

Prevalence and risk factors for gastro-esophageal reflux disease in the North-Eastern part of Bangladesh

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Abstract

Despite a common disorder population-based data on gastro-esophageal reflux disease (GERD) in Bangladesh is lacking. This epidemiological study was designed to determine the prevalence of GERD and its association with lifestyle factors. This population-based cross-sectional study was done by door to door interview of randomly selected persons in both urban and rural areas of North Eastern part of Bangladesh by using a validated questionnaire. A cutoff point 3 was chosen as a valid and reliable scale to confirm GERD. Statistical analysis was done by SPSS-12 version and the level of significance was set at $P \leq 0.05$. A total of 2000 persons with an age range of 15 to 85 years were interviewed; 1000 subjects from urban area and 1000 from rural area. Among the study subjects 1064 were male and 936 were female. A total of 110 persons (5.5%) were found to have GERD symptoms and among them 47 were men and 67 were women. The monthly, weekly and daily prevalence of heart-burn and or acid regurgitation was 5.5%, 5.25% and 2.5% respectively. Female sex, increased age and lower level of education were significantly associated with GERD symptoms. Prevalence was found more among city dwellers (approximately 6.0% versus 4.8%), married (6.23%, n=86), widowed/widowers (16.83%, n=17) and day labourer (8.78%). Level of education inversely influenced the prevalence. No significant association of GERD was found with body mass index (BMI) and smoking. Prevalence of GERD in North-Eastern part of Bangladesh was lower than that of western world. Prevalence was found higher in urban population, women, married, widowed/widowers and in poor and illiterate persons. BMI and smoking had no significant association with GERD.

Introduction

Gastro Oesophageal reflux disease (GERD) is a potentially serious condition with risks of complications like stricture, Barrett's oesophagus and malignancy^{1,2}. This chronic, painful disease substantially interferes with physical activity, impairs social functioning, disturbs sleep and reduces productivity at work²⁻⁴. Abnormal reflux of gastric contents to oesophagus is responsible for symptoms of GERD¹. Various environmental or lifestyle risk factors like obesity, fatty food, smoking, alcohol and NSAIDs are thought to be associated with GERD^{5,6}.

GERD has traditionally been considered less common in Asian countries in comparison to western world⁵⁻¹². There are few population-based data on GERD in Asia¹⁰⁻¹². Studies from some Asian countries reported a rising trend of prevalence of GERD¹¹⁻¹³.

In Bangladesh we have little data on the magnitude of the problem^{14,15}. Only population based survey reported a prevalence of 40.9%¹⁴. According to

Masud's report the monthly, weekly and daily prevalence rates of heart-burn and or acid regurgitation were 24.6%, 17.2% and 12.5% respectively in a hospital outpatient population of Bangladesh¹⁵.

Patients with GERD can have symptoms without objective evidence of oesophagitis¹⁶. Considering the limitations of objective medical testing, GERD symptoms play a pivotal role in the diagnosis of the problem. Heart burn and or acid regurgitation are considered to be reasonably specific symptoms for the diagnosis⁵. Further diagnostic evaluation is necessary^{1,5,17}, if there is no response to therapy, when there are alarm symptoms suggestive of complications or for confirmation of diagnosis prior to anti-reflux surgery¹⁷. Studies also reported association of GERD with asthma, hoarseness of voice, dyspepsia, atypical chest pain and non-obstructive dysphagia⁶⁻⁸.

Recently questionnaires have been used as a useful diagnostic tool in the epidemiological settings. GERD questionnaires may quantify the

characteristics of individual symptom (frequency, duration and severity) and also can measure the quality of life. The validity and reliability of symptom-based diagnosis of GERD, has been confirmed in several studies^{5,6,10,11,18-20}. These cross-sectional and longitudinal surveys assessed association of GERD with a number of socio-demographic factors such as age, gender, education, occupation, smoking, body mass index (BMI), lifestyle etc. The Questionnaire by Manterola et al¹⁸ provided a valid & reliable scale to detect GERD with a high sensitivity (91.6%) and specificity (94.9%) and it was brief and simple. Significant difference exists between urban and rural population of Bangladesh in respect to socio-cultural, and environmental factors, which may affect epidemiological features. Data on various aspects of GERD is lacking in Bangladesh. Knowledge on prevalence estimates and associated risk factors of GERD in our population might play a part in defining local health needs as well as to improve the management of these patients. This cross sectional population-based survey was designed to find out the prevalence of GERD symptoms as well as to find out the association of GERD with various socio-demographic variables in both urban and rural population of eastern part of Bangladesh.

Materials and Method

Subjects & study design: This observational study was conducted in the Sylhet district of Bangladesh during the period of December 2010 to March 2011. Total 2000 subjects with an age range of 15 to 80 years were interviewed (male 1064 and female 936) in a home setting by trained interviewers using a valid questionnaire under direct supervision of the investigator. Sylhet district comprises of 207 mahallas under City Corporation and 3052 villages outside the city corporation. Each mahalla in the city and each village outside the city were considered as a cluster. Ten clusters were selected from city (six from non-slum area and four for slum areas) and ten clusters from villages. Households were then randomly selected. Informed consents were taken from the participants (not more than one male and one female from each household). BMI of each subject was calculated from the height and weight measured during interview. Subjects with history of abdominal surgery, jaundice, suffering from chronic illness like diabetes mellitus, heart failure, chronic pulmonary disease, pregnant lady, significant illness that might impair the ability to complete the questionnaire and persons unwilling to take part in the survey were excluded.

Questionnaire: A Bengali version of the questionnaire¹⁴, originally developed & validated by Mantorela et. al¹⁸ was used for data collection. The questionnaire comprised of three sections; demographic data, common & uncommon GERD symptoms with frequency. A cutoff point 3 was chosen as a valid & reliable scale to confirm GERD. *Alternatively GERD was defined as heartburn and/or acid regurgitation occurring at least weekly over the past year.* The following definitions were used to identify individual symptoms in the GERD questionnaire: (i) heartburn-a burning pain or discomfort in the central chest behind the sternum; (ii) acid regurgitation- a bitter or sour-tasting fluid coming back into the throat or mouth; (iii) chest pain- feeling of any pain or discomfort inside the chest, excluding heartburn, primary abdominal pain and past history of ischaemic cardiac pain. iv) globus-eeling of a lump in the throat when not swallowing; (v) hoarseness of voice- harshness or roughness of voice not related to respiratory tract infection; and (vi) chronic cough-cough occurring 4- times in a day on four or more days per week. No laboratory investigation or other procedure was done due to lack of feasibility.

Statistics: Statistical analysis was performed with SPSS-12 version. Distribution of the factors like age, sex, education, marital status, occupation, BMI, smoking & individual symptom were compared by Pearson's Chi-squared test. Multiple logistic regression analysis with age, sex marital status & occupation then performed to measure the association of these factors with GERD. Odds ratios with 95% confidence intervals (CIs) were computed. All the statistical comparisons were two-sided using the 0.05 significance level.

Result

Out of total 2,555,000 subjects of Sylhet district, 263,000 persons were living in the city corporation area (in 207 mahalla ie, 207 urban clusters) and 2,292,000 in 3052 villages (i.e. 3052 rural clusters) outside the city. A total of 1000 subjects (male 530, female 470) were included from 10 urban clusters (non-slum area 06, and slum area 04 clusters) and 1000 persons (male 534 and female 466) from 10 rural clusters. Mean age of the study population was 34.20±13.84, whereas the mean age of the subjects with GERD was 42.19±16.08.

Prevalence of GERD: The socio-demographic characters and the crude age and gender specific, prevalence estimates of IBS subjects are described in table-I.

The overall, unadjusted estimate of GERD was 5.5 (n=110) cases per 100 based on questionnaire at a cutoff point of 3. Mean age of the GERD patients

was 41.96±15.94 (male 41.66±15.93, female 42.19±16.08). The prevalence of heart-burn and or acid regurgitation at least monthly, at least weekly and daily was 5.5%, 5.25% & 2.5% respectively (table II). The prevalence of GERD By questionnaire is slightly higher than GERD defined by weekly prevalence of heart-burn and or acid regurgitation (5.5% VS 5.25%).

Factors associated with GERD: Sex: Significantly more women had GERD than men (6.73%, n=63 VS. 4.41%, n=47, P= 0.015) (Table-I) based on questionnaire and according to daily prevalence of heart-burn and or acid regurgitation (table-II). Multivariate analysis showed that women were 1.5 times more prone to GERD (OR 1.562).

Age: Majority (n=1648) of study subjects were within 15-45 years group and prevalence of GERD in this age group was 4.24% (n=70). An increased prevalence of GERD symptoms was found with increasing age in both univariate and multivariate analysis (table1). Highest prevalence was found in 56 to 65 years age group (18.75%, P 0.000, OR 7.220) based on questionnaire (table-I) and as well as by weekly prevalence of heart-burn and or acid regurgitation (table-II).

Other Factors: GERD was found more prevalent among married and widowed/ widowers (6.23% and 16.83% respectively). Both univariate and multivariate analysis showed increased association of GERD with lower level of education (table-1). Prevalence of GERD was highest among day labourer (8.78%, 18/205, P 0.002, OR 1.710) and was lowest among students 0.43% (1/230) (table-I).

Body mass index (BMI) and smoking was found to have no significant association with GERD by both univariate and multivariate analysis. Prevalence of GERD was highest (6.8%, n=29) among underweight persons (table-1). No statistically significant difference was found in GERD symptom prevalence among city slum & non-slum dwellers (6.0% VS 6.33%, P 0.38) (table-1). GERD symptoms were found more prevalent among city dwellers in comparison to villagers (6.2% vs 4.8 %).

Symptom pattern of GERD: The monthly, weekly and daily prevalence of heart-burn was 5.5%, 5.25% & 2.5% respectively. Heart-burn was the presenting complain in all cases of GERD, where as regurgitation was present in around 91% of GERD patients (table-III).

Among the other symptoms (chest pain, globus, hoarseness of voice, chronic cough and asthma) of GERD (table-3), chronic cough (91.5 % VS 71.4%, P 0.008) and hoarseness of voice (66.0% VS 46.0%, p 0.029) were significantly more prevalent in men (table III). No significant age group

difference was found in the prevalence of these symptoms (table-IV) except heart-burn.

Table 1: Socio-demographic characteristics and prevalence of GERD symptoms

Variable	Univariate analysis		P value	Multivariate analysis	
	GERD % (n)	No GERD % (n)		OR	95%CI
Gender					
Male*	4.41% (47)	95.59% (1017)	0.015	1.00	
Female	6.73% (63)	93.27% (873)		1.562	(1.059- 2.303)
Total	5.5% (110)	94.5% (1890)			
Age:					
15-24 years	3.09%(21)	96.9%(657)	0.000	1.00	
25-34 years	4.39%(26)	95.6%(566)		1.437	(0.800- 2.582)
35-44 years	8.2%(23)	93.92%(355)		2.027	(1.106- 3.714)
45-54 years	8.51%(16)	91.49%(172)		2.910	(1.487- 5.697)
55-64 years	18.75%(18)	81.25%(78)		7.220	(3.687- 14.136)
> 65	8.82%(6)	91.18%(62)		3.028	(1.178- 7.781)
Education					
No education	8.36%(61)	91.63%(668)	0.001	6.255	
Primary	4.32%(31)	95.68%(686)		3.095	(1.511- 25.889)
SSC	4.98%(12)	95.02%(229)		3.590	(0.732- 13.086)
HSC	2.3%(4)	97.7%(170)		1.612	(0.792- 16.279)
Graduation	1.96%(2)	98.04%(100)		1.00	(0.291- 8.931)
Post graduation	0%	100%(37)			
Occupation					
Service holder	5.33%(13)	94.62%(231)	0.002	1.00	
Businessman	3.54%(8)	96.46%(218)		0.652	(0.265- 1.604)
Housewife	6.73%(50)	99.57%(229)		0.078	(0.010- 0.598)
Student	0.43%(1)	93.27%(693)		1.282	(0.684- 2.403)
Day labourer	8.78%(18)	91.22%(187)		1.710	(0.817- 3.581)
agriculture	8.42%(8)	91.57%(87)		1.634	(0.655- 4.078)
Others	4.67%(12)	95.33%(245)		0.870	(0.389- 1.947)
Marital status					
Unmarried	1.35%(7)	98.65%(511)	0.000	1.00	
Married	6.23%(86)	93.77%(1294)		4.852	(2.230- 10.553)
Widowed/widower	16.83%(17)	83.17%(84)		14.60	(5.879- 36.258)
Separated	0%	100%(1)			
BMI					
Under weight (<18)	29 (6.8%)	93.19% (397)	0.28	1.247	(0.646- 2.407)
Normal(18.5-25)	67 (5.07%)	94.93% (1254)		0.912	(0.504- 1.649)
Over weight(25-29.5)	14 (6.45%)	93.55% (203)		1.00	
Obese (>30)	0 (0%)	100% (36)			
Smoking status					
N, (%)					
Non-smoker	76 (5.32%)	93.42% (1335)	0.57	1.00	
Smoker	34 (5.95%)	94.05% (537)		1.127	(0.743- 1.710)
Region					
Rural	48 (4.8%)	95.2% (952)	0.38	0.790	
Non-slum area	38 (6.33%)	93.66% (562)		1.059	(0.477, 1.308)
Slum area	24 (6.0%)	94.0% (376)		1.00	(0.625, 1.795)

Table II: Prevalence of heart-burn and or acid regurgitation frequency by gender and age.

	Daily N (%)	Weekly N (%)	Monthly N (%)
Sex			
Male	19 (1.8%)	43 (4.04%)	47 (4.42%)
Female	31 (3.31%)	62 (6.62%)	63 (6.73%)
Total	50 (2.5%)	105 (5.25%)	110 (5.5%)
Age group			
15-24 years	7 (1.03%)	19 (2.8%)	21 (1.2%)
25-34 years	8 (1.35%)	24 (4.05%)	26 (4.4%)
35-44 years	11 (2.9%)	23 (6.08%)	24 (6.43%)
45-54 years	9 (4.8%)	15 (8%)	15 (8%)
55-64 years	10(10.63%)	18 (18.8%)	18 (18.8%)
> 65 years	5 (7.35%)	6 (8.8%)	6 (8.8%)
Total	50 (2.5%)	110 (5.25%)	110(5.5%)

Table III: GERD symptom pattern among male & female

Symptoms	Total n (%)	Male n (%)	Female n (%)	P value
Chest pain	103 (93.6%)	45 (95.7%)	58 (92.1%)	0.357
Heart-burn	110 (100%)	47 (100%)	63 (100.0%)	0.115
Regurgitation	100 (90.9%)	43 (91.5%)	57 (90.5%)	0.565
Globus	75 (68.2%)	32 (68.1%)	43 (68.3%)	0.573
Chronic cough	88 (80.0%)	43 (91.5%)	45 (71.4%)	0.008
Hoarseness of voice	60 (54.5%)	31 (66.0%)	29 (46.0%)	0.029
Asthma	54 (49.1%)	25 (53.2%)	29 (46.0%)	0.291

Table IV: Symptom pattern of GERD according to age group

Variable Symptoms	Age group							P value
	Total N(%)	15-24 years, n(%)	25-34 years n(%)	35-44 years n(%)	45-54 years n(%)	55-64 years n(%)	> 65 years n(%)	
Globus	75(68.2%)	17(81.0%)	19(73.1%)	14(60.9%)	11(68.8%)	11(61.1%)	3(50.0%)	0.584
Chronic cough	88(80.0%)	17(81.0%)	21(80.8%)	18(78.3%)	13(81.2%)	16(88.9%)	3(50.0%)	0.501
Hoarseness of voice	60(54.5%)	13(61.9%)	15(57.7%)	11(47.8%)	9(56.2%)	11(61.1%)	1(16.7%)	0.443
Asthma	54(49.1%)	11(52.4%)	15(57.7%)	9(39.1%)	3(18.8%)	13(72.2%)	3(50.0%)	0.042
Heart burn	110(100%)	21(100%)	26(100%)	23(100%)	16(100%)	18(100%)	6(100%)	0.003
Regurgitation	100(100%) 90.9%	21(100%)	23(88.5%)	20(87.0%)	15(93.8%)	15(83.3%)	6(100%)	0.450

Discussion

Gastro-esophageal reflux disease (GERD) is one of the most frequent health problems in the western world¹³ and as a chronic condition, GERD places a substantial burden on patients and the health care delivery system⁴. There is no gold standard diagnostic test for GERD. Most frequently done investigations like upper GI endoscopy and 24 hour oesophageal pH monitoring lack sensitivity and have several limitations²¹⁻²³. Questionnaire-based diagnosis of GERD is reliable with high sensitivity and specificity¹⁸.

In the present series the prevalence of GERD based on questionnaire¹⁸ (cut-off point 3) was 5.5% which is similar to population-based survey in Korea¹², Singapore²⁰, China¹¹, Iran^{10,24} and India^{25,26} but is lower than that in the western population^{4,27-29}. These Asian studies showed that prevalence varied with age, sex, education, occupation, smoking, alcohol intake and psychosomatic ailments etc. The prevalence of GERD in this study was lower than that of only population-based study in Dhaka city (40.9%)¹⁴. Only published study¹⁵ involved OPD population of a referral center of Dhaka city and reported a GERD prevalence of 22.8%. This significant difference may be due to selected population who came for consultation in Gastroenterology outpatient clinic. The present population-based study included both rural and urban population.

The monthly, weekly and daily prevalence of heart-burn and or acid regurgitation in our study were 5.5%, 5.25% and 2.5% respectively. The corresponding prevalence's reported by Masud¹⁵ were 24.6%, 17.2% & 12.5% respectively. Studies from USA showed that heart burn and or acid regurgitation occurred in approximately in 7% of adult population on a daily basis, 14-20% on a weekly basis and 44% on monthly basis^{6,9}. A Chinese population survey reported that the annual, monthly and weekly prevalence rates of GERD were 29.8%, 8.9% and 2.5% respectively in their population¹¹. The weekly prevalence of GERD on the basis of heart-burn and or acid regurgitation in

Korea (3.0%)¹² is comparable to our study. Geographic differences in GERD prevalence estimates are difficult to interpret, but may be related to differences in study definitions, questionnaire used, population selection and socio-cultural factors.

In this series prevalence estimates of GERD was higher among women than men based on symptom score (6.73% versus 4.41%) and by weekly prevalence of heart-burn and or acid regurgitation (table-II). This prevalence is comparable to the finding in India²⁵, but higher than that of Korea¹² and lower than that of China¹¹ and western countries like USA⁶, Belgium²⁷ and Sweden²⁸. Differences in GERD prevalence estimates may be due to differences in dietary habit, environmental and socio-cultural factors and work pattern. GERD prevalence was equal in both men and women in USA⁶ but in Belgium prevalence was more in women (31.1% and 25.6% respectively)²⁷. High prevalence of GERD in housewives in the present study may be related to their sedentary life style.

GERD is variably associated with age. On multiple logistic regression analysis an increasing prevalence of GERD was found with increasing age in our study. The finding conforms to the finding of Masud et al¹⁵ but Shahed found higher prevalence of GERD among younger age group (25- 34years, OR 1.71)¹⁴. In our survey highest prevalence was found in the 55-65 years group, but in China³⁰ highest prevalence was found in 30-39 years age group and in Japan in 40-49 years age group was more vulnerable. On the other hand studies from USA⁶, Korea¹² Singapore²⁰, Belgium²⁷ and Spain²⁹ failed to show any association of GERD with age.

GERD symptoms were found more prevalent among urban people in our study. Higher socio-economic status with excess intake of fat, chocolate, coffee, citrus foods and alcohol consumption, other environmental and psychosomatic factors might contribute.

BMI was found as a risk factor for GERD in the studies from China³⁰, Spain²⁹ and Dhaka¹⁴. But

studies from Korea¹² and Iran²⁴ found no association between GERD and BMI. In this series, no significant difference in prevalence of GERD was found with increase in BMI which is consistent with Masud¹⁵. This may be due to relatively small number of over-weight and obese persons (only 12.5%) in our study population.

Association between smoking and GERD is controversial. Several reports showed direct relationship of GERD with smoking^{32,33}. However, studies from Spain²⁹ and India²⁶ did not find any relation between smoking and GERD. In our study association of GERD with smoking was unclear (5.95% VS 5.32%) which is consistent with the finding of Masud¹⁵.

By multiple logistic analyses GERD was inversely related to level of education. This increased prevalence of GERD among persons with low level of education in our study is consistent with the report from Spain²⁹ and Masud¹⁵. Lack of knowledge regarding healthy life style and less ability to modify life style factors precipitating GERD symptoms might play a role²⁹. Present study showed that GERD was more prevalent among day labourer (8.78%), farmer (8.42%) and house wives (5.32%). These findings are not in agreement with the reports from Bangladesh^{14,15} and Korea¹². Level of education and health related awareness may play a role here. Higher prevalence of GERD among married, widows and widowers in our study differs from the finding of Masud et al¹⁵. Psycho-social factor might have an influence here.

Symptom analysis showed that the 5 most common GERD related symptoms were heart-burn (100%), regurgitation (90.9%), Chest pain, chronic cough, and globus (table-III). Wong et al¹¹ reported acid regurgitation as the most common symptom in a Chinese population, but heart-burn was the most common symptom in our study population and regurgitation occupied the 2nd position. Heart-burn and or acid regurgitation on daily and weekly basis was more prevalent in women (table-II). Among the other symptoms hoarseness of voice and chronic cough were more prevalent in men (table-III). Cigarette smoking may play a role. No significant variation was found in symptom pattern in different age group except heart-burn and or acid regurgitation. These two symptoms found to increase with increasing age.

In conclusion, this questionnaire based community survey showed that GERD is not an uncommon condition in our community though the disease burden is less than that of western world. GERD is more common in women, older age group (>45 years), urban population, and in lower socioeconomic groups with lower level of

education. BMI and smoking were not found to be significantly associated with GERD. More research are required involving different population in different parts of country and preferably with some investigations for exact estimation of the disease burden and planning appropriate health care.

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