%
	4–7/week	16	8.1%
<b>Regurgitation</b>	None	116	58.9%
	Once	60	30.5%
	2–3/week	9	4.6%
	4–7/week	12	6.1%
<b>Chest pain</b>	None	156	79.2%
	Once	29	14.7%
	2–3/week	10	5.1%
	4–7/week	2	1.0%
<b>Nausea</b>	None	143	72.6%
	Once	38	19.3%
	2–3/week	12	6.1%
	4–7/week	4	2.0%
<b>Difficulty sleep</b>	None	161	81.7%
	Once	19	9.6%
	2–3/week	9	4.6%
	4–7/week	8	4.1%
<b>Over counter medications</b>	None	164	83.2%
	Once	23	11.7%
	2–3/week	6	3.0%
	4–7/week	4	2.0%

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.<sup>1</sup> One study done among Tunisian primary care population found a prevalence of 24%.<sup>14</sup> In another study done among hospital employees in North India, GERD prevalence was found to be 16.2%.<sup>15</sup> The reported prevalence of GERD in medical students from Syria and Iran was 14.8% and 21.2%, respectively.<sup>16,17</sup>

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.<sup>18</sup> In Saudi Arabia population, the prevalence of GERD varies from 28.7% to 45.4% based on two different studies.<sup>7,8</sup>

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%.<sup>19</sup> However, another study done among medical students in Chennai, South India has shown a prevalence of GERD of 14.4%.<sup>20</sup> 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.<sup>21,22</sup> Further, a linear increase of reflux symptoms for each BMI category was found.<sup>23</sup>

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.<sup>19</sup> This finding

**Table 2** Risk factors of GERD symptoms in participants

Characteristics		Score groups				p-value
		Negative		Positive		
		n	%	n	%	
<b>BMI</b>	Underweight	24	88.9%	3	11.1%	0.000
	Normal weight	91	80.5%	22	19.5%	
	Overweight	25	71.4%	10	28.6%	
	Obese	6	27.3%	16	72.7%	
<b>Coffee, tea, chocolate</b>	None	41	91.1%	4	2.2%	0.18
	Once/day	61	98.4%	1	1.6%	
	2–3/day	34	89.5%	4	10.5%	
	More than 3/day	46	88.5%	6	11.5%	
<b>Energetic drinks</b>	None	108	94.7%	6	5.3%	0.01
	Once/day	49	92.5%	4	7.5%	
	2–3/day	15	75.0%	5	25.0%	
	More than 3/day	10	100.0%	0	0.0%	
<b>Soft drinks</b>	None	51	98.1%	1	1.9%	0.07
	Once/day	64	92.8%	5	7.2%	
	2–3/day	38	92.7%	3	7.3%	
	More than 3/day	29	82.9%	6	17.1%	
<b>Fried food</b>	None	20	100.0%	0	0.0%	0.02
	Once/day	78	95.1%	4	4.9%	
	2–3/day	55	93.2%	4	6.8%	
	More than 3/day	29	80.6%	7	19.4%	
<b>Smoke</b>	No	135	94.4%	8	5.6%	0.08
	Yes	47	87.0%	7	13.0%	
<b>Family history</b>	No	106	96.4%	4	3.6%	0.01
	Yes	75	87.2%	11	12.8%	
<b>Sport activities</b>	No	59	68.6%	27	31.4%	0.54
	Yes	84	78.5%	23	21.5%	

was not confirmed by other researchers; as no relationship between BMI and gastro-oesophageal reflux symptoms was found in a Swedish population-based study.<sup>24</sup> 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.<sup>25</sup> 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.<sup>26</sup>

Furthermore, the impact of drinks and food items in the induction of GERD symptoms is not clear.<sup>27</sup> Similar to our results, tea and coffee were not associated with symptoms of GERD,<sup>25,27</sup> while in another study, coffee increased symptoms of GERD.<sup>28</sup> 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.<sup>29,30</sup> Similarly, in this study, a significant relation was found between fried food and symptoms of GERD ( $p$ -value  $\leq 0.05$ ).

Interestingly, symptoms of GERD were associated with symptoms of reflux in the patient near relatives or a close family member.<sup>31</sup> Some studies concluded the increased symptoms of GERD in those with a positive family history.<sup>32,33</sup> Our data were similar to such results. According to some studies, there was evidence of a genetic determinant of GERD.<sup>34,35</sup> 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 3** The logistic regression for the prediction of GERD among medical students

Model	Unstandardized coefficients		Standardized coefficients	T	Sig.
	B	Std. error	Beta		
Energetic drinks	0.000	0.035	0.001	0.009	0.993
Fried food	0.072	0.043	0.164	1.694	0.092
Family history	0.124	0.057	0.155	2.179	0.031
BMI	0.023	0.035	0.048	0.676	0.500

proposed in genome-wide association studies as potential factors in the appearance of reflux disease.<sup>36</sup> Also, a relation between gene-encoding collagen type III alpha I and symptoms of reflux was detected.<sup>37</sup> 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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