

Original Research Article

The prevalence of gastroesophageal reflux disease and its association with various risk factors in a tertiary care centre in West Bengal

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ABSTRACT

Background: Gastroesophageal Reflux (GER) is the regurgitation of gastric contents and acid into the esophagus. Frequent and abnormal amounts of reflux leads to Gastroesophageal reflux disease (GERD) which causes symptoms like heartburn, regurgitation, and /or other complications. In view of absence of any data on the prevalence of GERD from this part of India, the current population based study was conducted to study the prevalence of GERD and its association with various risk factors.

Methods: In this community based prospective cross-sectional observational study, 500 patients from rural and urban areas of West Bengal were included during the one year period from July 2014 to June 2015.

Results: Out of a total of 500 patients studied, the percentage of patients with GERD in our study population was found to be 31.3%. Out of 292 males enrolled for the study, number of patients with GERD was 66 (22.6%) as compare to females where the same was found to be 43.26% (90/208). The majority (68.2%) of patients had mild GERD, 18.5% had moderate GERD whereas only 13.3% of patients had severe GERD.

Conclusions: The percentage of patients with GERD in our study population was found to be 31.3%. It was observed to be significantly associated with increasing Body Mass Index (B.M.I), smoking, the female gender, a sedentary lifestyle, dinner to bed-time interval of ≤ 2 hours, chronic NSAID use, and a past history of abdominal surgery.

Keywords: Gastroesophageal reflux disease, Heartburn, Regurgitation

INTRODUCTION

Gastroesophageal Reflux (GER) is the regurgitation of gastric contents and acid into the esophagus caused by the repeated opening of lower esophageal sphincter. It itself is not a disease but a normal physiologic process that occurs multiple times each day, without causing any mucosal damage.¹ Frequent and abnormal amounts of GER due to failure of normal anti-reflux barrier leads to Gastroesophageal reflux disease (GERD) in which reflux of the gastric contents into the esophagus causes symptoms like heartburn and regurgitation. It is a chronic gastrointestinal disorder and can also present as cough or dysphagia.² Various risk factors are shown to be associated with Gastroesophageal reflux symptoms

including obesity, pregnancy, alcohol, smoking, and intake of non-steroidal anti-inflammatory drugs. The pathogenesis of GERD is complex resulting from imbalance between defensive factors protecting the esophagus (anti-reflux barriers, esophageal acid clearance, tissue resistance), and aggressive factors damaging the stomach lining (gastric acidity, volume, and duodenal contents).³

Although GER symptoms and gastroesophageal reflux disease are rarely life threatening, cross-sectional studies have shown that GER symptoms affect many aspects of health related quality of life, reduce work productivity, and lead to increased health-care resource utilization.⁴ Owing to the burden of the disease and the impact of

different life style adopted by people from different regions on the prevalence and severity of GERD, it becomes imperative to estimate the same in different populations. In view of these findings and the absence of any such data from this part of India, the current population based study was conducted to observe the prevalence of GERD, and its association with various risk factors in a tertiary care centre in West Bengal.

METHODS

The study was conducted in West Bengal (rural and urban population) during a period of one year from July 2014 to June 2015. A sample size of 500 patients (250 from urban and 250 from rural areas) was taken up for study from the inclusion criteria as mentioned below and data was collected using a pretested proforma meeting the objectives of the study. The Inclusion criteria consisted of Bengal residents age >18 years, while the exclusion criteria consisted of Non-residents of Bengal and pregnant women. The sample size for the study was calculated based on an anticipated prevalence of 18.7%8, a confidence level of 95%, an absolute error of 1.5%, by using the formula:

$N = (Z^2Pq/e^2)$
 N=Minimum sample required
 Z= Z score (1.96 at 95% C.I)
 p = Proportion of the factor under investigation (10%)
 e = Maximum (absolute) error allowed (1.5%)
 Q= (1-p)
 Sample size = 500

Methodology

All the eligible subjects were selected from the patients presenting to the Out-patient Medicine department of CNMC, West Bengal. Each selected subject was interviewed and surveyed with the help of a previously validated questionnaire which included 2 sections.⁵ The first section elicited the demographic and lifestyle factors and the second section evaluated the symptom score for GERD which was based on the presence and severity of heartburn and regurgitation in the past 1 month. These terms were thoroughly explained to the subjects by word description by the physicians well acquainted in local language. The demographic details included data on age, sex, urban/rural habitat, income, and body mass index (BMI). Lifestyle factors taken into account were information on smoking, alcohol consumption, and physical activity.

Heartburn was defined as a burning sensation behind the sternum in the anterior chest, and Regurgitation was defined as a bitter or sour tasting fluid spontaneously coming in to the mouth.⁵ The severity and frequency of the individual symptoms were used to calculate the symptom score (Table 1).

Severity score

- No symptoms = 0
- Mild symptoms with spontaneous remission not interfering with normal activity and sleep = 1
- Moderate symptoms with spontaneous but slow remission and mild interference with normal activity and sleep = 2
- Severe symptoms without spontaneous remission and marked interference with normal activity and sleep =3.

Frequency

- Absence of symptoms= 0
- Frequency of <2 times/week =1
- 2 to 4 times per week = 2
- 4 times per week = 3

The final score for each symptom i.e. heart burn and regurgitation was obtained by multiplying the scores for severity and frequency. 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. 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.⁵ Upper GI endoscopy was done in selected subjects with refractory GERD at CNMC Hospital, West Bengal.

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 | Frequency (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 a week) |

RESULTS

Table 2 shows prevalence and severity of GERD in the study population. Out of total 500 patients studied, the percentage of patients with GERD in our study population was found to be 31.3%.

Table 2: Prevalence and severity of GERD.

| Studied population | GERD | | | No GERD | Total |
|---------------------------|-------------|------------|------------|---------|-------|
| | Mild | Moderate | Severe | | |
| | 106 (68.2%) | 29 (18.5%) | 21 (13.3%) | | |
| Number of patients | 156 | | | 344 | 500 |
| Prevalence (%) | 31.3 | | | 68.7 | 100 |

Table 3: Prevalence of GERD in studied population as per age, gender, location and B.M.I

| Factors | Total enrolled | GERD | Percentage | P-value | |
|-----------------|----------------|------------|------------|---------|---------|
| Age | 18-29 | 58 | 15 | 25.2 | 0.103* |
| | 30-39 | 112 | 45 | 37.5 | |
| | 40-49 | 171 | 55 | 32.1 | |
| | 50-59 | 130 | 31 | 18.0 | |
| | ≥60 | 29 | 10 | 25.9 | |
| | Mean±SD | 46.4±16.34 | 44.9±19.45 | - | |
| Gender | Male | 292 | 66 | 22.60 | <0.001* |
| | Female | 208 | 90 | 43.26 | |
| Location | Rural | 250 | 82 | 32.8 | 0.088* |
| | Urban | 250 | 74 | 29.6 | |
| B.M.I | <20 | 42 | 9 | 21.5 | <0.001* |
| | 20-24.9 | 327 | 92 | 27.8 | |
| | 25-29.9 | 102 | 37 | 32.7 | |
| | ≥30 | 29 | 18 | 62.0 | |

*Statistically significant difference (P-value < 0.05)

Table 4: Prevalence of GERD in studied population as per lifestyle and dietary factors.

| Lifestyle and dietary factors | Total enrolled | GERD | Prevalence | P-value | |
|-------------------------------|----------------|------|------------|---------|---------|
| Smoking | Current smoker | 102 | 49 | 46.03 | <0.001* |
| | Non-smoker | 347 | 91 | 24.22 | |
| | Ex-smoker | 51 | 16 | 31.37 | |
| Tea | No Intake | 38 | 7 | 21.5 | 0.559# |
| | < 5 cups/day | 411 | 128 | 30.4 | |
| | > 5 cups/day | 51 | 21 | 32.7 | |
| Spicy food | Yes | 154 | 62 | 38.9 | <0.001* |
| | No | 346 | 94 | 22.6 | |
| Non-veg | Yes | 462 | 147 | 31.5 | 0.643# |
| | No | 38 | 9 | 23.5 | |
| Diner to bed time | ≤2 hours | 88 | 39 | 44.3 | <0.001* |
| | >2 hours | 412 | 117 | 25.1 | |
| Physical activity | Sedentary | 108 | 45 | 36.2 | <0.001* |
| | Non-sedentary | 392 | 111 | 18.2 | |

Statistically significant difference (P-value<0.05)

Table 5: Prevalence of GERD in studied population as per associated medical conditions.

| Medical conditions | Total enrolled | GERD | Prevalence | P-value | |
|-------------------------------|----------------|------|------------|---------|--------|
| Diabetes | Yes | 97 | 24 | 24.9 | 0.554# |
| | No | 403 | 132 | 30.1 | |
| Hypertension | Yes | 120 | 34 | 28.3 | 0.113# |
| | No | 380 | 122 | 32.1 | |
| COPD | Yes | 84 | 21 | 25.0 | 0.497# |
| | No | 416 | 135 | 29.6 | |
| Ischemic heart disease | Yes | 53 | 17 | 31.7 | 0.115# |
| | No | 447 | 139 | 35.8 | |

Continued.

| Medical conditions | | Total enrolled | GERD | Prevalence | P-value |
|--------------------|-----|----------------|------|------------|---------|
| Abdominal surgery | Yes | 22 | 10 | 45.4 | 0.002* |
| | No | 478 | 146 | 26.7 | |

*Statistically significant difference (P-value<0.05)

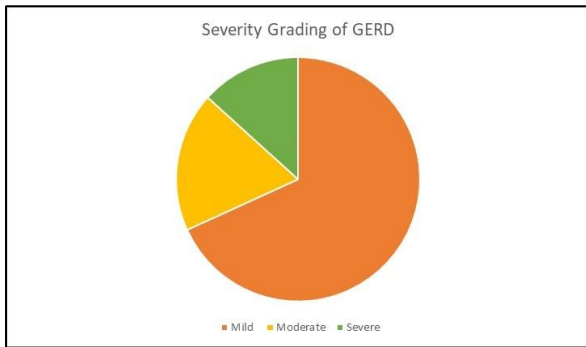


Figure 1: The various grades of severity of GERD in the studied population.

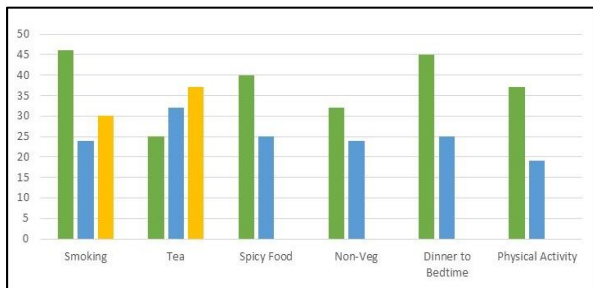


Figure 2: The relationship of various dietary and life style factors with the prevalence of GERD.

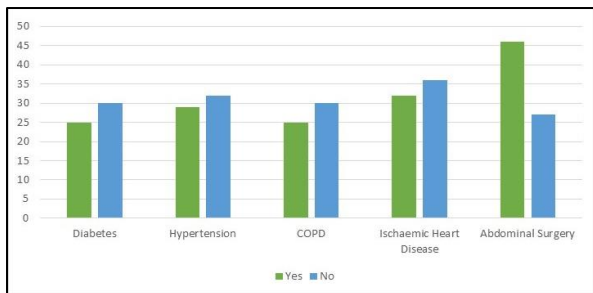


Figure 3: Prevalence of GERD in cases with various underlying medical disorders.

In our study the, majority (68.2%) of patients had mild GERD, 18.5% had moderate GERD while as only 13.3% of the patients had severe degree of the disease. Table 3 shows the prevalence of GERD in studied population as per age, gender, location and B.M.I. As it is evident from the above table, there was observed to be a statistically significant association between female sex and increasing B.M.I with GERD, although no such association was seen with age or location of residence. Table 4 shows the prevalence of GERD in studied population as per lifestyle and dietary factors. A statistically significant association

was seen with smoking, spicy foods, a dinner to bedtime of ≤ 2 hours, and a sedentary lifestyle.

Table 5 shows the prevalence of GERD in cases with various underlying medical conditions. A statistically significant association was observed between GERD and Bronchial asthma as well as with prior abdominal surgeries.

DISCUSSION

Gastroesophageal reflux disease (GERD) is a common and chronic gastrointestinal disorder with a significant negative impact on health-related quality of life.⁶ Although increasing attention is being given to the epidemiology of GERD in Asia- Pacific region, community-based prevalence of this data is lacking from most countries in this region. The present study was performed to observe the prevalence of GERD in this region of India and to identify various socioeconomic and life style factors associated with symptoms of GERD.

Out of a total of 500 cases that were enrolled in the present study, 50% belonged to the urban areas and 50% came from rural areas. The age ranged from >18 years to more than 60 years with the mean age of the study population being 46.4±16.34 years, and the mean age of the persons with GERD was found to be 44.9±19.4 years. The overall prevalence of GERD in the study group was found to be 31.3%, and it was observed that the highest prevalence was observed between the ages of 30-39 years. The female gender was found to be more prone to the development of GERD as compared to their male counterparts.

In an Israeli study conducted by Moskowitz et al in 2011, the prevalence of GERD was seen on twice weekly, once weekly and once monthly basis and the same was found to be 8.4%, 12.5% and 21.5% respectively, but our study was not done on any such pattern.⁷ The prevalence seen in our study is also comparable to the results of certain other studies like the one conducted in school going children in one of the cities in Taiwan by Jiann-HWA8 in 2014 where same was found to be 20.5%. The prevalence found in our study group is much higher that seen in many other parts of the world in different studies conducted from time to time.⁹⁻¹⁴ Certain studies available from China as well as Spain observed a similar prevalence of GERD than what we have observed in our study.^{15,16}

In our study the prevalence of GERD was seen to go up as the BMI increased beyond 25 kg/m². The same has been proved by the studies conducted by Rubio in Spain, Khan et al in Pakistan in 2014, and Hung et al in

Taiwan.¹⁶⁻¹⁸ A study from Kaiser Permanente health system found a significant relationship between increased abdominal diameter and reflux symptoms that was independent of BMI.¹⁹

Other associated risk factors of statistical significance in our study included smoking, consumption of more of spicy food with a dinner to bed time interval of < 2 hours, and a history of NSAID intake. The prevalence rate in case of current smokers was found to be 46.03% as against 24.22% seen in case of non-smokers. In fact the prevalence among ex-smokers was also less (31.37%) as compared to the current smokers. There are studies available that have documented the increased prevalence of GERD associated with smoking but at the same time few studies are contradictory.^{8,14,22-25} Subjects consuming spicy foods showed the prevalence of GERD to be 38.9% as compared to those subjects who avoided spicy foods in their diet (22.6%). As per the literature available, spicy food such as "curry" may precipitate GERD symptoms, but interventional studies are lacking.^{11,26}

The dinner to bed time interval was found to have a great impact on the GERD development as far as our study is concerned. In persons where this interval was < 2 hours, the prevalence was as high as 44.3% while as in the other group where this interval was > 2 hours, the same was only 25.1%. Subjects with high consumption of tea and non-vegetarian diet also showed the increased prevalence of GERD in our study but not to the extent of statistical significance. Role of increased tea intake and spicy foods has also been proved by earlier researchers in their studies.^{11,22} Increased risk of GERD with the intake of meat has been proved by earlier studies also and has been attributed to the high fat content of meat being responsible for delayed gastric emptying.¹³

Physical activity as per our study has a very important role to play in the prevalence of GERD. Those who resorted to a sedentary life style were more prone to develop GERD than those who remained physically active. The prevalence in the previous group in our study was 36.2% against 22.6% in those who were physically active. Other studies showing the association of GERD with sedentary life style include those conducted by Kumar et al, Pandeya et al and Cela et al.^{22,24}

Co-morbid conditions that had a statistically significant role in the prevalence of GERD in our study included a history of abdominal surgery where the prevalence was found to be 45.4% as against the prevalence of 26.7% in patients with no history of abdominal surgery. Our results were consistent with the studies conducted earlier regarding association of GERD with co-morbid conditions.^{10,14,22}

CONCLUSION

Our findings demonstrated a Gastroesophageal Reflux Disease (GERD) prevalence of 31.3% in the Kashmir

valley during a study period of one year from July 2015 to June 2016. Statistically significant association was observed between GERD and various parameters such as female gender, B.M.I, smoking, consumption of spicy diet, sedentary lifestyle, and a dinner to bedtime interval of ≤ 2 hours. A significant association was also observed with the use of NSAIDs and a history of prior abdominal surgeries. No significant association was observed with any other co-morbid condition such as diabetes, hypertension, COPD or ischemic heart disease. As far as the severity of the disorder is concerned, majority of the patients showed symptoms of mild severity, whereas only less than 31.8% of them showed symptoms of moderate to severe degree. These findings were consistent with the reported trends in previous studies, and thus signify the various risk factors and lifestyle choices responsible for the increasing prevalence of GERD.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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