

Prevalence and Associated Risk Factors of Gastroesophageal Reflux Disease among University Students in Saudi Arabia

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Abstract

Background: Gastroesophageal reflux disease (GERD) is a common gastrointestinal disorder characterized by the reflux of stomach contents into the esophagus, leading to irritation and potential complications such as Barrett's esophagus, esophageal stricture, and esophageal adenocarcinoma. Globally, its prevalence ranges from 10% to 30%, while studies in Saudi Arabia report higher rates between 23.5% and 45.4%. University students are considered a high-risk group due to lifestyle factors such as irregular eating patterns, excessive caffeine intake, stress, and poor sleep quality. **Objectives:** This study aimed to determine the prevalence of GERD and its associated risk factors among university students in Saudi Arabia. **Methods:** This descriptive cross-sectional study will be conducted in Saudi Arabia between July and December 2025. The target population includes Saudi undergraduate students aged 18–25 years. Participants will be recruited through a convenience sampling technique using an online self-administered questionnaire distributed via social media platforms. The questionnaire consists of three sections: demographic information, lifestyle and dietary habits, and the validated GERDQ tool to assess GERD symptoms. Inclusion criteria are Saudi nationality, age 18–25 years, and current university enrollment. Exclusion criteria include pregnancy, non-Saudi nationality, non-university status, other gastrointestinal diseases, and the use of acid-suppressive medications for unrelated conditions. The minimum sample size of 384 participants was calculated using the Raosoft sample size calculator, assuming a 5% margin of error and a 95% confidence level. Data will be entered in Microsoft Office Excel (2024) and analyzed using the Statistical Package for the Social Sciences version 28. A pilot test with 20 participants will be performed to ensure clarity and feasibility; pilot responses will be excluded from the primary analysis. **Results:** The mean age of the participants was 20.58 years, with a standard deviation of 1.69 years, and the majority were female, accounting for 82.9% of the group. The rate of GERD occurrence was 36.6%. A significant number of participants indicated that they regularly consume coffee (67.1%), fast food (58.1%), and tea (47.1%), whereas 35.6% stated that they do not engage in regular physical activity. The logistic regression analysis indicated that individuals with a normal body mass index had significantly lower odds of experiencing GERD compared to those who were obese (odds ratio [OR] = 0.277, $P = 0.001$). Smoking (OR = 0.372, $P = 0.001$) and a family history of GERD (OR = 0.418, $P = 0.001$) were significant independent factors associated with a higher risk of developing GERD. Students studying health or medical fields had notably lower chances of experiencing GERD compared to those in other disciplines (OR = 0.523, $P = 0.043$). Other factors, such as gender, physical activity, meal frequency, and eating habits, did not show a significant statistical relationship with the outcomes. **Conclusion:** GERD is common among university students, and factors such as obesity, smoking, family history, and educational background are important influences. These results highlight the significance of changing lifestyles, providing health education, and implementing preventive measures aimed at young adults to decrease the impact of GERD.

Key words: Gastroesophageal reflux disease, GERD, gastrointestinal disorder, reflux, university students, prevalence, risk factors

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INTRODUCTION

Millions of people worldwide suffer from digestive issues and diseases, which are a major source of illness. The American Nutrition Association estimates that 70 million Americans deal with digestive problems on a daily basis. One of the most prevalent chronic gastrointestinal disorders in adults is gastroesophageal reflux disease (GERD), which arises when stomach contents reflux and rise up into the esophagus due to a big hiatal hernia or malfunction of the lower esophageal sphincter. When stomach acid comes into contact with the esophageal lining, it might result in symptoms or consequences. Heartburn, regurgitation, sporadic coughing, sore throats, and mucosal damage are the hallmark signs of GERD. More severe issues, including Barrett's esophagus, esophagitis, and esophageal strictures, can be brought on by persistent acid reflux.^[1,2]

One of the most prevalent gastrointestinal conditions in the United States, GERD has a detrimental impact on quality of life and causes significant direct and indirect healthcare expenses. According to current meta-analyses, the incidence of GERD symptoms is around 14.8% worldwide. The prevalence of GERD varies significantly between nations. This estimated incidence varies from 52.1% in Greece to as low as 2.5% in some Chinese groups. The rates typically range from 10% to 20% in North America and Europe. According to studies conducted in Central America, the prevalence is approximately 19.6%, compared to 10% in Asia. All of this suggests that the disease's manifestation is influenced by dietary practices, lifestyle choices, genetics, and socioeconomic circumstances.^[3] The prevalent of GERD in Saudi Arabia has not been thoroughly investigated, according to recent research, the prevalence rates in Arar and Riyadh were 29% and 45%, respectively, in Saudi Arabia.^[4] Other study made on Saudi Arabia showed a prevalence of 28.7% in general.^[5]

The three main symptoms of GERD that are seen in the clinic are heartburn, regurgitation, and chest pain. In addition to these common symptoms, patients may also report atypical or extra-esophageal symptoms, such as hoarseness, a persistent cough, or the globus sensation, which is a lump in the throat.^[6] It has been demonstrated that psychological stressors worsen GERD symptoms.^[7] In a study of individuals with pre-existing heartburn, stress was observed to exacerbate symptoms. Anxious persons perceive acid events more dramatically, even though their real acid levels are within the normal range. Stress is thought to increase a patient's susceptibility to acid reflux, which could account for why symptoms appear to worsen.^[7] GERD can have very detrimental effects, such as a lower quality of life and a higher chance of developing additional illnesses.^[8,9]

Gastric belching, a physiological venting of air that may cause reflux, and supra-gastric belching, a behavioral pattern of fast air entry/expulsion before entry into the stomach, are both

described in the Lyon Consensus, an expert declaration that offers objective diagnostic thresholds for GERD. It's crucial to distinguish between these symptoms in patients who are suspected of having proton pump inhibitor (PPI)-refractory GERD, in which case their esophageal symptoms persist despite good adherence to a course of single- or double-dose PPI taken 30 min before a meal for 4–8 weeks.^[10]

There are a number of documented risk factors for GERD. GERD prevalence is strongly correlated with advancing age; people over 50 indicate a prevalence of 17.3%, whereas younger groups claim a frequency of 14.0%. A greater verified prevalence of GERD is also associated with female sex. Smoking is a major risk factor; the proportion of current smokers is 19.6%, compared to 15.9% for non-smokers. Nonsteroidal anti-inflammatory drug use is also linked to a higher incidence of GERD. With a prevalence of 22.1% among obese people and 14.2% among those of normal weight, obesity is one of the biggest risk factors. Higher GERD prevalence is also associated with socioeconomic characteristics, such as lower income and educational level.^[3,11]

An increased risk of GERD is linked to lifestyle and demographic factors, which are sometimes exacerbated by familial predisposition. The results of two systematic studies show that obesity and growing older are risk factors for GERD. Additional demographic risk factors include being a woman, having less education, living in an urban area, having a poor income, and being divorced, separated, or widowed.^[12,13] Lifestyle factors include things like smoking, drinking alcohol, not exercising, and eating poorly. In addition, the likelihood of family inheritance is 31%. In Saudi Arabia, GERD was strongly predicted by family history. An increased incidence of GERD, which is characterized by reflux symptoms, is also associated with genetic variables.^[14]

To further understand this disease, epidemiological research is required to identify etiologies and risk factors in various communities.^[15] Thus, the current investigation intends to ascertain the prevalence of GERD and related risk factors among Saudi Arabian university students. People would be more informed about lifestyle options that can help them manage GERD symptoms, improve their quality of life, and prevent GERD consequences if they were aware of how common the condition is. Developing public health interventions for groups at high risk of GERD could be aided by identifying risk factors.

METHODS

Study design and setting

This was a descriptive cross-sectional study conducted in Saudi Arabia between July 2025 to December 2025. The study targeted undergraduate university students in

Saudi Arabia aged 18 years and above. Participants were recruited via an online questionnaire using a convenience sampling technique. Informed consent was obtained before participation.

Sample size

The calculation of the sample size was conducted to ensure that the minimum number of respondents would accurately stand for the entire population. The sample size was found using the Raosoft sample size calculator, with a margin of error of 5%, and a confidence level of 95%. Based on these parameters, the minimum required sample size was 384 participants.

The sample size was calculated using the standard formula:

$$n = P(1-P) \times Z^2/d^2$$

Where:

n: Calculated sample size

Z: The z-value for the selected level of confidence ($1-\alpha$) = 1.96

P: Estimated prevalence of GERD = 0.50

Q: ($1-P$) = 0.50

d: The maximum acceptable margin of error = 0.05

Therefore, the calculated minimum sample size was:

$n = (1.96)^2 \times 0.50 \times 0.50 / (0.05)^2 = 384$ participants as provided by the Raosoft calculator.

Inclusion and exclusion criteria

The inclusion criteria were male and female university students in Saudi Arabia between the ages of 18 and 25 who had been diagnosed with GERD. Participants had to be Saudi nationals.

The exclusion criteria included individuals younger than 18 or older than 25 years, non-Saudi nationals, non-university students, those diagnosed with other gastrointestinal diseases, individuals taking medications that affect gastric acid secretion for unrelated conditions, and pregnant students.

Method for data collection, instrument

A structured, self-administered questionnaire was used as the primary tool for data collection in this study. Data were collected through an online survey distributed through social media platforms such as Twitter, Snapchat, Instagram, WhatsApp, and Facebook.

The questionnaire consisted of three main sections:

- Section one included demographic information such as gender, age, marital status, place of residence, level of education, body mass index (BMI), and blood type.
- Section two focused on risk factors and lifestyle-related variables. These included the frequency of physical

activity, type of analgesics used, number of meals consumed per day, predominant food and drink types, improvement with PPI medications, smoking, family history of GERD, eating salty and pickle foods with meals, fast food, analgesic use, and fiber intake.

- Section three included the GerdQ questionnaire, a validated tool used to assess symptoms and diagnose gastroesophageal reflux disease. The questionnaire consisted of 6 items, 4 of which assessed symptoms and situations considered positive predictors for GERD diagnosis: heartburn, regurgitations, sleep disturbances, and use of over-the-counter products. The other two items evaluate symptoms considered negative predictors for reflux, such as nausea and epigastric pain. The patient responds to each question about symptom frequency during the past week using a Likert-like scale from 0 to 3 for positive predictors and from 3 to 0 for negative predictors. The maximum score achievable is 18.

GERD Q was considered positive if the was considered positive if the score was >8. Two of the six items (items 5 and 6) assessed how GERD impacted quality of life, and a score over 3 on this subscale was associated with a greater impact of the disease on the subject's health.

Pilot test

A pilot test was conducted by distributing the questionnaire to 20 individuals to evaluate its clarity and the feasibility of the research. The pilot data were excluded from the primary analysis.

Analysis and entry method

Data were initially entered using Microsoft Office Excel (2024) for Windows. The data were then transferred to the Statistical Package for the Social Sciences Software (SPSS) program, version 26 (IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp.) for statistical analysis.

RESULTS

In Table 1: This study included 492 participants. The majority were females (82.9%). The mean age was 20.58 ± 1.692 , where the majority of respondents were from 20 to 22 years (59.8%). Regarding BMI levels, 54.9% were normal, while 36.2% overweight and 8.9% obese. The majority of participants were single (98%), live in the Western region (64%), with blood group O+, and in the health and medical field (51.4%).

In Table 2: Physical activity showed 35.6% reporting no weekly exercise, 1 day a week 22.6%, 1–3 days 30.1%, and only 11.8% reported activity more than 3 times/week.

Table 1: Sociodemographic characteristics of the studied participants (*n*=492)

Variable	Category	Frequency (<i>n</i>)	Percentage
Age (mean±S.D)	20.58±1.692		
Height (mean±S.D)	161.45±8.017		
Weight (mean±S.D)	59.71±15.615		
BMI (mean±S.D)	24.79±4.66		
Gender	Female	408	82.9
	Male	84	17.1
Age group	<20 years	128	26
	From 20 to 22 years	294	59.8
	From 23 and above	70	14.2
BMI levels	Normal	270	54.9
	Overweight	178	36.2
	Obese	44	8.9
Marital status	Single	482	98
	Married	8	1.6
	Divorced	1	0.2
	Widow	1	0.2
Residential area	Southern region	30	6.1
	Western region	315	64
	Center region	80	16.3
	Eastern region	52	10.6
	Northern region	15	3.04
University major	Health/Medical	253	51.4
	Engineering/Technical	91	18.5
	Administrative/Business	58	11.8
	Humanities/Social	23	4.7
	Other	67	13.6
Blood group	O+	174	35.4
	O-	36	7.3
	A+	101	20.5
	A-	9	1.8
	B+	55	11.2
	B-	9	1.8
	AB+	24	4.9
	AB-	4	0.8
	I don't know	80	16.3

BMI: Body mass index, S.D: Standard deviation

Paracetamol was the most common used with 56.5%, while 29.1% not using pain killers. Dietary patterns showed frequent consumption of potential reflux-triggering foods and beverages, including coffee (67.1%), fast food (49.6%), tea (47.1%), sweets (39.8%), soft drinks (37.4%), and full-fat dairy products (52.2%), while 73.0% of participants reported use of salt or pickles. fiber-rich food intake was high (84.3%). Most participants reported eating fewer than three meals/day (61.4%). Regarding other risk factors, 33.9% had a family history of GERD, and 9.8% were smokers, while 18.9% reported regular use of painkillers. More than half of the participants (58.1%) regularly eat fast food, and 56.3% had never used acid-reducing medications, with 16.3% reporting symptom improvement.

In Table 3: For heartburn, about 45.3% of the participants reported no symptoms in the past week, while 23% reported for 1 day, 22.2% for 2–3 days, and 9.6% reporting symptoms on 4–7 days. A slightly higher pattern was observed for regurgitation, as 33.5% reported no episodes, 29.3% for 1 day, 22.2% for 2–3 days, and 15.0% on 4–7 days. Upper stomach pain more than half of the participants (51.6%) reporting no pain, 25.2% for 1 day, 15.9% for 2–3 days, and only 7.3% experiencing it on 4–7 days. Nausea showed 31.7% without symptoms, on 1 day (27.8%) and 2–3 days (26.8%), while 13.6% reported symptoms 4–7 days. Sleep disturbance due to reflux showed as 58.5% reported no problem on sleep, 1 day with 20.5%, 2–3 days 16.3%, and 4.7% reported on 4–7 days. The use of additional medications for reflux, the majority (83.7%) reporting no use, 1 day for 11%, 2–3 days for 3.9%, and only 1.4% using them for 4–7 days.

In Table 4: The prevalence of GERD represented 36.6% of the studied participants [Figure 1].

Table 5 shows that positive GERD was significantly more common among females than males ($P < 0.001$) and among smokers than non-smokers ($P < 0.001$). Dietary habits also showed a significant association, as participants with positive GERD were more likely to eat regular fast food ($P = 0.001$) and daily use of salt or pickles with meals ($P = 0.047$). Those with a family history of GERD showed a higher association with positive GERD status ($P < 0.001$). Regular painkiller use was also significantly higher among participants with positive GERD ($P = 0.004$). While no statistically significant associations were observed between GERD and blood group ($P = 0.628$), physical activity level ($P = 0.897$), number of meals per day ($P = 0.060$), intake of fiber-rich foods ($P = 0.512$), or BMI category ($P = 0.440$).

In Table 6: The multivariable logistic regression was conducted to demonstrate the association between the studied predictors and GERD status. BMI level was a significant predictor of GERD. Those with normal BMI had significantly lower odds of GERD compared with obese (odds ratio [OR] = 0.277, $P = 0.001$). University major also

Table 2: Risk factors and lifestyle of the studied participants (*n*=492)

Variable	Category	Frequency (n)	Percentage
How often do you do physical activity for 30 min or more during the week?	None	175	35.6
	1 day/week	111	22.6
	1–3 days/week	148	30.1
	>3 days/week	58	11.8
When you need to use painkillers, which type do you use most often?	Not used	143	29.1
	Nonsteroidal anti-inflammatory drug (Diclofenac, Brufen, Aspirin, etc.)	60	12.2
	Opioids (Morphine, Codeine, Tramadol, Oxycodone, etc.)	4	0.8
	Other	7	1.4
	Paracetamol (Panadol, Fevadol, etc.)	278	56.5
Number of meals per day	3 meals	167	33.9
	<3 meals	302	61.4
	More than 3 meals	23	4.7
Which of the following foods do you eat frequently (more than 3 times/ week)	Chocolate - Chocolate	143	29.07
	Citrus fruits (e.g., oranges, lemons)	126	25.61
	Full-fat dairy products	257	52.24
	Tomatoes and tomato-based products	177	35.98
	Sweets/Sugary	196	39.84
	Fast food (e.g., burgers, pizza)	244	49.59
	Other	117	23.78
Which of the following drinks do you consume frequently (more than 3 times/week)	Citrus juices (orange, lemon, etc.)	77	15.65
	Full-fat milk	168	34.15
	Coffee	330	67.07
	Energy drinks	64	13.01
	Soft drinks	184	37.40
	Tea	232	47.15
	Other	76	15.45
Do your acid reflux (heartburn) symptoms improve when using acid-reducing medications (e.g., Omeprazole, Esomeprazole, Lansoprazole, Pantoprazole, Rabeprazole)?	No	47	9.6
	Yes	80	16.3
	I don't know	88	17.9
	Not used	277	56.3
Are you a smoker?	No	444	90.2
	Yes	48	9.8
Does anyone in your family have gastroesophageal reflux disease?	No	325	66.1
	Yes	167	33.9
Do you use salt or pickles with your daily meals?	No	133	27.0
	Yes	359	73.0
Do you regularly eat fast food?	No	206	41.9
	Yes	286	58.1
Do you regularly use painkillers?	No	399	81.1
	Yes	93	18.9
Do you eat foods rich in fiber (fruits, vegetables, bran, etc.)?	No	77	15.7
	Yes	415	84.3

Table 3: GERD questionnaire for diagnosis of GERD

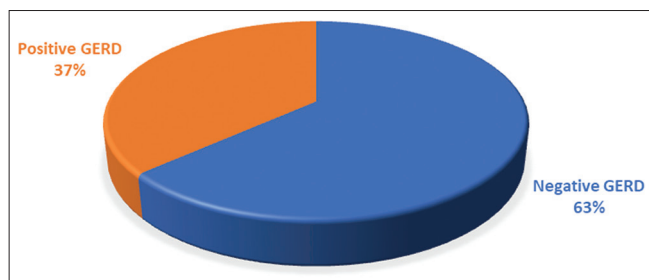
Variable	Category	Frequency (n)	Percentage
1. How often did you have a burning feeling behind your breastbone (heartburn)?	0 day	223	45.3
	1 day	113	23.0
	2–3 days	109	22.2
	4–7 days	47	9.6
2. How often did you have stomach contents (liquid or food) moving upwards to your throat or mouth (regurgitation)?	0 day	165	33.5
	1 day	144	29.3
	2–3 days	109	22.2
	4–7 days	74	15.0
3. How often did you have pain in the center of the upper stomach?	0 day	254	51.6
	1 day	124	25.2
	2–3 days	78	15.9
	4–7 days	36	7.3
4. How often did you have nausea?	0 day	156	31.7
	1 day	137	27.8
	2–3 days	132	26.8
	4–7 days	67	13.6
5. How often did you have difficulty getting a good night's sleep because of your heartburn and/or regurgitation?	0 day	288	58.5
	1 day	101	20.5
	2–3 days	80	16.3
	4–7 days	23	4.7
6. How often did you take additional medication for your heartburn and/or regurgitation, other than what the physician told you to take (such as Tums, Roloids, Maalox)?	0 day	412	83.7
	1 day	54	11.0
	2–3 days	19	3.9
	4–7 days	7	1.4

GERD: Gastroesophageal reflux disease

Table 4: Prevalence of GERD levels among the studied participants ($n=492$)

GERD level	Frequency	Percentage
Negative GERD	312	63.4
Positive GERD	180	36.6
Total	492	100

GERD: Gastroesophageal reflux disease

**Figure 1:** Prevalence of gastroesophageal reflux disease among the participants

showed a significant effect ($P = 0.008$), where students in health/medical fields had significantly lower odds of GERD

compared to other majors ($OR = 0.523$, $P = 0.043$). Smoking showed a higher OR among smokers than non-smokers ($OR = 0.372$, $P = 0.001$). Gender, physical activity, number of meals per day, salt intake, painkiller use, and fiber consumption were not statistically significant predictors. Family history of GERD is a strong independent predictor, with significantly reduced odds reported ($OR = 0.418$, $P = 0.001$).

DISCUSSION

The chronic condition known as GERD is typified by the regurgitation of stomach contents into the oesophagus. Globally, 13.98% of adults are expected to have GERD.^[13] Following a meal, patients with GERD usually experience regurgitation and heartburn; they also report a burning sensation in the retrosternal area that may radiate to the neck or back; heartburn may worsen when lying supine or bending over; and other, less common symptoms of GERD include dysphagia, chest pain, water brash, pain during swallowing, burping, hiccups, nausea, and vomiting.^[16] According to earlier studies, college students in particular had a higher frequency of GERD than the overall population. This is

Table 5: Association between GERD levels and sociodemographic characteristics (*n*=492)

Variable	Negative GERD <i>n</i> (%)	Positive GERD <i>n</i> (%)	Chi-square (χ^2)	<i>P</i> -value
Gender	Male: 46 (12.8) Female: 314 (87.2)	Male: 38 (28.8) Female: 94 (71.2)	17.486	<0.001
Blood group			6.170	0.628
Physical activity/week	None: 127 (35.3) 1 day: 84 (23.3) 1–3 days: 106 (29.4) >3 days: 43 (11.9)	None: 48 (36.4) 1 day: 27 (20.5) 1–3 days: 42 (31.8) >3 days: 15 (11.4)	0.595	0.897
Number of meal/days	3 meals: 126 (35.0) <3 meals: 222 (61.7) >3 meals: 12 (3.3)	3 meals: 41 (31.1) <3 meals: 80 (60.6) >3 meals: 11 (8.3)	5.625	0.060
Smoking	No: 338 (93.9) Yes: 22 (6.1)	No: 106 (80.3) Yes: 26 (19.7)	20.248	<0.001
Salt/pickles with meals	No: 106 (29.4) Yes: 254 (70.6)	No: 27 (20.5) Yes: 105 (79.5)	3.957	0.047
Regular fast-food intake	No: 167 (46.4) Yes: 193 (53.6)	No: 39 (29.5) Yes: 93 (70.5)	11.258	0.001
Family history of GERD	No: 260 (72.2) Yes: 100 (27.8)	No: 65 (49.2) Yes: 67 (50.8)	22.748	<0.001
Regular painkiller use	No: 303 (84.2) Yes: 57 (15.8)	No: 96 (72.7) Yes: 36 (27.3)	8.245	0.004
Fiber-rich food intake	No: 54 (15.0) Yes: 306 (85.0)	No: 23 (17.4) Yes: 109 (82.6)	0.430	0.512
BMI groups	Normal: 271 (75.3) Overweight: 61 (16.9) Obese: 28 (7.8)	Normal: 93 (70.5) Overweight: 29 (22.0) Obese: 10 (7.6)	1.642	0.440

GERD: Gastroesophageal reflux disease, BMI: Body mass index

probably because students are more likely to be exposed to several GERD risk factors, such as stress and increased caffeine intake.^[2]

This study included 492 participants. The majority were females (82.9%). The mean age was 20.58±1.692, where the majority of respondents were from 20 to 22 years (59.8%). Regarding BMI levels, 54.9% were normal, while 36.2% overweight, and 8.9% obese. The majority of participants were single (98%), live in the Western region (64%), with blood group O+, and in health and medical field (51.4%). The objective of this study was to determine the prevalence of GERD and its associated risk factors among university students in Saudi Arabia.

The prevalence of GERD in the present study represented 36.6% of the studied population. Nearly similar to us, Ethiopian study found prevalence in Ethiopia had gone to 32%.^[17] A systematic review of eight studies among Saudi university students reported prevalence rates ranging from 18% to 35% in different individuals, which gave rise to a pooled prevalence of 26%.^[2,18-24] GERD prevalence rates

among Egyptian university students have been reported to range from 17% to 28%.^[25] According to Indian research, the incidence among engineering, medical, and non-medical students is between 11% and 20%.^[26] A pooled global prevalence of GERD of 13.98% was determined by Nirwan *et al.* thorough global assessment, which examined 102 papers from 37 countries.^[13] Their analysis showed notable regional variations, such as the lowest incidence in China (4.16%) and the highest prevalence in Turkey (more than 22%).^[27] Such results agree with those reported in other countries such as Oman^[28] and Nigeria,^[29] where the prevalence of GERD in university students ranged from 11% to 33%. These parallels show that GERD in college students is closely associated with lifestyle and behavioral modifications that are easily disregarded in academic settings but are controllable.^[30]

In the present study regarding symptoms of GERD, 45.3% of the participants reported no heartburn symptoms in the past week, while 23% reported for 1 day, 22.2% for 2–3 days, and 9.6% reporting symptoms on 4–7 days. According to Ye *et al.*, there is a positively declining correlation between reflux incidence and GERD symptoms because reflux events are

Table 6: Binary logistic regression analysis of factors associated with GERD among the study participants ($n=492$)

Variable (reference category)	B	OR (Exp B)	95% CI	P-value
BMI levels (Obese)				0.000
Normal versus obese	-1.284	0.277	0.138–0.556	0.001
Overweight versus obese	-0.689	0.502	0.245–1.029	0.060
Gender (Male versus female)	0.363	1.437	0.763–2.707	0.262
University major (Other)				0.008
Health/Medical versus other	-0.649	0.523	0.279–0.979	0.043
Engineering/Technical	-0.563	0.570	0.273–1.190	0.134
Administrative/Business	0.401	1.493	0.679–3.284	0.318
Humanities/Social	0.121	1.129	0.400–3.183	0.819
Physical activity	—	—	—	0.611
Number of meals/days	—	—	—	0.831
Smoking (No)	-0.989	0.372	0.203–0.682	0.001
Family history of GERD (Yes)	-0.873	0.418	0.269–0.648	0.001
Salt/pickles use	-0.375	0.687	0.424–1.115	0.128
Fast food consumption	-0.420	0.657	0.422–1.022	0.063
Painkiller use	-0.206	0.814	0.482–1.374	0.441
Fiber-rich diet	0.133	1.142	0.655–1.991	0.640

GERD: Gastroesophageal reflux disease, BMI: Body mass index, CI: Confidence interval, OR: Odds ratio

crucial in the development of the severity of disease etiology. This is because reflux episodes cause damage to the integrity of the mucosa, which leads to the manifestation of mucosal erosion.^[31] Therefore, a higher risk of GERD severity among students is linked to both the frequency and duration of reflux episodes.^[32]

Dietary habits also showed a significant association, as participants with positive GERD were more likely eating regular fast food ($P = 0.001$) and daily use of salt or pickles with meals ($P = 0.047$). In agreement with us, a study in the Jazan region found that dietary habits, like the type of food and the number of meals per day, are significantly associated with GERD.^[21] Unusual eating habits were linked to GERD symptoms in a prior study carried out in Sri Lanka.^[33] Contrary to a different study conducted at Shaqra University in Saudi Arabia, the investigators found no significant correlation between diet categories associated to fatty and spicy foods.^[2] Our findings demonstrated a strong correlation between smoking and GERD, as demonstrated by other findings.^[2,34] GERD is more common among current smokers than in non-smokers because smoking might lower esophageal pressure and worsen the condition.^[34] Our results, which demonstrated a favorable correlation between smoking and the onset of reflux disease, support this. Nevertheless, other research found no connection between smoking and GERD.^[35,36]

Positive GERD was significantly more common among females than males ($P < 0.001$). In agreement with us, Sharma *et al* showed significantly more females having

GERD.^[1] Furthermore, a study on 620 university students in Iran, GERD was more prevalent in females, although this difference was not significant.^[37] Comparing our results 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 both genders.^[38,39] However, a study in southern India conducted on 1072 participants reported a significant association of male gender and GERD.^[40]

Regarding BMI, there were no statistically significant associations observed between GERD and BMI, but multivariable logistic regression was conducted to demonstrate the association between the studied predictors and GERD status. BMI level was a significant predictor of GERD. Those with normal BMI had significantly lower odds of GERD compared with obese ($OR = 0.277$, $P = 0.001$). This runs contrary to the results of a prospective cross-sectional study conducted in India, which discovered that GERD symptoms are more common, frequent, and severe as BMI increases.^[41] There are a number of reasons why our study did not find a significant correlation between obesity and GERD. These include the use of self-reported weight measures, the sample's possible lack of representativeness in comparison to the wider population, and the risk that weight differences among university students may not fairly reflect variances in the larger population. Furthermore, the observed absence of correlation may possibly be due to chance variation.

CONCLUSION

The study showed that GERD is common among university students, with a prevalence rate of 36.6%. There were associations found between BMI, smoking, family history of GERD, and university major, indicating that both lifestyle choices and genetic factors play a role in the development of the disease. Obesity raises the developing GERD, whereas students in health-related fields tend to have a lower risk, likely because they are more aware of healthy habits. Smoking and a positive family history were significant independent factors associated with GERD. Other dietary and behavioral factors did not demonstrate independent relationships in the multivariable analysis. The results highlight the importance of health education programs that address weight management, smoking cessation, and knowledge of GERD risk factors for young adults.

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ETHICAL APPROVAL

The study was fully explained to all participants, and it was emphasized that participation was voluntary. Written informed consent was obtained from each participant before enrollment. All collected information was securely stored and used exclusively for research purposes.

INFORMED CONSENT

Written informed consent was obtained from all study participants.

DATA AND MATERIALS AVAILABILITY

All data generated or analyzed during this study are included in this published article.

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