

ORIGINAL ARTICLE

Gastroesophageal reflux disease and heartburn among the general population of Saudi Arabia

Sumayah Abdulrahman Alzahrani^{1*}, Malikah Zaki Alshaikhmohamed², Arub Mohammed Albalawi³, Nawal Mashni Alharbi⁴, Basema Muneer Alqatari⁵, Sarah Ali Alatwi¹, Doaa Ali Alhalal⁶, Zainab Hussain Almatar⁶, Rawan Abdulwahab Saeed⁷, Abeer Mohammed Asiri¹

ABSTRACT

Background: Gastroesophageal reflux disease (GERD) is one of the most common upper gastrointestinal disorders that develop when a retrograde flow of stomach contents occurs leading to GERD symptoms or complications. The present study aimed at evaluating the prevalence of GERD and heartburn as well as their main characteristics and risk factors among the Saudi population, Saudi Arabia.

Methodology: A cross-sectional study was carried out on a random sample of the general population of Kingdom of Saudi Arabia, during the period from 1 January to 16 June 2019, using a pre-designed questionnaire for the data collection.

Results: The study included 1,734 participants; the majorities (76.8%) of the participants were females. The study reported that 17.8% of the Saudi population had GERD. There was a significant correlation between GERD and gender, age, body mass index group, marital status, region, and family history of GERD ($p > 0.05$), but there was no relation with average family income. It was more prevalent among females by 73.1% and among the age group 31–40 years by 32%. Furthermore, 38.8% of cases were with average weight, and more than half were married (57.6%).

Conclusion: The study concluded that 17.8% of the Saudi population had GERD. There was a significant correlation between GERD and gender, age, obesity, marital status, region, and family history of GERD.

Keywords: Gastroesophageal reflux disease (GERD), heartburn, the general population of Saudi Arabia.

Introduction

Gastroesophageal reflux disease (GERD) is one of the most prevalent upper gastrointestinal disorders that develop when a retrograde flow of stomach contents occurs leading to GERD symptoms or complications [1]. It is a common clinical problem affecting millions of people worldwide. Almost half of all adults will report reflux symptoms during some time of their of lifespan [2]. Epidemiological data found that the prevalence of GERD in the United States of America and Europe was up to 27.8% 25.9%, respectively. GERD prevalence was found to be as low as 11.6% in Japanese adults [3]. GERD is classified as either non-erosive reflux disease or erosive reflux disease based on the presence or absence of endoscopic esophageal mucosal damage. In general, patients usually stay with very little development or

regressions in their phenotypic presentation throughout their lifetime [4]. The most common known risk factors of GERD are heredity, obesity, and cigarette smoking. High intake of nutritional fiber and mild physical exercise appear to decrease this risk, while gender and age do not significantly affect GERD's risk [5]. GERD may be associated with a variety of other symptoms,

Correspondence to: Sumayah Abdulrahman Alzahrani
*Medical Intern, Tabuk University, Tabuk, Saudi Arabia
Email: sumayah.alzahrani9@gmail.com

Full list of author information is available at the end of the article.

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including heartburn, regurgitation, water brash, chest pain or discomfort, dysphagia, belching, epigastric pain, nausea, and bloating. Patients may experience extra-esophageal symptoms, such as cough, hoarseness, throat clearing, throat pain or burning, wheezing, and sleep disturbances [6,7]. GERD diagnosis is typically based on an empirical trial on classic symptoms and response to acid suppression. People with heartburn or GERD can often relieve their symptoms by changing some of their lifestyle habits. They may attempt to prevent certain kinds of food, for example, or drink less alcohol. These changes are not always easy to do, but the effort may be worth it. Medications can also reduce symptoms. If this does not provide sufficient relief, it could be referred for surgery [8]. A previous study in Kingdom of Saudi Arabia (KSA) designed to determine the risk factors of GERD's among the Saudi Arabian population [9] found that GERD was noticed in participants eating greasy (31.2%) and fast food (32.7%), on analgesics (38.4%), drinking tea (33.4%), not taking fibers (37.4%), and these were statistically significant with GERD ($p \leq 0.05$). The characteristics and behavior of participants statistically significant with GERD were with a positive family history (39.3%), obese (39.4%), not performing weekly regular physical activities (31.1%), and smoking (39.3%). Another study in KSA aimed to determine the prevalence of GERD in the population of Riyadh and to assess its association with other factors found that; the prevalence of GERD was 45.4%. Prevalence was higher in older individuals and those with a higher body mass index (BMI). There was no difference between males (45.43%) and females (45.13%) ($p = 0.92$); there was a trend of a higher prevalence in smokers (51.63% vs. 44.41%) [10]. The present study was aimed at evaluating the prevalence of GERD and heartburn as well as their main characteristics and risk factors among the Saudi population, Saudi Arabia.

Subjects and Methods

A cross-sectional study was conducted on a random sample of the general population of the KSA, during the period from 1 January to 16 June 2019, using a pre-designed questionnaire for data collection. The sample size was calculated using the sample size equation: $n = z^2 p(1-p)/e^2$. Data were collected from 1,558 individuals aged above 18 years. Systematic random sampling technique was followed. Data were collected using a pre-designed online questionnaire, which includes questions designed to fulfill the study objectives as socio-demographic characteristics, including age, sex, educational level, marital status, region, and average monthly household income. Questions about GERD, the intensity of that pain, if continuous or not, increases with food intake or not, and other signs and symptoms of reflux were also included. The questionnaire also included questions about risk factors, such as smoking, obesity, diabetes mellitus, preferred food, coffee, tea and chocolate, soft drinks, hot foods, take away meals, fatty meals, and specific herbs. Predisposing factors as overeating

(habit), suffering from stress and anxiety, suffering from stomach ulcers, history of quantification of the stomach, suffering from delayed stomach emptying, symptoms, family history and management of GERD among cases. All the data were analyzed using the statistical package for social sciences version 20. Descriptive statistics were used for the prevalence and quantitative variables. Risk factors were determined using the χ^2 test, and p -value of less than 0.05 was considered as statistically significant. Written informed consent after explaining the purpose of the study was obtained from all individuals who participated in the study. The questionnaires used in data collection were anonymous, and confidentiality of data was assured.

Results

Table 1 shows the socio-demographic characteristics of the participants, the study included 1,734 participants, of which the majority 76.8% of the participants was females; the most common age group was 21–30 years old. Furthermore, 46% of them were single and 77% were highly educated. Among the total, 40.4% of them were from Eastern province, 4.8% had diabetes mellitus (DM), 9.6% were smokers, 5.7% had hypertension, 2.3% overweight, and 20.4% were obese. Table 2 and Figure 1 illustrates the GERD among the studied population, KSA, 2019. The total prevalence of GERD in KSA was found to be 17.8% and 22.3% reported facing the symptoms but was not clinically diagnosed. Regarding symptoms of GERD, the present study found that heartburn, usually after eating, which may get worse at night, reflux of food or acid was the most common which was reported by 81.6% followed by trouble in sleeping among 24.2%, sleep disturbance in 23.2%, and 9.1% with a feeling of a lump in the throat (Table 3). Table 4 illustrates the relationship between socio-demographic characters and GERD among the studied population. There was a significant correlation between GERD and gender, age, BMI group, marital status, region, and family history of GERD ($p > 0.05$), but there was no relation with average family income. It was more prevalent among females by 73.1% and among the age group 31–40 years by 32%. Furthermore, 38.8% of cases were with a healthy weight, and more than half were married (57.6%).

Discussion

GERD, which results from refluxed gastric contents into the esophagus, is a digestive disorder and leads to troublesome symptoms and complications such as heartburn and regurgitation [11]. Mild symptoms occurring more than two times per week, and moderate or severe symptoms more than once per week are considered troublesome [11]. The emphasis on symptoms highlights the most common problem in patients with GERD. These symptoms have an impact on the lives of affected individuals and also decrease work productivity [12,13]. The disease is associated with complications such as Barrett's esophagus, esophageal stricture, and esophageal

Table 1. Socio-demographic and general characteristics of the studied population (n = 1,734).

Variables	No.	%
Gender		
Female	1,331	76.8
Male	403	23.2
Age group		
<21	334	19.3
21–30	648	37.4
31–40	384	22.1
>40	368	21.2
Marital status		
Married	883	50.9
Single	798	46.0
Divorced	39	2.2
Widow	14	8
Educational level		
University or more	1,336	77.0
Secondary	323	18.6
Preparatory	56	3.2
Primary	15	9
Illiterate	4	2
Region		
Southern Region	112	6.5
Eastern Province	701	40.4
The northern area	489	28.2
Western Region	243	14.0
Central area	189	10.9
Average monthly household income		
Excellent	294	17.0
Very good	572	33.0
Good	410	23.6
Average	389	22.4
Low	69	4.0
BMI group		
Underweight	118	6.8
Normal	755	43.5
Overweight	508	29.3
Obese	353	20.4
Diabetes mellitus		
No	1,651	95.2
Yeas	83	4.8
Smoking		
No	1,568	90.4
Yeas	166	9.6
Hypertension		
No	1,635	94.3
Yeas	99	5.7
Other chronic diseases		
No	1,521	87.7
Yeas	213	12.3

Table 2. GERD among the studied population.

GERD	No.	%
Yeas	309	17.8
No	1,039	59.9
Facing the symptoms but not officially diagnosed	386	22.3

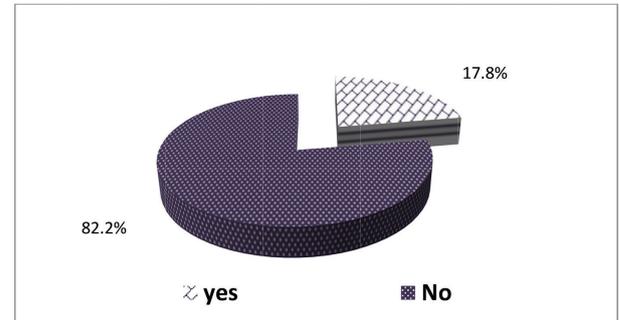


Figure 1. Percentage of GERD among the studied Saudi population.

adenocarcinoma. This chronic, painful disease interferes with physical activity, impairs social functioning, disturbs sleep, and reduces productivity at work [14]. Various environmental or lifestyle risk factors like obesity, fatty food, smoking, alcohol, and non steroidal anti-inflammatory disease (NSAIDs) are thought to be associated with GERD [15]. The prevalence of GERD is high in North America (19.8%), South America (23%), and Europe (15.2%) and much lower in China (3.1%) and the Far East (5.2%) [16,17]. The present study is a cross-sectional study conducted among 1,734 Saudi population and aimed to evaluate the prevalence of GERD and heartburn and their main characteristics and risk factors among the Saudi population, Saudi Arabia. In this study, we found that 17.8% of the Saudi population had GERD. Contrast to our results, in Riyadh, another study was conducted among 1,265 subjects reporting a high prevalence rate of GERD with 45.4% [10]. This was higher than another survey conducted in the Western region of Saudi Arabia which reported a prevalence of 23.47% [18]. However, in Arar City, Northern Saudi Arabia, a cross-sectional study was carried out among 302 individuals reporting a total prevalence of 61.8% [19]. Another study was carried out in the Qassim region among 200 Saudi school teachers which reported an overall prevalence of 55% [20]. Similar to our results, another study conducted in Abha, Southern Saudi Arabia, among 1,607 patients found that 15% had GERD [21]. In Southern India, another study conducted, among 1,072 participants found that the prevalence of GERD was 22.2 % [22]. Also, an Italian study conducted among 3,012 of university students reported a total of 792 students (26.2% of the respondents) with typical GERD symptoms occurring at least weekly once [23]. In the Tibet autonomous region, China, a cross-sectional study carried out among 5,680 subjects reported; the

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Table 3. Symptoms, family history, and management of GERD among cases.

Symptoms	No.	%
Heartburn, usually after eating, which may get worse at night, reflux of food or acid	252	81.6
Sleep disturbance	71	23.2
Feeling a lump in the throat	28	9.1
Trouble sleeping	75	24.2
Family history of GERD	59	19.1
Number of nights having difficulty sleeping well due to severe pain (during the past week)		
1–2	229	74.1
3	67	21.7
4	24	7.7
Waking up to sleep because of a burning sensation before	81	26.2
Performing sports activities for at least 30 minutes a day	48	15.5
Using analgesics especially before going to sleep	63	20.3
Type of analgesics used		
Paracetamol analgesics (Panadol - fevadol, etc.)	42	13.5
Non-steroidal analgesics (rofenac, propin, aspirin, etc.)	83	26.9
Preferred food (there is overlapping)		
Coffee, tea, and chocolate	161	52.1
Soft Drinks	83	26.9
Hot foods	82	26.5
Take away meals	79	25.6
Fatty meals	70	22.6
Specific herbs	52	16.8
Predisposing factors		
Eating much (habit)	183	59.2
Suffering from stress and anxiety	121	39.2
Suffering from stomach ulcers	112	36.2
Pregnancy (in females)	33	10.7
History of quantification of stomach	33	10.7
Suffering from a delayed stomach emptying	43	13.9
Time for dinner		
One hour before sleeping	145	46.9
Three hours before sleep	62	20.1
Five hours before sleep	32	10.4
Two hours before sleeping	84	27.1
Presence of complications	55	17.8
Types of complications		
Narrowing of the esophagus	31	10.0
Possible carcinogenic changes (Barrett's esophagus)	7	2.2
Open sore (ulcer)	16	5.2
Hiatus hernia	1	0.3
Asking medical care	302	97.7
Diagnoses	302	97.7
Describing a treatment or a treatment plan	305	98.7
Improvement after treatment	279	90.3

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Table 4. The relationship between GERD and socio-demographic characteristics of the studied population.

Variables	Responses	GERD			Total (n = 1,734)	p-value
		Facing the Symptoms (n=386)	No. (n = 1,039)	Yes (n = 309)		
Gender	Female	274	831	226	1,331	0.000
		71.0%	80.0%	73.1%	76.8%	
	Male	112	208	83	403	
		29.0%	20.0%	26.9%	23.2%	
Age-group	<21	59	246	29	334	0.001
		15.3%	23.7%	9.4%	19.3%	
	21–30	139	414	95	648	
		36.0%	39.8%	30.7%	37.4%	
	31–40	92	193	99	384	
		23.8%	18.6%	32.0%	22.1%	
>40	96	186	86	368		
	24.9%	17.9%	27.8%	21.2%		
BMI group	Underweight	21	78	19	118	0.025
		5.4%	7.5%	6.1%	6.8%	
	Normal	158	477	120	755	
		40.9%	45.9%	38.8%	43.5%	
	Overweight	111	298	99	508	
		28.8%	28.7%	32.0%	29.3%	
Obese	96	186	71	353		
	24.9%	17.9%	23.0%	20.4%		
Marital status	Widow	2	9	3	14	0.001
		.5%	.9%	1.0%	8%	
	Single	160	525	113	798	
		41.5%	50.5%	36.6%	46.0%	
	Married	214	491	178	883	
		55.4%	47.3%	57.6%	50.9%	
Divorced	10	14	15	39		
	2.6%	1.3%	4.9%	2.2%		
Family history of GERD	No	234	1,006	163	1,403	0.001
		60.6%	96.8%	52.8%	80.9%	
	Yes	152	33	146	331	
		39.4%	3.2%	47.2%	19.1%	
Average family income	Excellent	55	175	64	294	0.330
		14.2%	16.8%	20.7%	17.0%	
	Very good	133	337	102	572	
		34.5%	32.4%	33.0%	33.0%	
	Good	103	246	61	410	
		26.7%	23.7%	19.7%	23.6%	
Average	79	241	69	389		
	20.5%	23.2%	22.3%	22.4%		
Low	16	40	13	69		
	4.1%	3.8%	4.2%	4.0%		

(Continued)

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Table 4. (Continued)

Variables	Responses	GERD				p-value
		Facing the Symptoms (n=386)	No. (n = 1,039)	Yes (n = 309)	Total (n = 1,734)	
Region	Southern	26	70	16	112	0.000
		6.7%	6.7%	5.2%	6.5%	
	Eastern	165	418	118	701	
		42.7%	40.2%	38.2%	40.4%	
	Northern	87	328	74	489	
		22.5%	31.6%	23.9%	28.2%	
	Western	64	127	52	243	
		16.6%	12.2%	16.8%	14.0%	
Central	44	96	49	189		
	11.4%	9.2%	15.9%	10.9%		

Table 5. The relationship between GERD and other medical problems of the studied population.

Stomach ulcer	No	350	1,015	257	1,622	0.001
		90.7%	97.7%	83.2%	93.5%	
	Yes	36	24	52	112	
		9.3%	2.3%	16.8%	6.5%	
Eating much (habit)	No	271	956	224	1,451	0.002
		70.2%	92.0%	72.5%	83.7%	
	Yes	115	83	85	283	
		29.8%	8.0%	27.5%	16.3%	
Stomach quantification	No	373	1,032	296	1,701	0.002
		96.6%	99.3%	95.8%	98.1%	
	Yes	13	7	13	33	
		3.4%	0.7%	4.2%	1.9%	
Suffering from stress and anxiety	No	137	885	82	1,104	0.001
		35.5%	85.2%	26.5%	63.7%	
	Yes	249	154	227	630	
		64.5%	14.8%	73.5%	36.3%	
Suffering from other chronic diseases	No	336	935	250	1,521	0.001
		87.0%	90.0%	80.9%	87.7%	
	Yes	50	104	59	213	
		13.0%	10.0%	19.1%	12.3%	
Suffering from hypertension	No	363	995	277	1,635	0.025
		94.0%	95.8%	89.6%	94.3%	
	Yes	23	44	32	99	
		6.0%	4.2%	10.4%	5.7%	
Smoking	No	340	962	266	1,568	0.022
		88.1%	92.6%	86.1%	90.4%	
	Yes	46	77	43	166	
		11.9%	7.4%	13.9%	9.6%	
Diabetes mellitus	No	369	997	285	1,651	0.001
		95.6%	96.0%	92.2%	95.2%	
	Yes	17	42	24	83	
		4.4%	4.0%	7.8%	4.8%	

prevalence of GERD to be 10.8% [24]. Also, in Nigeria, another study conducted among 772 subjects reported a low prevalence of GERD, with 9.3% [25]. According to the relationship between GERD and socio-demographic characteristics of the studied population, the present study found that there was a significant correlation between GERD and gender, age, BMI group, marital status, region and family history of GERD ($p > 0.05$) but, there was no relation found with average family income. It was more prevalent among females by 73.1% and among the age group 31–40 years by 32%. Also, 38.8% of cases were with average weight, and more than half were married (57.6%). Similar to our results, another study reported female gender to be associated with GERD, age appeared to be a risk factor for GERD, being more in individuals over the age of 30 years. Also, the study found that the risk of GERD increased with BMI of ≥ 25 kg/m², and there was a significant relationship between central obesity and reflux symptoms [26]. In contrast to our results, another Greek study found that there was no significant difference in reporting GERD symptoms between the two sexes ($p = 0.086$) [27]. In Nigeria, another study reported a significant correlation between increasing age and GERD, but other risk factors considered showed no association with the disease [25]. Another study also found statistically substantial results among divorced/widow ($p = 0.003$) but, there was no association between GERD's prevalence and gender, age ($p > 0.05$) [28]. Regarding symptoms of GERD, our study found that heartburn, usually after eating, which may get worse at night, reflux of food or acid was the most common symptom and was reported among 81.6% followed by trouble in sleeping 24.2%, sleep disturbance 23.2% and 9.1% were reported with a feeling of lump in the throat. Another study found that 61.8% of cases reported loss of appetite as an associated condition, 57% with nausea and vomiting, 55.9% with indigestion, 55.4% with food regurgitation, 41.4% with chest pain and 35.5% with headache [19]. A study in Southern India found that most common symptoms were heartburn 26.4%, acid regurgitation 18.1%, and night sleep disturbance 10.2% [22]. In Pakistan, another study reported that 84.38% of the cases had dyspepsia, 45.28% reported anxiety, 10.27% with restlessness and anxiety, and 4.93% reported nightmares [29]. As regards of the relationship between GERD and other medical problems of the studied population, the present study reported that there was a significant relationship with a stomach ulcer, eating much, stomach quantification, suffering from stress and anxiety, smoking, suffering from hypertension, and diabetes mellitus. In contrast to our results in India, another study was not able to find any association between tobacco use and GERD [26]. There were a lot of predisposing factors for GERD; the present study reported; eating much by 59.2%, suffering from stress and anxiety 39.2%, suffering from stomach ulcers 36.2%, suffering from delayed stomach emptying 13.9% and pregnancy, quantification of stomach reported by 10.7%. Another study reported; special meals (mainly fatty meals) among 84.9%) of the subjects followed by

coffee drinking 77.4%, stress 71%, spicy food 58.1% and smoking 17.2% as predisposing factors for GERD [19].

Conclusion

The study concluded that 17.8% of the Saudi population had GERD. There was a significant correlation between GERD and gender, age, obesity, marital status, region, and family history of GERD. The present study recommends health education to stress on proper nutrition and nutritional habits, and especially to target professional population who work under stress and most probably liable to GERD.

List of Abbreviations

BMI	Body mass index
GERD	Gastroesophageal reflux disease
KSA	Kingdom of Saudi Arabia

Conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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None.

Consent for publication

Informed consent was obtained from all the participants.

Ethical approval

The research was done under the supervision of Tabuk University, Tabuk, Saudi Arabia.

Author details

Sumayah Abdulrahman Alzahrani¹, Malikhah Zaki Alshaikhmohamed², Arub Mohammed Albalawi³, Nawal Mashni Alharbi⁴, Basema Muneer Alqatari⁵, Sarah Ali Alatwi¹, Doaa Ali Alhalal⁶, Zainab Hussain Almatar⁶, Rawan Abdulwahab Saeed⁷, Abeer Mohammed Asiri¹

1. Medical Intern, Tabuk University, Tabuk, Saudi Arabia
2. Alexandria University, Alexandria, Egypt
3. Tabuk University, Tabuk, Saudi Arabia
4. King Faisal University, Alhasa, Saudi Arabia
5. Royal College of Surgeons in Ireland, Dublin, Ireland
6. Medical intern, Alfaisal University, Riyadh, Saudi Arabia
7. King Khalid University, Abha, Saudi Arabia

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