

Prevalence of Gastroesophageal Reflux Disease Symptoms in Saudi Arabia

Georgios Zacharakis^{1*}, Moaz Hassan Alharbi¹, Manal Mahmood Alsalmi², Sultan Bander Alotaibi³, Yasmeen Abdullah Algaradi¹, Fatimah Nassir Alsadiq³, Pavlos Nikolaidis⁴

¹Endoscopy Unit, Department of Internal Medicine, University Hospital, Prince Sattam bin Abdulaziz University, Al Kharj, Saudi Arabia.

²Ibn Sina National College for Medical Studies, Jeddah, Saudi Arabia.

³Almaarefa Medical College, Riyadh, Saudi Arabia.

⁴Computer & Information Sciences, Al-Imam Muhammad Ibn Saud Islamic University, Riyadh, Saudi Arabia.

ABSTRACT

Objectives: The aims of this study were a) to describe the frequency of gastroesophageal reflux disease (GERD) symptoms among adults of Kingdom of Saudi Arabia (KSA) b) to investigate the patient demographics and lifestyle habits associated with these symptoms, and c) to estimate the patients referred for endoscopy and possibly received medical treatment.

Methodology: A nationwide study of 1353 adult individuals, randomly selected in the general Saudi population. A web-based questionnaire survey was used. The Arabian language questionnaire included four parts: (1) Sociodemographic factors and comorbidities; (2) Lifestyle habits; (3) GERD symptoms at least within the prior 3 months, according to AGA guidelines (2013); and (4) Possible referrals for upper gastrointestinal endoscopy and regimens or other therapies to manage symptoms. The sample included Saudi Arabians adults only, representative of KSA.

Results: Among 1353 adult individuals visited the site, 763 (56.4%) agreed to participate. The average respondent age was 20 (18-67) years. Almost half of the respondents were females (50.5%), married (36.2%), 29% overweight and 28% obese. Almost all women (93.4%) were perimenopausal. About 19% of participants reported daily heartburn symptom noticeable and bothersome. Symptoms consistent with GERD at least two or three times per week also reported such as heartburn (49.3%), regurgitation (35.9%), hypersalivation 32.5% etc. The frequency of these symptoms was not correlated with older ages and gender ($p>0.05$). Obese/overweight and smokers showed significant higher frequencies of few GERD symptoms: hypersalivation

and dysphagia for smokers, ($p=0.007$, $X^2=9.71$ and $p=0.00001$, $x^2=48.39$, respectively), and heartburn and hypersalivation for obese/overweight respondents, ($p=0.0058$, $x^2=12.49$ and $p=0.0042$, $x^2=13.16$, respectively). About 1/4 of the respondents undertook upper GI endoscopy with 9.8% reporting esophagitis and 22.8% gastritis. Despite frequent manifestations of GERD, about 58.45% respondents reported that they did not take any medicines either prescribed by physicians, or over the counter to manage symptoms. About half of the respondents (48.7%) adopted lifestyle modifications including diet changes.

Conclusion: Symptoms consistent with GERD were found to have high prevalence in KSA and represent major public-health problem.

Keywords: Gastroesophageal Reflux Disease, Epidemiology, Endoscopy, Lifestyle Modifications, Treatment.


*Correspondence to:

Dr. Georgios Zacharakis,
Professor of Gastroenterology & Hepatology,
Head, Endoscopy Unit, Department of Internal Medicine,
University Hospital, Prince Sattam Bin Abdulaziz University,
Al Kharj 11942, Saudi Arabia.

Article History:

Received: 15-10-2017, Revised: 06-11-2017, Accepted: 31-12-2017

Access this article online

Website: www.ijmrp.com	Quick Response code 
DOI: 10.21276/ijmrp.2018.4.1.006	

INTRODUCTION

Gastroesophageal reflux disease (GERD) is clinically presented by a large number of symptoms concerning the upper gastrointestinal tract such as heartburn and/or regurgitation - for 2 or more times per week or more often - usually in the absence of any identifiable organic causes in the majority of cases.^{1,2} Endoscopy and pH-measurements further investigations provided a comprehensive characterization of the disease but not necessary to establish diagnosis of GERD. Non-erosive reflux

disease (NERD) comprises the majority of patients (up to 70%).¹ In particular, upper endoscopy is required only if there are present alarm symptoms and in the case of patients with high risk of complications (Barrett esophagus, stenosis etc), erosive reflux disease (ERD). The prevalence of GERD symptoms in the community ranges from 2.5% to more than 25%.¹

Extraesophageal typical symptoms consistent with GERD include asthma, chronic cough, and laryngitis. Although, several

epidemiological studies have associated these extraesophageal symptoms with GERD etiology cannot be inferred from these studies.³⁻⁶

BACKGROUND

These days, there is an increase of direct and indirect costs related to the management of GERD including diagnosis, therapy, screening and follow up of its possible complications.¹ Furthermore, GERD may affect health-related quality of life and may cause psychological co-morbidities,^{7,8} such as depression or anxiety,⁷ impair sleep,⁸ resulting in the absence from work or school with a consequently relevant economic burden.⁹

The prevalence of GERD in the Gulf region are not well characterized and there is a shortage of data on the subject. A research in Riyadh showed that the frequency of GERD in the study population was 45.4%,¹⁰ and GERD was more frequent in older people (mean age 31.9 vs. 30.0 years, $P < 0.001$) with a higher BMI (27.29 vs. 26.31 kg/m², $P = 0.02$). No difference was reported between males (45.43%) and females (45.13%) ($p = 0.92$) but there was a trend of a higher prevalence in smokers (51.63% vs. 44.41%). Furthermore, a study from the Eastern Province of Saudi Arabia demonstrated that patients suffering from GERD and non-ulcer dyspepsia had worse health-related quality of life (HRQOL) scores, compared with those without these disorders.¹¹

Limited data about GERD symptoms associated with lifestyle habits are available in the Kingdom of Saudi Arabia (KSA).

AIMS AND OBJECTIVES

The aims of this study can be concluded as

- To report the frequency of GERD among adults of KSA
- To investigate patient demographics and lifestyle habits associated with these symptoms, and
- To estimate the patients referred for endoscopy and possibly received medical treatment.

MATERIALS AND METHODS

Ethical Considerations

The protocol of this study was reviewed by the Institutional Ethics Committee of the College of Medicine in Prince Sattam bin Abdulaziz University of Al Kharj. All participants explained that the involvement in the study was voluntary without any charges for not participating or compensation for participating.

All volunteers were administered with a specific questionnaire through social media twitter and informed consent to participate in this epidemiology survey which assessed the presence of upper gastrointestinal symptoms related to GERD. All data were held confidential. Confidentiality of the volunteer answers was preserved by adopting anonymous self-administered questionnaire with no question about identity details.

Study Participants

The study targeted inhabitants of KSA over 18 years old who owned social media such as twitter. A computer-assisted google questionnaire survey program was used. Surveyed participants were classified by gender, age, and other patient characteristics.

Sample Size

The study conducted during the period from March 1st, 2016 to the 1st of June 2017. The study was performed in KSA. It is a 2,143,865 Km² surface area, sheltering about 32 million people

out of which 21.1 million are native Saudis and the rest 10.4 are expatriates according to 2016 census data.¹² The majority (78.9%) of the population is urban. The median age in Saudi Arabia is 28.6 years. The sex ratio for total population is 1.3 male/female. About half of the population is younger than 25 years old (as of Feb 2012).¹³ Up to 1960, most of the population was nomadic or seminomadic. Later, the rapid economic and urban growth allowed the population to be settled. Now, 80% of Saudis live in seven major urban centers—Riyadh, Jeddah, Mecca, Medina, Hofuf, Taif, and Dammam.¹⁴

The sample size was calculated from the following equation (OpenEpi, 2016)

$$n = \frac{[DEFF * Np(1-p)]}{[(d^2/Z^2(1-\alpha)^2 * (N-1) + p * (1-p))]}$$

Where:

n: is the sample size.; N: is the study population which is about 21.1 million (General Authority for Statistics K.S.A, 2016).; P: is the maximum percentage of the properties studied in any community which is considered to be 50%.

Hypothesized % frequency of outcome factor in the population (p): 50%+/-5.; Confidence limits as % of 100 (absolute +/-)(d): 5%

Design effect (for cluster surveys- DEEF): 1

According to this formula, the sample size was calculated to be 385 participants that represent confidence level of 95% and 5% of worst acceptable limit. For correction of any possible data loss the total sample should be more. Finally, among 1353 adult individuals visited the site, 763 (56.4%) agreed to participate which was more than enough for the validity of results.

This study includes multistage stratified sampling method with the following strata: I) Gender-specific stratum where a proportion of volunteers of either sex will be sampled based on their representation in the reality, II) the age is the second stratum and III) the level of education is the third stratum comprising Secondary school and University degree.

Survey Methodology

The research instrument is 37-item, anonymous, novel questionnaire obtained from reviewing the AGA recommendations for GERD.¹² It was first formed in English and then translated into Arabic by four dual tongue Arabic-speaking translators who were unaware of one another. Backward translation from Arabic to English was carried out by other translators. The Arabic and English version questionnaires were pretested for validity and reliability by a pilot study conducted on 20 patients in University Hospital of Al Kharj, by face to face interview followed completion of questionnaire private or reversed, who were not included in the main survey. The pilot study was conducted from March 1st, 2016 through June 1st, 2017. All queries from the pilot study were addressed before the study was carried out. Test-retest reliability was applied and an average correlation coefficient of 0.71 has been obtained. The participants required average 20 minutes for the questionnaire to be completed.

The questions are formed in three forms as follows; yes-no questions, Multiple choices questions each with strings of other specification, and matrix with three answers true, false, uncertain, or agree, disagree, and neutral.

The questionnaire included four parts: (1) Sociodemographic features containing items about gender, age, marital status, nationality, education levels, smoking, body mass index (BMI) including weight and height, employment status, physical activity and comorbidities; (2) Dietary habits; (3) Presence of symptoms

consistent with GERD and (4) Use of medications and other therapies to manage symptoms of GERD and referral for upper GI endoscopy.

Statistics

The statistical analysis will be carried out using Statistical Package for Social Science version 20 (SPSS, inc, Chicago, USA). Descriptive statistics were performed for the patient characteristics. Correlations between GERD symptoms and several patient characteristics such as gender, age etc. were assessed using χ^2 tests with a two-tailed $\alpha = 0.05$ (a priori significance level of $P < 0.05$). Data will be coded and entered the software for testing and adjusting their normality. Categorical variables will be expressed in terms of frequency and percentage, while continuous variables will be represented as means and standard deviations. Only when P value is less than 0.05 will be considered statistically significant.

RESULTS

Population Characteristics

The study included 763 participants with symptoms consistent with GERD who agreed to participate in the study out of 1353 who visited the site giving a response rate of 56.4%. About 37% of the participants live in the west region of KSA (figure 1).

The baseline characteristics of the participants are presented in table 1. The average age of the participants was 20 (18-59) years. Among the participants 533 (69.8%) were in the age group 18-29 years whereas only 114 (14.9%) were over 40 years. Slightly more than half of them (50.5%) were females. A total of 93.4% of women were perimenopausal. Only 7.6% were housewives. About 75% of the respondents had never smoked, were singles (62%), and the majority (79%) of the study sample had college education, and about 37% were governmental employees and 34.7% were college students.

Figure 1: Distribution of participants by geographical region of KSA

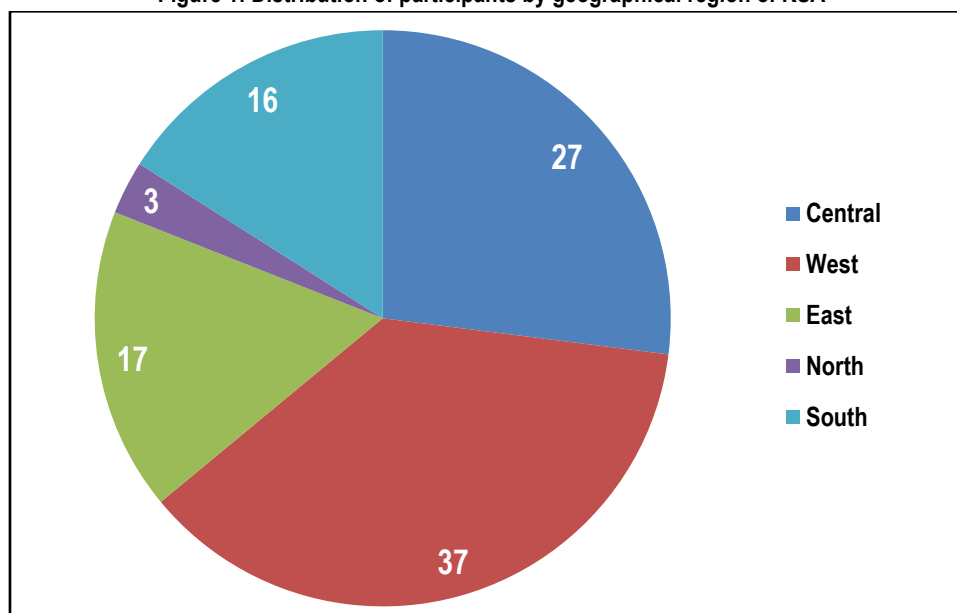


Table 1: Personal characteristics of the study population of KSA

Characteristic	n (%)	Characteristic	n (%)
Gender		Smoking	
Male	377 (49.5)	Never/stopped	566 (74.4)/67 (8.8)
Female	386 (50.5)	Yes, <10	11.8
Age		Yes, 10-20	9.9
18-29	531 (69.8)	Yes, >20	4.3
30-39	120 (15.2)	Marital status	
40-59	112 (14.9)	Single	471 (61.7)
Education level		Married	276 (36.2)
University	601 (78.8)	Divorce	13 (1.7)
Secondary school	143 (18.7)	Widowed	3 (0.4)
Primary school	19 (2.5)	Employment status	
Nutritional Status		Employed	276 (36.3)
Malnourished	63 (8.2)	Self-employed	19 (2.2)
Normal	261 (34.2)	Housewife	58 (9.6)
Overweight	223 (29.2)	Unemployed	143 (18.7)
Obese	216 (28.3)	Students	267 (34.7)

Nearly 1/3 of the population had normal weight (34.21%) but more than half were either overweight (29.21%) or obese (28.28%).

Regarding the dietary habits of the participants, they reported daily consumption of fruits (20.7%), green vegetables (48.5%), or legumes (19.5%). Most volunteers reported consumption of coffee or tea (89%) daily. Almost one-third (30.5%) consumed fruits, green vegetables, or legumes daily 4-7 times per week. However, 14% of the participants never consumed the above food groups.

About the physical activity (more than 30 minutes duration) of participants, almost half of them (47.1%) reported no physical activity at all. Only 13.6% of them had physical activity more than three times per week. Finally, the respondents frequently reported that they suffer from the following comorbidities: diabetes mellitus (3.9%), hypertension (4.3%), thyroid disorder (4.3%), heart disease (1.3%), headache (25.3%) and anemia (13%). Headache (25.3%) was the prevalent non-GI complaint.

The following gastrointestinal (GI) disorders were also reported: hemorrhoids (15.5%), irritable bowel syndrome (37.4%), anorexia/bulimia (29.5%), diverticulosis (0.5%) and cholecystitis (3.8%). About one third (33.4%) reported no GI complaints related to the above conditions.

GERD Symptoms

The majority of participants (49.3%) reported heartburn (chest burning sensation) symptom as shown in figure 2. About 19% of respondents reported highly frequently heartburn symptom, 4-7 times per week. About 4% of participants reported that symptoms affected daily activities. About 27% reported they experienced nocturnal GERD and sleep disturbances. The participants also reported the following symptoms at least 2 or 3 episodes weekly: heartburn (28%), regurgitation (35.9%), excessive salivation (32.5%). Other symptoms reported included non -cardiac chest

pain (24.1%), difficulty in swallowing (dysphagia) 6.4%, painful swallowing (odynophagia) 2.8%, acid taste in mouth 22.9%. Few participants reported the following extraesophageal symptoms: laryngitis/hoarseness of the voice 11.7%, chronic sore throat 10.9%, dry chronic cough 11.3%, and asthma 9%.

Association of Symptoms with Other Variables

GERD symptoms associated with gender: Females compared to the male participants showed not significant higher frequencies of most GERD symptoms occurring at least two three times per week, including heartburn ($p= 0.88$, $\chi^2=2.92$), regurgitation ($p=0.07$, $\chi^2=3.9$), dysphagia ($p= 0.36$, $\chi^2=0.82$) and odynophagia ($p= 0.14$, $\chi^2=2.19$) except hypersalivation, more frequent in females ($p=0.015$, $\chi^2=5.9$)

GERD symptoms associated with age: GERD symptoms were not correlated significantly with age groups ($p>0.05$). Heartburn ($p= 1.7$, $\chi^2=5.01$), regurgitation ($p=0.9$, $\chi^2=4.6$), dysphagia ($p= 0.49$, $\chi^2=2.38$), odynophagia ($p= 0.54$, $\chi^2=2.12$) and hypersalivation ($p=0.07$ and $\chi^2=7.09$) were not more frequent in older ages >40years old.

GERD symptoms associated with BMI: Obese and overweight respondents compared to normal weight or thin participants showed significant higher frequencies of most symptoms consistent with GERD occurring at least two three times per week, including heartburn ($p= 0.0058$, $\chi^2=12.49$) and excessive salivation ($p=0.0042$, $\chi^2=13.16$).

GERD symptoms associated with smoking: Heartburn, regurgitation and odynophagia symptoms of GERD were not correlated significantly with smoking ($p>0.05$). However, hypersalivation ($p=0.007$, $\chi^2=9.71$) and dysphagia ($p=0.00001$, $\chi^2=48.39$) were more frequently with smoking respondents and those who stopped smoking later in life.

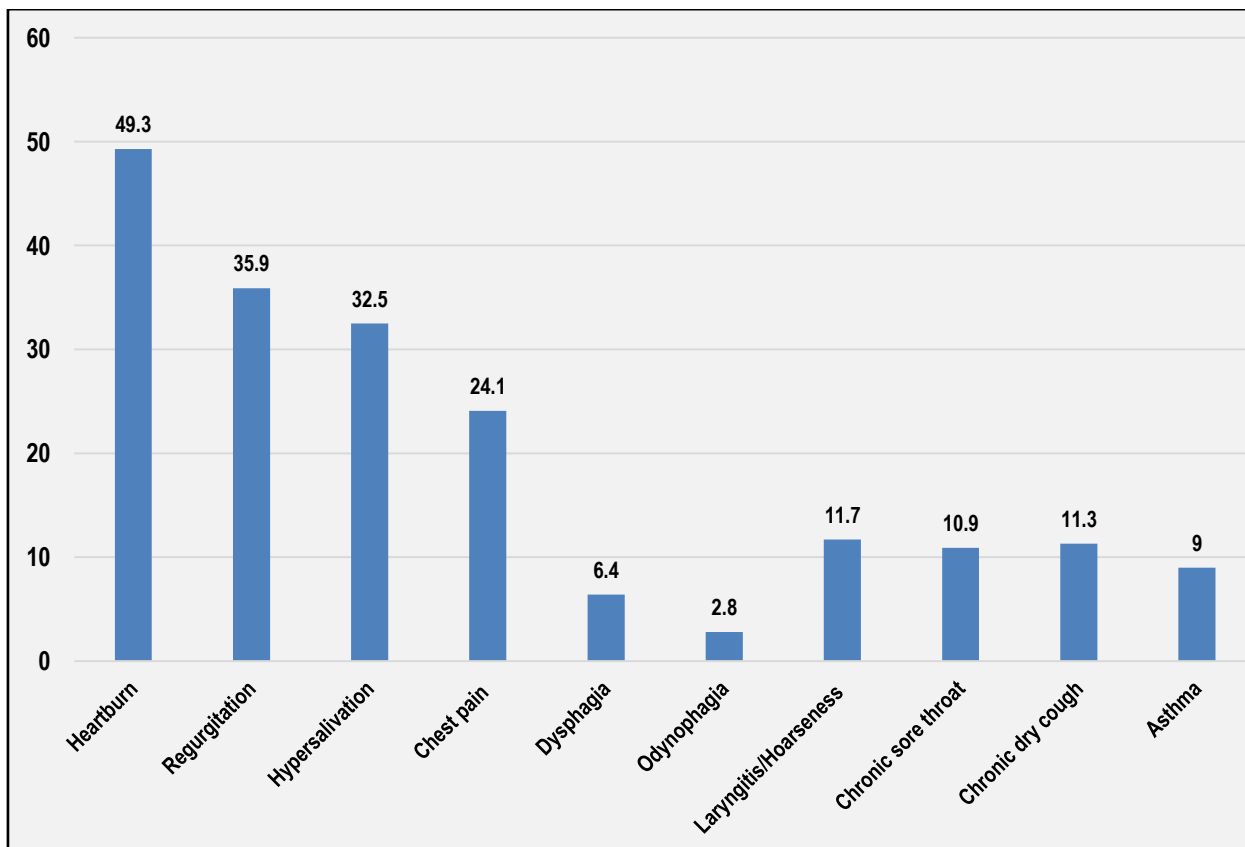


Figure 2: Frequency of symptoms consistent with GERD

Manage Symptoms of GERD

The majority of respondents (58.4%) did not use any medicines to manage GERD symptoms (Table 2). Among the participants who took medication, half of them used prescribed regimens (22.1 %) or and the other half used regimens over the counter (19.5%). Of those respondents who used regimens over the counter, they (22.6%) reported the use of herbs for the management of GERD. Also, 57.2% of the respondents reported relief of symptoms under medicines.

The participants also reported lifestyle modifications for the management of GERD as shown in Table 2. Among the

participants 48.7% modified their diet. Dietary changes included avoiding spice food 37.9%, heavy meal before sleep 42.7% and citrus fruits or coffee 23.3%. Few participants reported the use of sleeping with extra pillow 17.8% and avoid smoking 9.1%. Weight loss reported by one third of participants (28.9%).

Upper Gastrointestinal Endoscopic Findings

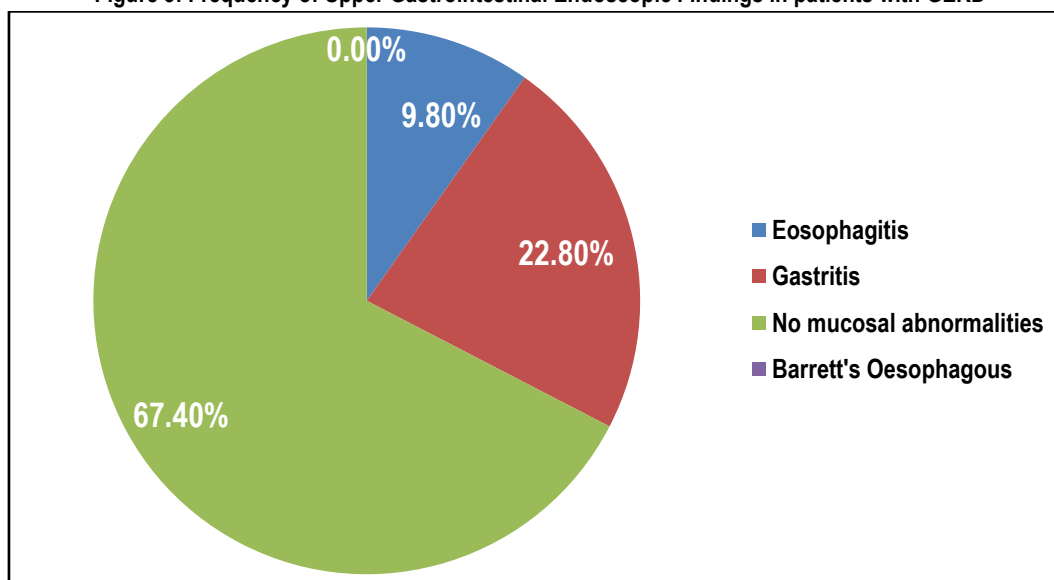
Of those participants with GERD symptoms who underwent upper GI endoscopy with any indication (23%), they reported the following endoscopic findings of esophagitis 9.8% and gastritis 22.8% (Figure 3). The majority of the respondents showed no mucosal abnormalities in the upper GI endoscopy.

Table 2: Distribution of treatments for symptoms consistent with GERD

Treatment	%
Medication	
Prescribed by physician	165 (22.1)
Over the counter	145 (19.5)
Not use any drug	437 (58.4)
Other therapies	
Herbal tea	173 (22.6)
Dietary changes or restrictions	
Weight loss	221 (28.9)
Dietary changes*	264 (34.6)
Avoid smoking	69 (9.1)

*Dietary changes included: avoid spice food, avoid heavy meal before sleep, avoid citrus fruits or coffee

Figure 3: Frequency of Upper Gastrointestinal Endoscopic Findings in patients with GERD



DISCUSSION

Our study, the largest epidemiologic study of upper GI symptoms in KSA was performed by social media via twitter. Twitter surveys are preferred in KSA and probably have higher response rates than household or mall surveys although data is not available. Our study also did not provide information of the natural history of GERD symptoms.

The prevalence of GERD in our study was 49.3%. Similarly, the prevalence of GERD in the other surveyed population in KSA was 45.4% (10). In our cohort, the prevalence of GERD was higher compared to that reported in the literature in other countries. In a recent systematic review, the range of GERD prevalence was

found to be 18.1-27.8% in North America, 8.8-25.9% in Europe, 2.5-7.8% in East Asia, 8.7-33.1% in the Middle East, 11.6% in Australia, and 23.0% in South America.^{15,16}

Approximately 20% of our study population reported highly frequent GERD symptoms (everyday bothersome symptoms). Yet, more than half of the respondents (58%) did not receive medicines. The rest adopted lifestyle modifications to manage symptoms. Symptoms were not reported significantly more frequently by either females or males as reported in other study conducted in KSA.¹⁰ Other studies also reported that there is no significant difference in prevalence among males and females, but males seem to have a higher rate of complications such as

esophagitis, Barrett's esophagus etc. The rate of esophagitis is 2:1 and the rate of Barrett's is 0:1 in males compared to females.¹⁷ Frequencies of GERD symptoms did not vary significantly by age in our study. This is probably because the sample consisted mainly of young people; almost 70% included age group from 18 to 29 years old, average age 20 years old. Other study reported that GERD incidence increases with age, particularly after the age of 40.¹⁸

Obesity also seems to increase the risk of GERD.¹⁸ A meta-analysis published in the *Annals of Internal Medicine* in 2005 concluded that obesity was significantly associated with increase in the risk of GERD symptoms, erosive esophagitis, and esophageal carcinoma.¹⁹ In our study, the frequencies of heartburn and hypersalivation symptoms of GERD were higher in obese/overweight, statistical significant difference shown. Regarding smoking, only dysphagia and hypersalivation symptoms were more frequently found in smokers and those who used to smoke but stopped, statistically significant difference shown. Approximately 74.4% of our study population did not smoke so probably GERD symptoms such as heartburn and regurgitation probably could not be associated with smoking. Another study in KSA also showed that GERD was more prevalent in older individuals (mean age 31.9 vs. 30.0 years, $P < 0.001$), in those with a higher BMI (27.29 vs. 26.31 kg/m², $P = 0.02$) and there was a trend of a higher prevalence in smokers (51.63% vs. 44.41%) but not statistically different.¹⁰

Also, most participants had university level of education, almost 80%. Subsequently, levels of education could not be associated with the symptoms.

Gastrointestinal disorders are among the common causes of visiting health care facilities in Saudi Arabia and the number of patients attending endoscopy units for various gastro symptoms is increasing.²⁰⁻²² Although dyspepsia was considered among the most common indications for upper gastrointestinal endoscopy,²³⁻²⁵ other causes are also overwhelming.²⁶⁻²⁸

In the present study, upper GI endoscopy with normal mucosal findings was reported frequently among participants who underwent this procedure (67.40%). The rate of normal endoscopy is similar to other Saudi studies conducted in the past,^{11,20,29} and the more recent studies.^{30,31} In a study of 200 Kuwaiti dyspeptic patients referred for endoscopy, only 7% were found to have esophagitis.³² While in Gizan, in the southern part of Saudi Arabia, a retrospective study of individuals who underwent an upper gastrointestinal endoscopy identified Barrett's esophagus in 0.003%.¹⁰ In our study, esophagitis was reported in 9.8%. Literature suggests that the prevalence of gastritis among adults in the Western world is estimated at 62%.³³ In the present study, gastritis was the commonest pathology reported in our patients with prevalence of 22.80%, which is similar to other studies in Saudi and other Arabian countries.^{10,31,32} The difference between our results and western countries' prevalence regarding gastritis may be attributed to life style and alcohol use, which is not prevalent in Saudi Arabia.

Regarding other behavioral risk factors, the respondents drank coffee/tea (80%), ate green vegetables (49%), legumes (14%), and/or fruits (21%), but only 30% of them consumed such food at least 4 days per week. Overall, most behavioral risk factors do not seem to have a strong influence on incidences of GERD. Only obesity and cigarette smoking may be most strongly associated as

a trigger of GERD.³⁴ Newer research indicates that increased fiber with reduction in simple sugar intake may improve symptoms.³⁵ However, lifestyle modifications are a cornerstone in the treatment of GERD and our respondents also adopted these lifestyle modifications. Medical practitioners do provide counseling about weight loss, head elevation, tobacco and alcohol cessation, avoidance of late meals, and cessation of foods that can potentially exacerbate symptoms despite the fact that there is limited evidence for the avoidance of alcohol and certain dietary ingredients including carbonated drinks, caffeine, fat, spicy foods, chocolate, and mint that can be beneficial for GERD symptoms.³⁶ The participation rate (22.1%) was very low. More than half of the respondents (58.4%) reported that they neither received any regimens from physicians or over the counter, but about 40% adopted lifestyle modifications to manage symptoms. About 1/5 of the respondents use medications over the counter for their symptoms.

CONCLUSIONS

Symptoms consistent with GERD were found to have high prevalence in KSA and represent major public-health problem. Most respondents had not been diagnosed for GERD and had not taken medicines to manage their symptoms by physicians. Less than half adopted lifestyle modifications to manage symptoms. About 1/5 of the respondents use medications over the counter for their symptoms.

REFERENCES

1. Katz PO, Gerson LB and Vela MF. Diagnosis and Management of Gastroesophageal Reflux Disease. *Am J Gastroenterol* 2013;108:308–328.
2. Stanghellini V, Chan FK, Hasler WL, et al. Gastrointestinal disorders. *Gastroenterology*. 2016;150:1380–1392.
3. Havemann BD, Henderson CA, El-Serag HB. The association between gastro-oesophageal reflux disease and asthma: a systematic review. *Gut*. 2007;56:1654–1664.
4. Irwin RS, Curley FJ, French CL. Chronic cough. The spectrum and frequency of causes, key components of the diagnostic evaluation, and outcome of specific therapy. *Am Rev Respir Dis*. 1990;141:640–47.
5. El-Serag HB, Sonnenberg A. Comorbid occurrence of laryngeal or pulmonary disease with esophagitis in United States military veterans. *Gastroenterology*. 1997;113:755–760.
6. Makhadoom N, Abouloyoun A, Bokhary HA, Dhafar KO, Gazzaz ZJ, Azab BA. Prevalence of gastroesophageal reflux disease in patients with laryngeal and voice disorders. *Saudi Med J*. 2007;28:1068–71.
7. Tack J, Becher A, Mulligan C, Johnson DA. Systematic review: the burden of disruptive gastro-oesophageal reflux disease on health-related quality of life. *Aliment Pharmacol Ther*. 2012;35:1257–1266.
8. Mody R, Bolge SC, Kannan H, Fass R. Effects of gastroesophageal reflux disease on sleep and outcomes. *Clin Gastroenterol Hepatol*. 2009;7:953–959.
9. Gisbert JP, Cooper A et al. Impact of gastroesophageal reflux disease on work absenteeism, presenteeism and productivity in daily life: a European observational study. *Health Qual Life Outcomes*. 2009;7:90.
10. Almadi MA, Almousa MA, Althwainy AF, Altamimi AM, Alamoudi HO, Alshamrani HS, Alharbi OR, Azzam NA, Sadaf N, Aljebreen AM. Prevalence of symptoms of gastroesophageal reflux in a cohort of Saudi Arabians: a study of 1265 subjects. *Saudi J Gastroenterol*. 2014;20(4):248-54.

11. Al-Quorain A, Satti MB, Al-Hamdan A, Al-Gassab G, Al-Freihi H, Al-Gindan Y. Pattern of upper gastrointestinal disease in the eastern province of Saudi Arabia: endoscopic evaluation of 2982 patients. *Trop Geogr Med*. 1991;43:203-8.
12. Rodolfo C, Estimo JR. KSA population: 21.1m Saudis, 10.4m expats. "Arab news". Published — Thursday 4 February 2016. Available at: <http://www.arabnews.com/saudi-arabia/news/875131>
13. Murphy, Caryle. "Saudi Arabia's Youth and the Kingdom's Future". <https://www.wilsoncenter.org/sites/default/files/Saudi%20Arabia%E2%80%99s%20Youth%20and%20the%20Kingdom%E2%80%99s%20Future%20FINAL.pdf> (Cited on February 7, 2012).
14. House, Karen Elliott (2012). *On Saudi Arabia: Its People, past, Religion, Fault Lines and Future*. Published September 18th 2012 by Knopf. 69. www.goodreads.com/book/show/13330905-on-saudi-arabia
15. El-Serag HB, Sweet S, Winchester CC, Dent J. Update on the epidemiology of gastro-oesophageal reflux disease: A systematic review. *Gut*. 2014;63(6):871–880.
16. Talley NJ, Fett SL, Zinsmeister AR, Melton LJ 3rd. Gastrointestinal tract symptoms and self-reported abuse: a population based study. *Gastroenterology*. 1994;107:1040-1049.
17. Review Team: Hunt, Richard UK/Canada; Armstrong, David Canada; Katelaris, Peter Australia; Afihene, Mary Ghana; Bane, Abate Ethiopia; Bhatia, Shobna India; Chen, Min-Hu China; Choi, Myung Gyu Korea; Melo, Angelita Cristine Brazil; Fock, Kwong Ming Singapore; Ford, Alex United Kingdom; Hongo, Michio Japan; Khan, Aamir Pakistan; Lazebnik, Leonid Russia; Lindberg, Greger Sweden; Lizarzabal, Maribel Venezuela; Myint, Thein Myanmar; Moraes-Filho, Joaquim Prado Brazil; Salis, Graciela Argentina; Lin, Jaw Town Taiwan; Vaidya, Raj India; Abdo, Abdelmounen Sudan; LeMair, Anton The Netherlands. World Gastroenterology Organisation Global Guidelines: GERD Global Perspective on Gastroesophageal Reflux Disease. *Journal of Clinical Gastroenterology*. 2017;51:467–478.
18. Corley DA, Kubo A. Body mass index and gastroesophageal reflux disease: a systematic review and meta-analysis. *Am J Gastroenterol*. 2006;101:2619–2628
19. Hampel H, Abraham NS, El-Serag HB. Meta-analysis: obesity and the risk for gastroesophageal reflux disease and its complications. *Ann Intern Med*. 2005;143(3):199-211.
20. Ayoola EA, Al-Rashed RS, Al-Mofleh IA, Al-Faleh FZ, Laajam M. Diagnostic yield of upper gastrointestinal endoscopy in relation to age and gender: a study of 10112 Saudi patients. *Hepatogastroenterology*. 1996; 43: 409-15.
21. Satti MB, Twum-Danso K, Al-Freihi HM, Ibrahim EM, Al-Gindan Y, Al-Quorain A, et al. Helicobacter pylori-associated upper gastrointestinal disease in Saudi Arabia: a pathologic evaluation of 298 endoscopic biopsies from 201 consecutive patients. *Am J Gastroenterol*. 1990;85:527-34.
22. Al-Shehri AM, Al-Knawy B, Al-Jaber K. Use of a simple questionnaire developed by the American College of gastroenterology to determine prevalence of GERD among a community-based population in Saudi Arabia. *Saudi J Gastroenterology*. 2003;9:49.
23. Cooper GS. Indications and contraindications for upper gastrointestinal endoscopy. *Gastrointest Endosc Clin N Am*. 1994; 4: 439-454
24. Taye M, Kassa E, Mengesha B, Gemechu T, Tsega E. Upper gastrointestinal endoscopy: a review of 10,000 cases. *Ethiop Med J*. 2004;42:97-107.
25. Olokoba AB, Olokoba LB, Jimoh AA, Salawu FK, Danburam A, Ehalaiye BF. Upper gastrointestinal tract endoscopy indications in northern Nigeria. *J Coll Physicians Surg Pak*. 2009;19:327-328.
26. Tedesco FJ. Endoscopy in the evaluation of patients with upper gastrointestinal symptoms: indications, expectations, and interpretation. *J Clin Gastro enterol*. 1980;3 (suppl 2):67-71. 7.
27. Health and public committee, American College of Physicians, Philadelphia, Pennsylvania., Clinical competence in diagnostic OGD. *Annals of internal Medicine*. 1987;8:937-939.
28. The working party of the clinical services committee of the British Society of gastro enterology. Provision of GI endoscopy and relevant services for district general hospital, *Gut* 1991;32:95-100.
29. Satti MB, Twum-Danso K, Al-Freihi HM, Ibrahim EM, Al-Gindan Y, Al-Quorain A, et al. Helicobacter pylori-associated upper gastrointestinal disease in Saudi Arabia: a pathologic evaluation of 298 endoscopic biopsies from 201 consecutive patients. *Am J Gastroenterol*. 1990;85:527-34.
30. Al-Romaih WR & Al-Shehri AM. Appropriateness of upper gastrointestinal endoscopy referrals from primary health care. *Annals of Saudi medicine*. 2006;6(3): 224.
31. Elhadi AA, Mirghani HO, Merghani TH, Mohammed OS & Eltoum H. A Pattern of Endoscopic Findings of Upper Gastrointestinal Tract in Omdurman Teaching Hospital, Sudan. *Sudan Journal of Medical Sciences*. 2014;9(2):71-74.
32. Abahussain EA, Hasan FA, Nicholls PJ. Dyspepsia and Helicobacter pylori infection: Analysis of 200 Kuwaiti patients referred for endoscopy. *Ann Saudi Med*. 1998;18:502–5.
33. Loffeld RJLF, Liberov B and Dekkers PEP. "The changing prevalence of upper gastrointestinal endoscopic diagnoses: a single-centre study," *The Netherlands Journal of Medicine*. 2012;70(5):222-226.
34. Kaltenbach T, Crockett S, Gerson LB. Are lifestyle measures effective in patients with gastroesophageal reflux disease? An evidence-based approach. *Arch. Intern. Med*. 2006;166(9):965-71.
35. Newberry C, Lynch K. Can We Use Diet to Effectively Treat Esophageal Disease? A Review of the Current Literature. *Curr Gastroenterol Rep*. 2017;19(8):38.
36. Festi D, Scialoi E, Baldi F, et al. Body weight, lifestyle, dietary habits and gastroesophageal reflux disease. *World J Gastroenterol*. 2009;15:1690–1701.

Source of Support: Nil. **Conflict of Interest:** None Declared.

Copyright: © the author(s) and publisher. IJMRP is an official publication of Ibn Sina Academy of Medieval Medicine & Sciences, registered in 2001 under Indian Trusts Act, 1882.

This is an open access article distributed under the terms of the Creative Commons Attribution Non-commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

Cite this article as: Georgios Zacharakis, Moaz Hassan Alharbi, Manal Mahmood Alsalmi, Sultan Bander Alotaibi, Yasmeen Abdullah Algaradi, Fatimah Nassir Alsadiq, Pavlos Nikolaidis. Prevalence of Gastroesophageal Reflux Disease Symptoms in Saudi Arabia. *Int J Med Res Prof*. 2018 Jan; 4(1):21-27.

DOI:10.21276/ijmrp.2018.4.1.006