Original Article

Prevalence of Gastroesophageal Reflux Disease And Its Correlates in Adults Residing in an Urban Resettlement Colony of East Delhi

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Abstract:

Background: Gastroesophageal Reflux Disease (GERD) is known as a condition caused by abnormal reflux of gastric contents into the esophagus. Most common symptoms include heartburn (a burning sensation in the middle of the chest) and regurgitation (an upward moving sensation of stomach content). GERD is a distressing medical condition which is under reported. This study was carried out to study the associated risk factors of GERD.

Objective: The primary objective of the study was to determine the prevalence of GERD among adults residing in an urban resettlement colony of East Delhi. The secondary objective was to identify the risk factors associated with it.

Methods: It was a cross sectional descriptive study conducted in Nand Nagri, a resettlement colony in East Delhi from November 2016 to April 2018. The study population comprised of 300 adults (18 and above).For assessment of GERD, Questionnaire for Epidemiology of symptomatic GERD was used.

Results: The mean age of the study participants was 47.70 years. The prevalence of GERD among study participants was found to be 14.0%. On applying binary logistic regression to find out the predictors of GERD among study participants, female gender, BMI more than or equal to 25, smokers, having comorbid illness, consuming high amount of spices and more than 4 cups of tea or coffee were found to be significant predictors.

Conclusion: The prevalence of GERD observed in the study was 14.0%. Significant predictors of GERD were female gender, BMI more than or equal to 25, smokers, having comorbid illness, consuming high amount of spices and consuming more than 4 cups of tea or coffee.

Keywords: GERD, Heartburn, Prevalence, Regurgitation.

Introduction

Gastroesophageal Reflux Disease (GERD) is known as a condition caused by abnormal reflux of gastric contents into the esophagus. Most common symptoms include heartburn (a burning sensation in the middle of the chest) and regurgitation (an upward moving sensation of stomach content). The Montreal consensus defined GERD as "a condition which develops when the reflux of stomach contents causes troublesome symptoms and/or complications." Symptoms are "troublesome" if they adversely affect an individual's well-being.

GERD can be diagnosed using a combination of symptoms, 24 hours esophageal pH monitoring, endoscopy and response to anti-secretory medications. Heartburn and regurgitation have been shown to correctly identify GERD with a sensitivity of 89% and specificity of 94%.[1]

The prevalence of GERD varies widely around the world. GERD prevalence was estimated to be 7.1%–13.2% in Asia, 11.5%–19.0% in the Middle East, 12.2-16.2% in Australia, 15.1%-19.1% in Europe, 11.0%-25.3% in South America and 10.7%-20.9% in North America.[2]

Prevalence in India is estimated to be 7.6-25.0%.[3-9] A study done on the employees of a large hospital in New Delhi reported a prevalence of 16.2%.[5]

Compared to Western countries, Asian countries have reported lower prevalence of GERD. Owing to rapid economic

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growth and westernization, a large section of population has moved towards unhealthy lifestyle leading to rise in trends of noncommunicable diseases in Asia.

Reflux of gastric contents is commonly due to impaired closure of lower esophageal sphincter.[10,11] GERD can cause a gamut of complications that includes esophageal (esophagitis, Barrett's esophagus and rarely Adenocarcinoma esophagus) as well as extraesophageal complications such as, chronic cough, dysphasia, laryngitis, and asthma-like-symptoms.[12]

Reports on the risk factors have been inconsistent among different studies. Majority of studies have reported family history, older age, higher socioeconomic status, male gender, increased BMI, family history, use of Nonsteroidal Anti Inflammatory(NSAIDs) medications, low fruit consumption, smoking and high meat consumption as important risk factors.[3,13,14] Whereas few other studies have stated female gender, fatty diet and shorter dinner-to-bed time as significant risk factors.[6,15]

GERD is a distressing medical condition which is under reported. After extensive literature review we found that very few community based studies on the prevalence of GERD and its associated risk factors are available in India especially in Delhi. This study aims to address the gap in knowledge in this area.

The primary objective of our study was to assess the prevalence of Gastroesophageal Reflux Disease (GERD) among adult residents of an urban resettlement colony of East Delhi.

Materials and Methods:

This cross sectional study was done in Nand Nagri, a resettlement colony located in East Delhi. It has a population of 65,000. Nand Nagri is divided into 5 blocks (A, B, C, D and E) which have been further divided into 21 sub-blocks having around 10,000 households in total. The study was conducted between November 2016 to April 2018. With an expected prevalence of GERD 7.6%[9], taking 95% confidence interval and 3% absolute precision the sample size was calculated as 298, using Epi Info™ 7.2.0. This was rounded off to 300 to select equal number of participants from each sub-block. Adults aged 18 years and above residing in Nand Nagri for more than 6 months were included. Pregnant women, subjects who had undergone GIT surgery or taking NSAIDs for 3 months were excluded.

Sampling Procedure- Sampling was done in 2 stages. In first stage, one sub-block was selected randomly from each block- A4, B5, C2, D3, E1. In the second stage, 60 households were selected from each sub block using circular systematic random sampling. Except C2, all other sub-blocks have 500 households. In order to get 60 households from each block, sampling interval was obtained by dividing the number of households by 60. For blocks, A4, B5, D3 and E1 the interval was 8th household whereas for C2 the interval was 11th household. After selecting the household, all eligible individuals residing in the household were listed and numbered. One participant was selected randomly and interviewed by the investigator. If the participant was unavailable during the visit, subsequent visit was done according to his/her availability. If the household was found locked even after 3 visits, subsequent household in the ascending order was included in the study without disturbing the original allocation.

Study Tools- A pretested structured, interviewer administered questionnaire was used to get the desired information.

PART 1: Information about socio-demographic, anthropometric profile and other relevant medical history. The structured questionnaire about sociodemographic details included questions about the age, education and occupation of the study participants, socioeconomic status and type of family. Details about history of any medical illness and medication history were also recorded.

PART 2: For assessment of Gastroesophageal Reflux Disease, Questionnaire for Epidemiology of symptomatic GERD was used. It is a questionnaire based diagnostic tool developed by Sharma et al.[5] used in Delhi[9] and Ladakh.[16] This is based on symptom scoring of heartburn and regurgitation. The final score ranged from 0 to 18. The presence of GERD was defined as a score ≥ 4.[16]

Case definition- Heartburn was defined as a burning sensation behind the sternum in the anterior chest. Regurgitation was defined as a bitter or sour tasting fluid spontaneously coming in to the mouth. Symptom score was

Table 1. Grading of severity and frequency of symptoms of gastroesophageal reflux disease

Grade	Severity of heartburn and regurgitation	Frequency of heartburn and regurgitation
0	None	Absent
1	Mild symptoms with spontaneous remission. No interference with normal activity and sleep	Occasional (<2 days in a week)
2	Moderate symptoms with spontaneous but slow remission and mild interference with normal activity and sleep	Frequent (2–4 days in a week)
3	Severe symptoms without spontaneous remission and marked interference with normal activity and sleep	Very frequent (>4 days in week)

Table 2: Socio demographic profile of the study subjects (n=300)

Sociodemographic Profile	N (%)
Age group (years)	
18- 29 years	34 (11.3%)
30-39 years	53 (17.7%)
40-49 years	74 (24.7%)
50-59 years	64 (21.3%)
≥ 60 years	75 (25.0%)
Gender	
Male	124 (41.3%)
Female	176 (58.7%)
Marital status	
Unmarried	12 (4%)
Married	239 (79.7%)
Widow/widower	49 (16.3%)
Education status	
Illiterate	84 (28.0%)
Literate	216 (72.0%)
Occupation status	
Unemployed	98 (32.7%)
Employed	202 (67.3%)
Socio economic status (Kuppuswamy's scale)	
Lower	4 (1.3%)
Upper Lower	153 (51.0%)
Lower Middle	92 (30.7%)
Upper Middle	47 (15.7%)
Upper	4 (1.3%)
Smoking status	
Smoker (Current and Ex-smoker)	51 (17%)
Non smoker	249 (83%)
Tobacco chewers	
Yes	38 (12.7%)
No	262 (87.3%)
Gutka/ Pan masala	
Yes	20 (6.7%)
No	280 (93.3%)
Alcohol	
Yes	40 (13.3%)
No	260 (86.7%)
Dietary preference	
Vegetarian	122 (40.7%)
Nonvegetarian	178 (59.3%)
Spices consumption	
Low-Med	267 (89%)
High	33 (11%)
Tea/coffee consumption per day	
0-3 cups	274 (91.3%)
≥4 cups	26 (8.7%)

calculated using the severity and frequency of the individual symptoms (Table 1). The final score for each symptom i.e. heartburn and regurgitation was obtained by multiplying the scores for severity and frequency.[16]The total score was obtained by adding the final scores of individual symptoms. Thus the final score ranged from 0 to 18. The presence of GERD was defined as a score ≥ 4.[16] GERD was further classified as mild, moderate and severe based on the final symptom score range of 4–8, 9–13 and 14–18, respectively.[16]

Data management and statistical analysis- The data was entered into Microsoft Excel and cleaned. The cleaned data was analyzed using SPSS 20.0. The statistical analysis comprised of calculating means and proportions. Chi-square (Fischer's exact if required) was used to test the statistical association of GERD with various factors. The level of significance was taken as p<0.05. To find out the predictors of GERD, binary logistic regression was applied taking GERD as the dependent variable. Forward stepwise likelihood ratio (LR) was applied to find out the significant predictors. The criteria for entering and removing the variables into the regression model was p<0.05.

Results :

Baseline characteristics of study participants are shown in Table 2. The mean age of study participants was 47.70 years±14.34(SD) with minimum age being 19 years and maximum age being 86 years.

Of 300 study participants, 42 (14%) had symptom score ≥ 4, the cut-off for defining it GERD. Ninety one (30.3%) study participants complained of heartburn. Heartburn occurred on a daily basis (>4 days in a week) in 13 (4.3%) individuals, on a weekly basis (2-4days in a week) in 25 (8.3%) individuals, and occasionally (<2 days in a week) in 53 (17.7%). Forty-five (15%) individuals complained of regurgitation. Regurgitation occurred on a daily basis (>4 days in a week) in 11 (3.6%) individuals, on a weekly basis (2-4days in a week) in 14 (4.7%), and occasionally (<2 days in a week) in 20 (6.7%) individuals. Based on symptom score of heartburn and regurgitation, GERD is classified into mild (4-8), moderate (9-13) and severe (14-18). Twenty seven (64.3%) had mild GERD, 7 (16.7%) had moderate GERD and 8 (19.0%) had severe GERD. Table 3 shows distribution of frequency and severity of GERD symptoms.

Discussion:

Gastroesophageal reflux disease is characterized by reflux of gastric contents into esophagus. It can also cause dysphagia (difficulty in swallowing) and odynophagia (painful deglutition). It may also be associated with extraesophageal symptoms like coughing, asthma like symptoms and oral problems like tooth decay and gingivitis. It is the most common cause of non-cardiac chest pain. It has commonly been considered as a disease of prosperous people. Hence, in developing countries like India, GERD was not considered as a significant health problem until now. However, the prevalence of GERD has been increasing in India gradually, which may be

Table 3. Distribution of frequency and severity of GERD symptoms

Symptom		Frequency		
Heartburn (n=91)		Occasional (<2 times a week)	Frequent (2-4 times a week)	Very Frequent (>4 times a week)
No GERD(< 4)		44	3	2
GERD (≥4)	Mild (4-8)	0	2	1
	Moderate (9-13)	6	11	2
	Severe (14-18)	3	9	8
Regurgitation(n=45)				
No GERD(< 4)		7	0	0
GERD (≥4)	Mild (4-8)	0	2	1
	Moderate (9-13)	11	9	3
	Severe (14-18)	2	3	7

Table 4: Binary logistic regression analyses for significant predictors of GERD

Predictor Variable	B	S.E.	Adjusted Odds Ratio (95% C.I.)	p- value
Gender				
Male			1*	0.046
Female	0.821	0.411	2.272(1.015-5.085)	
Body Mass Index(BMI)				
BMI < 25 kg/m^2			1*	0.001
BMI ≥25 kg/m^2	1.245	0.387	3.473(1.625- 7.421)	
Smoking status				
Non-Smoker			1*	0.010
Smoker (current + Ex-Smoker)	1.229	0.476	3.419(1.346-8.690)	
Spices consumption				
Low to Med			1*	0.014
High	1.250	0.509	3.489(1.286-9.462)	
Co-Morbidity Illness				
No			1*	<0.001
Yes	1.432	0.392	4.186(1.940-9.033)	
Tea/ coffee consumption				
0-3 cups			1*	0.044
>3 cups	1.134	0.564	3.109(1.029-9.400)	

*Reference category

attributed to the rapidly developing economy and consequent changes which are taking place in diet and lifestyle. In the present study add the prevalence of GERD was found to be 14% as estimated using Questionnaire for epidemiology of GERD. [4,5] The prevalence of GERD ranges from 7.6% to 25.0% in different studies conducted in India. [3-6, 8, 9] The prevalence in our study was considerably higher as compared to studies done in other Asian countries like China, Japan, Iran, Bangladesh, Nepal. [20, 21] This could be attributed to various sociocultural and dietary habits in different Asian countries. GERD is more common in western world with prevalence as high as 52%[22]. Several studies done in USA, Nigeria, Greece have reported prevalence of GERD higher than the present study. [22,23] Higher prevalence in Caucasians as compared to Asians might be due to increased dietary fat consumption, higher BMI, lower prevalence of Helicobacter pylori infection (which is negatively associated with GERD)[24] and genetic factors.

Female gender was found to be a significant predictor of GERD in our study. Several studies done in India [4, 6, 8] as well as outside India [21, 25-27] have reported higher prevalence of GERD among females. Studies have shown that prevalence of non-

erosive reflux disease was more in females whereas males were more likely to be associated with erosive esophagitis.[28, 29]In the present study, mean BMI of the participants was 23.23 ± 2.39 kg/m^2. The prevalence of GERD among those who had BMI more than or equal to 25 kg/m^2 was 24.7% as compared to 10%, among the individuals who had BMI less than 25 kg/m^2 which was found to be statistically significant. Several studies have reported significant positive relationship between BMI and GERD [5- 7, 8, 10, 26, 30] whereas few studies have not observed significant relationship.[3, 4] El serag et al.[31] did a cross sectional study and reported that obese people had increased risk of GERD, as increased abdominal obesity leads to increased mechanical pressure on the stomach, thus promoting reflux of gastric contents into esophagus. This lead to increased exposure of esophagus to gastric acid. Murray et al.[32] reported that obesity was significantly associated with severity of GERD and obese individuals were likely to experience heartburn and regurgitation almost three times as compared to individuals who had normal weight. Cigarette smoking is known to adversely affect the defense mechanisms against reflux of gastric contents into the esophagus. Smoking leads to transient reduction in lower esophageal sphincter pressure, reducing salivary output and increased acid clearance time.[33] In present study prevalence of GERD in smokers was significantly higher than non-smokers. Several studies have reported similar findings [5, 9, 22] whereas few studies haven't observed relationship between smoking and GERD.[4, 6-8] Parietal cells in stomach are responsible for secretion of gastric acid. Spices stimulate these cells and lead to increased acid secretion. In the present study, prevalence of GERD was more in individuals consuming high amount of spices. Some other studies have also reported similar findings.[34] Tea is one of the most frequently consumed beverage in India. Both tea and coffee contain caffeine. Caffeine stimulates parietal cells and lead to increase gastric acid secretion.[35] In the present study addthe prevalence of GERD in individuals consuming more than four cups of tea was 30.8% as compared to 12.4% in individuals having 0-3 cups to tea/coffee, this association was found to be statistically significant. Several studies have observed significant association between tea/coffee consumption and presence of GERD symptoms.[36, 37] Certain drugs trigger or worsen the GERD by either reducing the tone of lower esophageal sphincter, causing increased gastric acid secretion or delayed gastric emptying. Consumption of these drugs can predispose an individual to develop GERD. In present study, the prevalence of GERD in individuals not consuming any medications (11.4%) was less as compared to 23.8% in individuals taking medicines. This association was found to be statistically significant on univariate analysis, but after adjusting with other variables in Binary logistic regression, it was not found to be significant. Wong et al. [38] have observed the association of calcium channel antagonist/nitrates and the presence of GERD whereas others did not find similar association.[5, 37] The prevalence of

GERD among individuals having selected co-morbid illness (Hypertension, Diabetes Mellitus, Bronchial Asthma and Heart disease) was 26.5% as compared to 7.9% in other group. This association was statistically significant. On univariate analysis, presence of hypertension and diabetes mellitus was observed statistically significant. Several studies have observed significant association between GERD and hypertension. [5, 6, 26] It may be due to antihypertensive medication as they reduce lower esophageal sphincter tone. There was no association of Asthma with GERD in our study, but a study conducted by Sharma et al.[5] found significant association between Asthma and GERD. In our study, diabetes was significantly associated with GERD whereas Sharma et al.[5] had observed no such association.

The strengths of our study were that it was a community based study to find out the prevalence of GERD among adults. To the best of our knowledge, this is the first study to be conducted in community setting in Delhi. Investigator has recorded the symptoms of GERD and evaluated heartburn and regurgitation using a validated symptom score questionnaire.

The limitations of our study were that it was conducted in Nand nagri, a resettlement colony in East Delhi. Due to manpower and time constraints participants from other areas of Delhi could not be included. Hence the results of the current study cannot be extrapolated to the whole of Delhi. Heartburn and regurgitation are cardinal symptoms of GERD, but atypical or extraesophageal symptoms of GERD were not taken into consideration. Hence, the study may be providing an under estimate of the disease burden.The study design was a cross sectional one. So the temporal relationship could not be established between the observed risk factors and GERD.

Conclusion

The prevalence of GERD among study participants was found to be 14.0%. As per the severity of GERD, 64.3% had mild GERD, 16.7% had moderate GERD and 19.0% had severe GERD. On applying binary logistic regression (using forward LR selection model) to find out the predictors of GERD among study participants, female gender, BMI more than or equal to 25, smokers, having comorbid illness, consuming high amount of spices and more than 4 cups of tea or coffee were found to be significant predictors.

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Conflict of interest: None

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