

# Prevalence and risk factors of gastroesophageal reflux disease among adults attending primary healthcare in Bahrain

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## ABSTRACT

**Background:** Gastroesophageal reflux disease (GERD) is one of the most diagnosed digestive disorders, with much-conducted research assessing its prevalence and risk factors associated with it worldwide. However, there are no published previous studies to determine such disease and its burden in Bahrain. Hence, this study aims to estimate the prevalence and evaluate the risk factors associated with GERD among adults attending primary care in Bahrain. **Material and Methodology:** A total of 385 adults aged 18 years and above participated in this descriptive cross-sectional study in the period from 1<sup>st</sup> to 27<sup>th</sup> of April 2023. The sample was collected randomly through an interview-based validated questionnaire from 10 health centers selected randomly. The questionnaire consisted of three sections: Demographic characteristics, risk factors that are associated with GERD and (GERD-Q) questionnaire with a scoring rate for the diagnosis of GERD, in which a score of 8 or more gives us the diagnosis of GERD. **Results:** A response rate of 93.6% was accomplished. Most of the participants were female (53.2%), Bahraini (88.6%), university-educated (50.9%) and married (71.2%). The mean age of the participants was 41.5 (SD = ±14.4 years). The prevalence of GERD was 41.5% which was statistically significant associated with family history of GERD, history of hypertension, sleeping within less than 1 hour after dinner, bariatric surgery and use of NSAIDs or Aspirin regularly ( $P < 0.05$ ). **Conclusions:** The prevalence of GERD was 41.5%, which is higher than in the Middle East, East Asia and Western countries. Many modifiable risk factors were associated with it which deserves the conduction of national prevention programs and educational campaigns to prevent this disease and its complications. Further studies are needed to assess other risk factors and the effect of GERD on the overall health status and quality of life.

**Keywords:** Bahrain, gastroesophageal reflux, GERD, prevalence, risk factors

## Introduction

Gastroesophageal reflux disease (GERD) is a chronic gastrointestinal condition characterized by the regurgitation of gastric contents into the esophagus. It is one of the most commonly diagnosed digestive disorders in the US

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and Europe with a prevalence of 20% and 25% respectively, resulting in a substantial economic burden costs directly and indirectly in addition to adversely affecting the quality of life.<sup>[1,2]</sup> GERD is mostly caused by multifactorial pathogenesis that can be intrinsic, structural, or both, like esophagogastric junction dysfunction, hypersensitivity of the esophagus, high intra-gastric pressure, and impaired esophageal bolus transit.<sup>[3]</sup> Clinically, GERD typically manifests with symptoms of heartburn and regurgitation. It can also present in an atypical presentation with extra-esophageal symptoms such as chest pain, dental erosions, chronic cough, laryngitis, or asthma.<sup>[2,4-6]</sup>

GERD is usually treated by proton pump inhibitors (PPIs) and lifestyle modification like decreasing weight, smoking cessation, and avoiding heavy meals at night.<sup>[3,7]</sup> Reflux of acid, bile, pepsin, and pancreatic enzymes into the esophagus causes epithelial injury which may progress to more extensive diseases. Early complications of GERD include heartburn, regurgitation, dysphagia, chronic cough, and recurrent chest infections. Long-standing GERD may cause erosive esophagitis, Barrett's esophagus, and esophageal adenocarcinoma.<sup>[8]</sup>

The global prevalence of GERD is 13.9% with an estimated 1.03 billion individuals suffering from GERD globally.<sup>[1]</sup> The region-wise prevalence varies between the Middle East, Europe, and East Asia representing 8.7% to 33.1%, 8.8% to 25.9%, and 2.5% to 7.8%, respectively.<sup>[1,9,10]</sup> In Saudi Arabia (KSA) the prevalence of GERD among general populations is 28.7%.<sup>[11]</sup> However, this number varies by city (in Al-Qunfudah 32.9%, Hail 58%, and in Abha 67.8%).<sup>[12-14]</sup> These significant variations are due to lifestyle, socioeconomic, and sociodemographic factors.<sup>[9]</sup>

There are risk factors that increase the chance of having GERD like age, lifestyle, obesity, taking non-steroidal anti-inflammatory drugs (NSAIDs), consuming coffee, tea, and smoking.<sup>[5,15]</sup> Moreover, other studied factors found to be associated with GERD such as gender, low education level, marital status (divorced/separated/widow), and sleeping within 1 hour from dinner.<sup>[9,16]</sup>

Although GERD is one of the most common gastrointestinal disorders with much conducted research worldwide, there are no published previous studies to assess the prevalence of GERD in Bahrain nor its risk factors. Hence, this descriptive cross-sectional study aims to estimate the prevalence and to evaluate the risk factors associate with GERD among adults attending primary care in Bahrain. This will lead to a better understanding of the magnitude of this disease. Thus, will promote early detection among high-risk group, help prevent associated risk factors, and prevent serious complications which will eventually lead to a better patient care. As a consequence, health services will be utilized in a proper way by practitioners to facilitate a better quality of life for the patients.

## Aim

This study aims to estimate the prevalence and to evaluate the risk factors associate with GERD among adults attending primary care in Bahrain.

## Objectives

1. To estimate the prevalence of GERD among adults attending primary healthcare in Bahrain in 2023.
2. To identify the risk factors for GERD and lifestyle habits among adults attending primary healthcare in Bahrain in 2023.

## Methods

### Study design and participants

A cross-sectional study was conducted in the Kingdom of Bahrain using an interview-based validated questionnaire on adults aged 18 years and above attending the primary healthcare centers in the period from 1<sup>st</sup>-27<sup>th</sup> of April 2023. By using a Microsoft Excel, Version 2010 stratified randomization tool, two health centers from each of the five health regions in the country were selected at random, yielding a total of 10 health centers (BBK Hidd Health Center, Al Muharraq Health Center, Al Naim Health Center, Jidhafs Health Center, Yousif Engineer Health Center, Sh. Jaber Al Sabah Health Center, Ahmed Ali Kanoo Health Center, AAli Health Center, Mohammed Jasim Kanoo Health Center, and Hamad Town Health Center). Then two general clinics from each health center were selected randomly. All the patients who attended those general clinics were invited to our study according to the inclusion and exclusion criteria.

Both Bahraini and non-Bahraini adults aged 18 years old and above who could understand reading and writing in Arabic and/or English were included in the study. Pregnant women, adults with cognitive impairment, language barrier, and critically ill patients were excluded.

Four hundred sixty-four people were enrolled, 53 of whom were excluded due to age, pregnancy, and language limitation. Four hundred eleven people fulfilled the inclusion criteria, of which 385 agreed to participate in the study.

### Sample size

We used the following equation to calculate our sample size

$$n = (E)^2 \times P(1 - P) / D^2$$

Where  $n$  = the minimum sample size.  $P$  is the expected prevalence, which is considered as 0.5.

$D$  = The precision which is taken as 0.05.  $E = 1.96$  for a 95% precision. After the calculation, we found that the minimum sample size to achieve is 385.

## Data collection tool

Direct face-to-face interviewing using a structured and pre-tested questionnaire was carried out by the research group members. The questionnaire consisted of three sections: Demographic characteristics, risk factors that are associated with GERD and (GERD-Q) questionnaire with a scoring rate for the diagnosis of GERD, in which a score of 8 or more gives us the diagnosis of GERD. Furthermore, as for the likelihood of GERD, scores 0-2 points were considered as < 50% likelihood of GERD, 3-7; 50% likelihood of GERD, 8-10; 79% likelihood of GERD, and 11-18; 89% likelihood of GERD.

Most of the studies used the Gerd-Q score to diagnose GERD.<sup>[12-14]</sup> The Gerd-Q score consists of six questions based on reported symptoms and calculated scores. The questions include four positive predictors of GERD (heartburn, regurgitation, sleep disturbance due to these two reflux symptoms and use of over-the-counter medication in addition to that prescribed) and two negative predictors of GERD (epigastric pain and nausea). Scores ranging from 0 to 3 were applied for the positive predictors and from 3 to 0 and 3 = none for negative predictors. It has been proven by most of the previously published studies about GERD to be used as a tool for the initial diagnosis and management of GERD without clinical diagnosis by Gastroenterologist.<sup>[17]</sup>

To further test the questionnaire, a pilot study was conducted using the study questionnaire. Five members of group researchers, fluent in both written and spoken English and Arabic language, conducted interviews using the study questionnaire on 20 participants from the general population. The objectives of the study were clearly explained to the participants prior to the start of each interview. All interviews were conducted in the participants' preferred spoken language (either English or Arabic). Similarities and differences were compared for accuracy in English.

The answered questionnaires were stored safely without respondent's names or identities to ensure their privacy.

Different sessions were held between the group researchers for agreement on the process of the interviewing to ensure consistency and avoid interviewer bias. Through these sessions simple, short, rating scale questions have been chosen and leading questions have been avoided. Complex concepts are broken into multiple questions to provide the most accurate response. Direct language was used to ask a single question at a time. Finally, they adjusted the same set of interview questions, body language, and attitude.

## Statistical analysis

All data were coded and analyzed in an anonymous way via an appropriate database program (SPSS), version 26.0 while maintaining the data confidentiality. Categorical variables were reported in frequencies and percentages. Continuous variables were represented as mean  $\pm$  standard deviation (SD).

The Chi-square test was used to determine whether there is a significant association between GERD score, demographic data, and other categorical characteristics of the participants. Also, logistic regression was used to explore the risk factors that have an impact on the presence of GERD. A *P* value of < 0.05 was statistically considered significant.

Approval from the Family Practice Residency Program research committee and the Primary Healthcare research committee were obtained before the study was conducted on 25<sup>th</sup> of January 2023. A brief introduction about the study was explained and verbal consent was taken from all of the included participants who were willing to participate in the study. Complete confidentiality was assured to them.

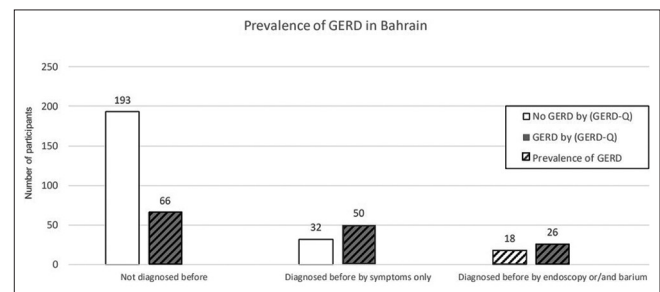
## Results

Out of 411 adults who met the inclusion criteria, 385 accepted to participate in the study, giving a response rate of 93.6%. Most participants were Bahraini (88.6%) and female (53.2%). The mean age was 41.5 (SD = 14.4 years). The majority were married (71.2%) and university-educated (50.9%). The mean BMI was 28.36 (SD = 6.19) and (70.4%) of the participants were obese. Among the past medical history, HTN (22.3%) and diabetes mellitus (16.9%) were the most prevalent diseases.

As illustrated in [Figure 1], the prevalence of GERD among the participants was found to be 41.5% included all participants with GERD-Q questionnaire score 8 and above and those who were diagnosed with GERD before by endoscopy or/and barium regardless of their score. Out of forty-four participants who were diagnosed before by endoscopy or/and barium; only 26 had GERD by GERD-Q scale while 18 were not. Symptoms wise; only 50 were diagnosed by GERD-Q scale.

As shown in [Figure 2], GERD is categorized according to likelihood into 50%, 79%, and 89% based on the total scores. Around sixty-three percent of the participants who were diagnosed by the GERD-Q scale carried a 50 percent likelihood of GERD (24.7%) with a 79 percent likelihood of GERD, and (12.2%) with an 89 percent likelihood of GERD.

Table 1 represents the distribution of GERD among study participants by their sociodemographic data. GERD



**Figure 1:** The prevalence of GERD in Bahrain is 41.5% (160/385). The overall GERD mean score is 7.5 $\pm$ 2.4

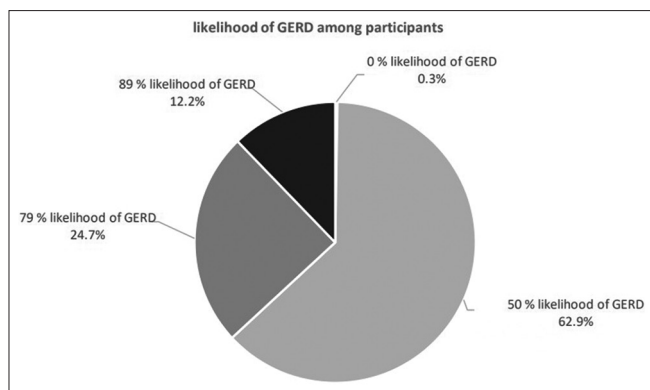


Figure 2: Likelihood of GERD among participants (Total = 385)

Table 1: Association between sociodemographic characteristics and GERD prevalence (Total=385)

Characteristics	Total n (%)	No GERD n (%)	GERD n (%)	P
<b>Age<sup>1</sup></b>				
≥50 years	115 (29.9)	63 (54.8)	52 (45.2)	0.342
<50 years	270 (70.1)	162 (60)	108 (40)	
<b>Sex</b>				
Male	180 (46.8)	106 (58.9)	74 (41.1)	0.867
Female	205 (53.2)	119 (58)	86 (42)	
<b>Nationality</b>				
Bahraini	341 (88.6)	193 (56.6)	148 (43.4)	0.041*
Non-Bahraini	44 (11.4)	32 (72.7)	12 (27.3)	
<b>Educational level</b>				
Intermediate or below	58 (15.1)	29 (50)	29 (50)	0.167
Secondary	131 (34)	84 (64.1)	47 (35.9)	
University	196 (50.9)	112 (57.1)	84 (42.9)	
<b>Marital status</b>				
Married	274 (71.2)	157 (57.3)	117 (42.7)	0.475
Unmarried	111 (28.8)	68 (61.3)	43 (38.7)	
<b>Occupation</b>				
Employed	187 (48.6)	100 (53.5)	87 (46.5)	0.06
Unemployed	198 (51.4)	125 (63.1)	73 (36.9)	
<b>BMI<sup>2</sup></b>				
Obese	271 (70.4)	150 (55.4)	121 (44.6)	0.06
Non obese (<25 kg/m <sup>2</sup> )	114 (29.6)	75 (65.8)	39 (34.2)	
<b>Medical illnesses</b>				
<b>Hypertension</b>				
Yes	86 (22.3)	36 (41.9)	50 (58.1)	<0.001*
No	299 (77.7)	189 (63.2)	110 (36.8)	
<b>Diabetes Mellitus</b>				
Yes	65 (16.9)	32 (49.2)	33 (50.8)	0.098
No	320 (83.1)	193 (60.3)	127 (39.7)	
<b>Bronchial asthma</b>				
Yes	17 (4.4)	6 (35.3)	11 (64.7)	0.048*
No	368 (95.6)	219 (59.5)	149 (40.5)	
<b>Dyslipidemia</b>				
Yes	60 (15.6)	30 (50)	30 (50)	0.149
No	325 (84.4)	195 (60)	130 (40)	
<b>Others</b>				
Yes	49 (12.7)	24 (49)	25 (51)	0.150
No	336 (87.3)	201 (59.8)	135 (40.2)	

<sup>1</sup>Mean age is 41.5±14.4 years. <sup>2</sup>Mean BMI is 28.36±6.19. \*P<0.05 (significant)

was detected among (43.4%) of Bahraini in comparison with non-Bahraini (27.3%) with reported statistical significance ( $P = 0.041$ ). In addition, GERD was disclosed in hypertensive participants (58.1%) compared to (36.8%) of non-hypertensive ( $P < 0.001$ ). GERD was noticed among (44.6%) of obese compared to (34.2%) of non-obese without statistical significance ( $P = 0.06$ ).

Table 2 reveals association between risk factors and GERD. Almost sixty percent of smokers complained of GERD compared to (37.8%) of non-smokers ( $P = 0.007$ ). GERD has statistical significance associated with sleeping within less than 1 hour after dinner, bariatric surgery, family history of GERD, and use of NSAIDs or Aspirin regularly ( $P < 0.05$ ). Other factors including alcohol consumption, number of meals per day, consumption of tea or coffee daily, and exercise frequency per week (walking for 30 mins per time) did not show statistical significance in relation to GERD ( $P > 0.05$ ).

Table 3 demonstrates the numerous stepwise logistic regression models for GERD predictors among responders. Among all factors, this table lists the factors that were the most significant predictors of having GERD, holding all other factors constant. Bariatric surgeries were associated with nearly eleven times more likely for GERD (odds ratio [OR] =10.994, 95% CI: 2.261, 53.449;  $P = 0.003$ ). Other factors were associated with double risk for GERD such as HTN (OR = 2.173, 95% CI: 1.222, 3.863;  $P = 0.008$ ), those who were sleeping within less than 1 hour after dinner (OR = 2.327, 95% CI: 1.319, 4.103;  $P = 0.004$ ), positive family history (OR = 2.263, 95% CI: 1.433, 3.574;  $P < 0.001$ ), and regular use of NSAIDs or Aspirin (OR = 2.168, 95% CI: 1.105, 4.254;  $P = 0.024$ ).

## Discussion

In this study, the prevalence of GERD (41.5%) that included all participants with GERD-Q questionnaire score 8 and above and those who were diagnosed with GERD before by endoscopy or/and barium regardless of their score. It is almost similar to that study reported in Riyadh,<sup>[18]</sup> but much lower than study conducted in Hail and Abha.<sup>[13,14]</sup> The global prevalence of GERD was (13.98%) with region-wise prevalence varying between the Middle East, Europe, Iran, and East Asia representing (8.7 to 33.1%), (8.8% to 25.9%), (33%), and (2.5% to 7.8%), respectively.<sup>[1,9,10]</sup>

Among all participants, (62.9%) with a 50% likelihood of developing GERD which was found to be similar to the Eastern Region in Saudi Arabia as it was (68.9%)<sup>[5]</sup> and higher than what was reported by Chen *et al.*<sup>[19]</sup>

As for sociodemographic, GERD was found to be insignificantly associated with age ( $P = 0.342$ ) similar to those studies done in Saudi Arabia<sup>[11,20]</sup> although other study showed GERD prevalence increases with age.<sup>[21]</sup> This difference is due to the small sample size, which is insufficient to assess the risk factors accurately. No association was



**Table 2: Association between risk factors and GERD prevalence (Total=385)**

Risk factors	Total n (%)	No GERD n (%)	GERD n (%)	P
Smoking status				
Smoker	89 (23.1)	41 (46.1)	48 (53.9)	0.007*
Non-smoker	296 (76.9)	184 (62.2)	112 (37.8)	
Cigarette				
Yes	48 (12.5)	26 (54.2)	22 (45.8)	0.521
No	337 (87.5)	199 (59.1)	138 (40.9)	
Vape				
Yes	32 (8.3)	14 (43.8)	18 (56.3)	0.078
No	353 (91.7)	211 (59.8)	142 (40.2)	
Water pipe				
Yes	36 (9.4)	12 (33.3)	24 (66.7)	0.001*
No	349 (90.6)	213 (61)	136 (39)	
Alcohol consumer				
Yes	14 (3.6)	9 (64.3)	5 (35.7)	0.651
No	371 (96.4)	216 (58.2)	155 (41.8)	
Consumption of coffee daily				
Yes	204 (53)	110 (53.9)	94 (46.1)	0.06
No	181 (47)	115 (63.5)	66 (36.5)	
Consumption of tea daily				
Yes	284 (73.8)	159 (56)	125 (44)	0.101
No	101 (26.2)	66 (65.3)	35 (34.7)	
Number of meals per day				
<3 meals	161 (41.8)	101 (62.7)	60 (37.3)	0.092
3 meals	187 (48.6)	108 (57.8)	79 (42.2)	
>3 meals	37 (9.6)	16 (43.2)	21 (56.8)	
Exercise frequency per week (walking for 30 mins per time)				
Never	212 (55.1)	122 (57.5)	90 (42.5)	0.435
1-3 times	94 (24.4)	52 (55.3)	42 (44.7)	
>3 times	79 (20.5)	51 (64.6)	28 (35.4)	
Sleeping within less than 1 hour after dinner				
Yes	71 (18.4)	33 (46.5)	38 (53.5)	0.024*
No	314 (81.6)	192 (61.1)	122 (38.9)	
Bariatric surgery				
Yes	14 (3.6)	2 (14.3)	12 (85.7)	0.001*
No	371 (96.4)	223 (60.1)	148 (39.9)	
Family history of GERD				
Yes	173 (44.9)	82 (47.4)	91 (52.6)	<0.001*
No	212 (55.1)	143 (67.5)	69 (32.5)	
Use of NSAIDs or Aspirin regularly				
Yes	51 (13.2)	19 (37.3)	32 (62.7)	0.001*
No	334 (86.8)	206 (61.7)	128 (38.3)	

\*P&lt;0.05 (significant)

found between sex and GERD ( $P = 0.867$ ). This result is the same in the majority of studies, including a study done in Arar Saudi Arabia, and a systemic review done in 2015 in USA.<sup>[20,22]</sup> However, some studies showed a significant association.<sup>[16,23]</sup> Regarding nationality, no literature studies emphasized the relation between GERD and nationality and this study found no association between them ( $P = 0.291$ ). BMI is well studied in the literature; high BMI is a well-known risk factor for GERD.<sup>[5,24]</sup> However, this study showed negative relation. This is explained by small size of population that cannot assess the risk factor properly. Among medical illnesses studied, the study shows a significant relation between GERD and HTN ( $P = 0.008$ ). This result is well known in the literature and supported by many other studies.<sup>[25-27]</sup> On the other hand, some study finds a negative relation.<sup>[28]</sup>

Modifiable risk factors such as lifestyle habits can contribute to increasing and decreasing GERD symptoms. There is a marked association between GERD and smoking ( $P = 0.007$ ) in our study as it has been shown in previously published studies.<sup>[5,15,16,24]</sup> Although some studies have shown that drinking tea on a daily basis increases symptoms of GERD,<sup>[15,24]</sup> our study found no correlation, which is similar to previous studies results.<sup>[16,29]</sup> The effect of drinking coffee on GERD is inconsistent; this study showed (46%) out of the total individuals having coffee on a daily basis have GERD symptoms with a ( $P = 0.06$ ). Some conducted study conclude that consuming coffee might aggravate GERD symptoms.<sup>[20]</sup> On the other hand, other studies showed a negative association with developing GERD.<sup>[16,29]</sup>

**Table 3: Binary logistic regression of factors on prevalence of GERD**

	<i>P</i>	Odds Ratio	95% CI for OR
Family history of GERD			
No (Reference)		1	
Yes	<0.001*	2.263	(1.433–3.574)
Bariatric surgery			
No (Reference)		1	
Yes	0.003*	10.994	(2.261–53.449)
Sleeping within <1 h after dinner			
No (Reference)		1	
Yes	0.004*	2.327	(1.319–4.103)
Hypertension			
No (Reference)		1	
Yes	0.008*	2.173	(1.222–3.863)
Use of NSAIDs or Aspirin regularly			
No (Reference)		1	
Yes	0.024*	2.168	(1.105–4.254)
Occupation			
Unemployed (Reference)		1	
Employed	0.108	1.475	(0.918–2.368)
Smoking status			
No (Reference)		1	
Yes	0.221	1.399	(0.817–2.396)
Bronchial asthma			
No (Reference)		1	
Yes	0.243	1.935	(0.638–5.868)
Nationality			
Non-Bahraini (Reference)		1	
Bahraini	0.291	1.510	(0.702–3.245)
BMI			
Non-Obese (Reference)		1	
Obese	0.304	1.307	(0.784–2.177)
Diabetes Mellitus			
No (Reference)		1	
Yes	0.314	1.382	(0.737–2.592)
Consumption of coffee daily			
No (Reference)		1	
Yes	0.393	1.222	(0.772–1.933)

\**P*<0.05 (significant)

As alcohol is a risk factor for GERD, a meta-analysis that was conducted among different regions in the world showed that the high prevalence of GERD is associated with those who do not drink alcohol or consume a low alcohol intake.<sup>[9,29]</sup> Furthermore, in our study, there is a negative association between alcohol consumers and GERD (*P* = 0.651). The result of this study highlighted that the habit of sleeping within 1 hour after dinner was found to be significantly associated with GERD, with a higher proportion of individuals who reported doing so (experiencing GERD symptoms (*P* = 0.024).

Furthermore, the frequency of exercise per week, specifically walking for 30 minutes per session, did not show a significant association with GERD (*P* = 0.435). All these findings are consistent with previous research conducted in various populations.<sup>[16]</sup> Having a family history of GERD was

strongly associated with an increased risk of developing GERD (*P* < 0.001) as proven by other studies.<sup>[5,14,16]</sup> Regular use of NSAIDs or Aspirin was found to be significantly associated with GERD, with a higher prevalence of GERD among individuals who reported regular usage (*P* = 0.001) like many other reported studies.<sup>[5,14,20,21]</sup> However, another study has not revealed a relationship between the use of NSAIDs and GERD.<sup>[16]</sup>

Bariatric surgery was also identified as a significant determinant of GERD, with a higher prevalence of GERD observed among individuals who underwent the procedure in this study (*P* = 0.001) as in another study.<sup>[30]</sup> Also, this study revealed that individuals who consumed more than three meals per day had a higher risk of GERD compared to those who had less than three meals per day. However, this association was found to be statistically insignificant (*P* = 0.092). Similarly, to our findings, a study was conducted on a large sample of Iranian adults, which shows no association between meal frequency and GERD,<sup>[31]</sup> but other study has found an association between eating habits, irregular eating, more snacks or meals, and GERD symptoms.<sup>[32]</sup>

As revealed in [Table 3], the binary logistic regression models showed that family history of GERD was the most significant predictor for having GERD. This coincided with many previous studies.<sup>[5,14]</sup> Other detected factors in this study such as sleeping within less than 1 hour after dinner, bariatric surgery, use of NSAIDs or Aspirin regularly, and history of HTN were verified as major risk factors like many antecedent studies.<sup>[5,14,25]</sup>

## Conclusion

In line with the current study's findings, the prevalence of GERD in the study population (41.5%) is higher than in many other countries especially the Middle East, East Asia, and Western countries. The most significant risk factors for developing GERD are family history of GERD, sleeping within less than 1 hour after dinner, bariatric surgery, use of NSAIDs or Aspirin regularly, and a history of HTN. Further thorough study of risk factors, particularly lifestyle, and nutritional habits along with the effect of GERD on the overall health status and quality of life is recommended. Community perceptions and practices must be considered by healthcare providers; therefore, national prevention programs and educational campaigns should be established to improve the utilization of primary healthcare services in order to prevent this disease and its complications.

## Limitations

There are some limitations to this study. Sample size was impacted by modest flow at health centers and self-reported information about GERD diagnosis history. Since it is the first study in Bahrain, further studies are needed to validate these results and to assess other risk factors associated with GERD due to its effect on the overall health status and quality of life.

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## Conflicts of interest

There are no conflicts of interest.

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