



Prevalence and Risk Factor of Gastro-esophageal Reflux Disease among Hail Population, Saudi Arabia

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Authors' contributions

This work was carried out in collaboration among all authors. Authors HAA, AAAT, MAAT and AHA conducted research, collected data and prepared initial draft of the article. MK designed the study, analyzed and interpreted data, prepared final draft of article. All authors have critically reviewed and approved the final draft and are responsible for the content and similarity index of the manuscript. All authors read and approved the final manuscript.

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ABSTRACT

Aims: Gastroesophageal reflux disease (GERD) is a common gastrointestinal disorder that develops when the contents of the stomach reflux into the esophagus due to large hiatal hernia or lower esophageal sphincter dysfunction. The common symptoms of the disease include heartburn and regurgitation. It takes place mainly among youngsters, females, and obese people. The aims of the study include GERD prevalence among Hail population and the related risk factors.

Study Design: Cross-sectional study.

Place and Duration of Study: Hail, Kingdom of Saudi Arabia. Between July to December 2020.

Methodology: A cross-sectional study conducted with 704 subjects aged more than 15 years, through self-administered questionnaire consisting of 22 questions. The questionnaire included demographic data, GERD clinical symptoms, and individual behaviour. Statistical data analyzed by using SPSS version 22.

Results: Out of 704 subjects, nearly half of the participants were males (51.7%). GERD was found

in 408 (58%) participants among them 276 (39.2%) had mild symptoms, 9.9% had moderate symptoms and 62 (8.8%) had severe condition. Most significant predictors of GERD (P <0.05) were Females with chronic health problems, anxiety, and having Spicy food. The participants with sports activity had less risk to develop GERD.

Conclusion: The results showed high prevalence of GERD among Hail population with many significant predictors. Public health providers should increase awareness about GERD and its significant effects on community.

Keywords: Esophageal sphincter dysfunction; GERD; Hail; prevalence; risk factor.

1. INTRODUCTION

Gastroesophageal reflux disease (GERD) is a common gastrointestinal disorder [1]. Previous study showed that the prevalence of GERD among Saudi population is higher than in Western countries and East Asia [2]. GERD develops when the contents of the stomach reflux into the esophagus due to large hiatal hernia or lower esophageal sphincter dysfunction [3]. The disease is characterized mainly by heartburn and regurgitation and prominent in youngsters, female, and obese people [1]. GERD has direct relationship with lifestyle e.g., cigarette smoking, use of NSAIDs, alcohol and coffee consumption, and diet [4]. One of the studies showed that the prevalence of GERD in the Saudi population is higher than East Asia and Western countries [5]. Even though GERD is one of the major issues that can affect the daily activity of people, in Saudi Arabia, there are no published reports in Hail city. Most people who suffer from GERD symptoms do not seek medical care; they either consider these symptoms as insignificant or take Over-the-counter medications. Therefore, the objective of the study was to measure the prevalence and determinant of GERD among Hail population. The study will be useful to health care providers for the diagnosis and management of GERD in the community.

2. MATERIALS AND METHODS

2.1 Research Design and Setting

A cross-sectional study was designed to determine the prevalence and risk factors of GERD among Hail population. Total 704 subjects, with more than 15 years of age, completed a self-administered questionnaire that contained 22 questions. The study was conducted between July to December 2020. The statistical data were analyzed by using SPSS version 22.

2.2 Sample Size

We calculated sample size by using the formula $ss = (Z^2 \times p \times q) / c^2$

Where, ss= sample size. Z= 2.58, p=0.5, q=(1-p)=0.5, c = Sampling error at 5%. Based on calculations, we found that the optimal sample size to achieve a precision of ±5% with a 99% confidence interval (CI) is 666, so the sample size was set to 704.

2.3 Development and Application of the Questionnaire

Information was collected regarding demographic data such as age, sex, height, weight and lifestyle including cigarette smoking; sleep behavior, eating breakfast, and others.

The GERD scale scoring method was used for the diagnosis of GERD. Total score of 0 to 2 points = 0 percent likelihood of GERD; 3 to 7 points = 50 percent likelihood; 8 to 10 points = 79 percent likelihood; 11 to 18 points = 89 percent [6]. All the points in the questionnaires explained very well to the participants and participants consent was taken well before filling the questionnaire.

2.4 Statistical Analysis

After data collection, it was coded and analysed by SPSS version 22 (SPSS, Inc. Chicago, IL). A p-value less than 0.05 was considered statistically significant. Descriptive analysis based on frequency and percent distribution was conducted for all variables including demographic data, clinical symptoms, and individual behaviour. Cross tabulation was used to assess univariate analysis for different risk factors of GERD. Relations between the factors were tested by using the Pearson chi-square test. Multiple logistic regression model was used

to assess the most significant adjusted determinants of participant's GERD.

3. RESULTS AND DISCUSSION

Out of 704 participants with a mean age of 23.6 ± 11.8 years, nearly half were males (364; 51.7%) and 42.7% participants had BMI >25 that indicated they were overweight. Total 107 (15.2%) participants were on drugs for chronic diseases and 220 (31.3%) had a family history of GERD. The results also showed that 27.1% participants were in stressed condition (Table 1). In term of clinical symptoms, 56.1% of the participants had Heartburn and 49.4% regurgitation. Also, 45.6% had epigastric pain and 50.6% were suffering from nausea. Heartburn related insomnia was also reported in 32.5% participants. The need for OTC medication for GERD symptoms was reported by 16.5% of the respondents (Table 2). GERD was detected among 408 (58%) participants that was mild in 39.2%, moderate in 9.9%, and severe in 8.8% of cases (Fig. 1).

Table 3 demonstrates risky behavior and habits for GERD among Hail population. Near about 25% participants had breakfast regularly but quick eating was reported in 29.8% of the participants. Total 48.4% participants slept less than 7 hours in a day while 50.9% practiced exercise regularly. Out of total participants, 18.8% were smokers and 73.2% were Spicy food users. Consumption of coffee more than once daily was reported by 44.2% of the participants. Univariate analysis showed that gender, age, drug for chronic diseases, stress, smoking, consuming spicy food, and sports had significant association ($p < 0.05$) with GERD (Table 4). On the other hand, BMI, family history, regular breakfast sleeping after dinner, sleeping duration, and coffee consumption did not show significant relation with GERD ($p > 0.05$). The factors mentioned in Table 5 were the most significant predictors for GERD such as gender (female), using drug for chronic diseases, anxiety and consuming spicy food. However, the participants who were engaged in sport had 10% less risk (OR=0.90) than others.

The study conducted to assess the prevalence and risk factors of GERD among Hail population and data collected based on demographic information, clinical symptoms, and individual behavior. In this study, we found that 58% of the participants had GERD, and most of them with mild symptoms (39.2%). Our study showed that

there is a high prevalence of GERD in Hail population in comparison to other study conducted in Saudi Arabia [5]. This is likely due to fact that people in Hail are more exposed to various GERD risk factors such as cigarette smoking and obesity [7]. In this study, we found that females had a higher risk of developing GERD compared to males that may be due to high prevalence of GI disorder in females [8]. Our results are similar to other studies conducted by Shaha et al. [9] and Mahadeva et al. [10]. However, most of the studies reflected no relation between gender and GERD [11]. Our study suggested that GERD was higher in old age as recommended by other studies too [12,13]. Concerning BMI, high value showed no significant relation to the disease [14,15]. On the other hand, some studies supported the relationship between high BMI and GERD and mentioned that high BMI may lead to decrease in lower esophageal sphincter pressure and increase thoracoabdominal pressure [16,17]. The present study also showed a positive association between GERD and the use of drugs for chronic diseases as well as stress. Other previous studies also supported our findings [1,18-20]. This is related to the fact that stress can decrease gastric emptying, increase mucosal sensitivity to acid in the esophagus and increase gastric acid secretion [21]. Regarding family history, our results showed no significant relationship between family history and GERD. However, in other studies among medical students in Saudi Arabia and Shiraz city in south of Iran showed a significant correlation between the two [4,22]. In the analysis, we noticed that GERD was more common in patients who consumed spicy food twice or more per week (48.9%). Spicy foods can irritate inflamed lower esophageal mucosa that may lead to heartburn as suggested by Choe et al. [23] and Alsulobi et al. [24]. Other studies do not mention spicy food as a significant factor [25,26]. Interestingly, this study showed a negative association between unhealthy eating habits like higher caffeine consumption, sleeping after 1 hour of having dinner, eating breakfast irregularly, having meals in less than 10 minutes, and the risk of developing GERD. This is in accordance with Nilsson et al study. [27]. On the other hand, some previous studies have showed a positive relationship between unhealthy eating habits and a higher prevalence of GERD [25,28,29]. Not surprisingly, smokers have a higher risk of developing GERD than the nonsmoker group (p -value 0.024) as mentioned by other studies too [24,30]. It seems that smoking impairs the lower

esophageal sphincter, which is an important barrier to acid reflux [31]. Our results showed that physically active people are less likely to develop GERD compared with physically inactive or less active people, (p-value 0.002). The long-term effect of exercise on GERD symptoms had not been addressed in many previous studies, but in a study conducted in Norway showed that exercise lasting at least 30 minutes weekly, decreased the risk of GERD symptoms by 50%. The association remains unclear and further

studies should be done to establish the exact role of physical exercise against GERD symptoms [27]. The main limitation of this study is that it is a cross-sectional study. In order to support the relationship between the significant risk factors and the prevalence of GERD, large sample size is required. A cohort study could be stronger than a cross-sectional study in finding the relation between observed determinant factors and developed GERD.

Table 1. Personal characteristics of the general population in Hail region, Saudi Arabia

Personal characteristics	N	%
Gender		
Male	364	51.7%
Female	340	48.3%
Age in years		
15-19	146	20.7%
20-24	321	45.6%
25-29	61	8.7%
30-35	61	8.7%
> 35 Yrs.	115	16.3%
Body mass index		
Normal	396	56.3%
Overweight	150	21.3%
Obese	158	22.4%
Using drugs for chronic disease		
Yes	107	15.2%
No	597	84.8%
Family members complain of GERD		
Yes	220	31.3%
No	484	68.8%
Feeling anxious or stress		
Never	141	20.0%
Sometimes	372	52.8%
Usually	191	27.1%

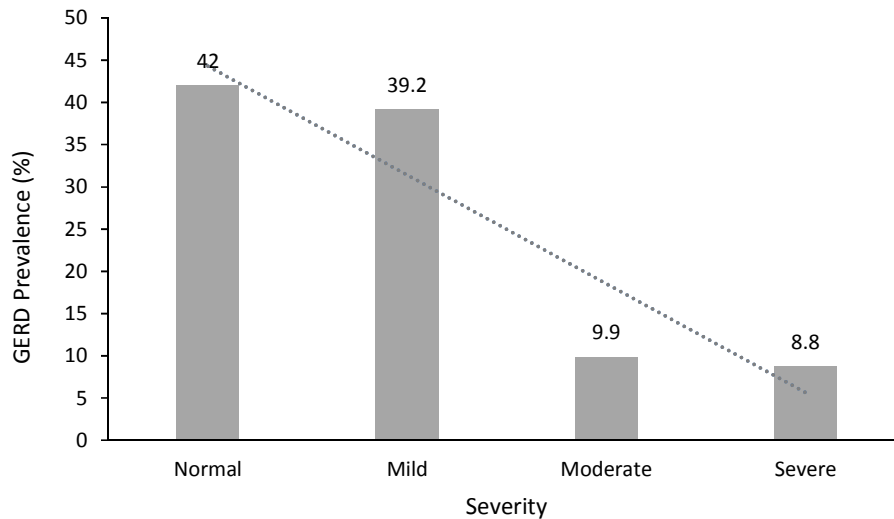


Fig. 1. GERD prevalence and severity among Hail population, Saudi Arabia

Table 2. Frequency of GERD related clinical presentation among hail population

Clinical presentation	N	%
Burning behind the Breastbone (Heartburn)		
Never	309	43.9%
1 day/ week	211	30.0%
2-3 days/ week	110	15.6%
4-7 days/ week	74	10.5%
Stomach contents moving up to the throat or mouth (regurgitation)		
Never	356	50.6%
1 day/ week	207	29.4%
2-3 days/ week	91	12.9%
4-7 days/ week	50	7.1%
Pain in the middle of the upper Stomach area		
Never	383	54.4%
1 day/ week	160	22.7%
2-3 days/ week	111	15.8%
4-7 days/ week	50	7.1%
Nausea		
Never	348	49.4%
1 day/ week	196	27.8%
2-3 days/ week	107	15.2%
4-7 days/ week	53	7.5%
Trouble in night's sleep because of Heartburn or regurgitation		
Never	475	67.5%
1 day/ week	126	17.9%
2-3 days/ week	73	10.4%
4-7 days/ week	30	4.3%
Need for using over-the-counter medicine for Heartburn or regurgitation		
Never	588	83.5%
1 day/ week	52	7.4%
2-3 days/ week	46	6.5%
4-7 days/ week	18	2.6%

Table 3. Risky behavior and habits for GERD among Hail population, Saudi Arabia

Risky habits and behavior	N	%	
Having breakfast regularly	Yes	177	25.1%
	Sometimes	213	30.3%
	No	314	44.6%
Having meals in less than 10 minutes	Yes	210	29.8%
	Sometimes	273	38.8%
	No	221	31.4%
Sleep duration	< 7 hours	341	48.4%
	> 7 hours	363	51.6%
Frequency of sports per week	Not practice	346	49.1%
	Once / week	123	17.5%
	Twice / week	85	12.1%
	3 time or more	150	21.3%
Smoking habits	Yes	132	18.8%
	No	572	81.3%
Frequency of having fast food per week	Never	83	11.8%
	Once / week	242	34.4%
	Twice / week	147	20.9%
	3 time or more	232	33.0%
Frequency of having spicy food per week	Never	189	26.8%
	Once / week	171	24.3%
	Twice / week	124	17.6%
	3 time or more	220	31.3%
Frequency of drinking coffee per day	Not drink coffee	111	15.8%
	Once-daily	282	40.1%
	More than once daily	311	44.2%

Table 4. Distribution of GERD among hail population according to their personal data and risky behavior

Factors		GERD				P-value
		No		Yes		
		N	%	N	%	
Gender	Male	174	47.8%	190	52.2%	.001*
	Female	122	35.9%	218	64.1%	
Age in years	15-19	57	39.0%	89	61.0%	.001*
	20-24	164	51.1%	157	48.9%	
	25-29	17	27.9%	44	72.1%	
	30-35	20	32.8%	41	67.2%	
	> 35 Yrs.	38	33.0%	77	67.0%	
Body mass index	Normal	163	41.2%	233	58.8%	.053
	Overweight	75	50.0%	75	50.0%	
	Obese	58	36.7%	100	63.3%	
Using drugs for chronic disease	Yes	25	23.4%	82	76.6%	.001*
	No	271	45.4%	326	54.6%	
Family history of GERD	Yes	81	36.8%	139	63.2%	.058
	No	215	44.4%	269	55.6%	
Feeling anxious or stressed	Never	77	54.6%	64	45.4%	.001*
	Sometimes	159	42.7%	213	57.3%	
	Usually	60	31.4%	131	68.6%	
Having breakfast regularly	Yes	74	41.8%	103	58.2%	.181
	Sometimes	100	46.9%	113	53.1%	
	No	122	38.9%	192	61.1%	
Having meals in less than 10 minutes	Yes	76	36.2%	134	63.8%	.121
	Sometimes	121	44.3%	152	55.7%	
	No	99	44.8%	122	55.2%	
Sleeping after dinner for 1 hour	Yes	39	37.9%	64	62.1%	.451
	Sometimes	118	41.0%	170	59.0%	
	No	139	44.4%	174	55.6%	
Sleep duration	< 7 hours	143	41.9%	198	58.1%	.954
	> 7 hours	153	42.1%	210	57.9%	
Frequency of sports per week	Not practice	129	37.3%	217	62.7%	.002*
	Once / week	58	47.2%	65	52.8%	
	Twice / week	29	34.1%	56	65.9%	
	3 time or more	80	53.3%	70	46.7%	
Smoking	Yes	44	33.3%	88	66.7%	.024*
	No	252	44.1%	320	55.9%	
Frequency of having fast food per week	Never	31	37.3%	52	62.7%	.463
	Once / week	108	44.6%	134	55.4%	
	Twice / week	56	38.1%	91	61.9%	
	3 time or more	101	43.5%	131	56.5%	
Frequency of having spicy food per week	Never	95	50.3%	94	49.7%	.045*
	Once / week	62	36.3%	109	63.7%	
	Twice / week	49	39.5%	75	60.5%	
	3 time or more	90	40.9%	130	59.1%	
Frequency of drinking coffee per day	Not drink coffee	46	41.4%	65	58.6%	.062
	Once-daily	133	47.2%	149	52.8%	
	More than once daily	117	37.6%	194	62.4%	

P: Pearson χ^2 test; *P < 0.05 (significant)

Table 5. Multiple stepwise logistic regression for predictors of GERD among the study population

Risk factors	P-value	OR _A	95% CI	
			Lower	Upper
Female	.001*	1.97	1.38	2.82
Drugs	.001*	1.65	1.29	2.11
Anxiety	.001*	1.44	1.13	1.83
Playing sports	.049*	0.90	0.79	0.99
Smoking	.002*	2.08	1.32	3.26
Spicy	.011*	1.19	1.04	1.37
Constant	.027	4.33		
Model Pseudo R ² ; P value	.36; .002*			
Classification accuracy	69.4%			

OR_A: Adjusted Odds ratio; CI: Confidence interval; *P < 0.05 (significant)

4. CONCLUSION

Our study showed that there is high prevalence of GERD among population of Hail, Saudi Arabia. The most significant factors for GERD included female gender, using drugs for chronic health problems, smoking, anxiety, and having spicy food. On the other hand, participants with sports activity had lesser risk. To reduce the prevalence of GERD, they should be educated to change their habits and encouraging them to do exercise and decrease additional weight.

CONSENT

All authors declare that written informed consent was obtained from the participants for this study.

ETHICAL APPROVAL

All authors hereby declare that the study have been examined and approved by the Research Ethics Committee, University of Hail, Hail, Saudi Arabia (No 23561/5/42 dated 17/12/202).

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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