

An analytical study on Gastro-esophageal Reflux Disease among Postgraduate Medical Students in India

Bandodkar Keyur D.¹, Vernekar Preksha P.², Ferreira Agnelo M.³

^{1,2}Junior resident, Department of Community Medicine, Goa Medical College. ³Associate Professor (Retd.), Department of Community Medicine, Goa Medical College.

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Abstract

Context: The challenging junior residency program can have adverse effects on general health and wellbeing along with changes in lifestyle and psychological stress which affect food habits and sleep patterns and can predispose to Gastro-esophageal reflux disease (GERD) which negatively impacts their health and quality of life.

Aims: (1) To estimate the prevalence of GERD among postgraduate medical students of Goa. (2) To study the risk factors associated with GERD among these students.

Methodology: This cross-sectional study was conducted at a medical college over a period of 2 months among 186 postgraduate students. Data was collected using a pre-designed, pre-tested, semi-structured questionnaire after obtaining informed consent and analysed using STATA software version 14.

Results: The prevalence of GERD among the study participants was 51% in the last 4 weeks. The most commonly reported symptoms were heartburn and regurgitation. Only family history of GERD, less time for meals while on duty and often times perceived stress were found to be positively predict the presence of GERD symptoms

Conclusion: The present study revealed a high prevalence of GERD amongst postgraduate medical students of Goa which highlights the need for implementation of competent educational strategies to manage academic and clinical responsibilities to curb stress and promote healthy lifestyle.

Key-words: Gastro-esophageal reflux disease, prevalence, postgraduate, medical

Introduction

Gastroesophageal reflux disease (GERD) is a syndromic complex in which the patient presents with symptoms suggesting typical reflux such as heart burn, regurgitation, or both and sometimes accompanied

by nausea, belching or atypical chest pain. According to population-based studies conducted from 1996 to 2004, the worldwide prevalence rates of GERD vary widely from 10 to 30% in Europe, America and Middle East populations to East Asia where it is lower than 10%.¹ relationship with *Helicobacter pylori* (*H. pylori*)

Corresponding Author: Keyur D. Bandodkar, Junior resident, Department of Community Medicine, Goa Medical College

E-mail: raykey23@gmail.com

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Most population-based studies conducted in India have reported prevalence of GERD less than 10% in adults but generally ranges between 7.6% and 30% in other studies.² which were generated by electronic voting iteration as well as face-to-face meeting and review of the supporting literature primarily from India. These statements include 10 on epidemiology, 8 on clinical presentation, 10 on investigations, 23 on treatment (including medical, endoscopic, and surgical modalities

The risk factors reported to have been associated with GERD are unhealthy lifestyle, obesity, alcohol, smoking and increased consumption of "fast-foods" although the cause of frequency and severity of these symptoms in certain individuals is unknown.^{3,4}

Resident doctors tend to have a robust academic program and busy duty schedules and are subject to living away from their hometown during junior residency which leads to changes in lifestyle and psychological stress during this period affect food habits and sleep patterns. Those with severe reflux may develop complications like esophagitis, esophageal strictures and Barrett's esophagus.⁵ "container-title": "John Hopkins Medicine", "language": "en", "title": "Gastroesophageal Reflux Disease (GERD

Previously published literature reveals that medical students have a higher risk for developing GERD owing to the above-mentioned factors. There is limited data available on potential of these factors in predisposing resident doctors to GERD.

Considering the fact that no study of this nature has been conducted in Goa, our present study was undertaken to estimate the prevalence of GERD among postgraduate medical students of Goa and study the various factors associated with GERD among the study participants.

Methodology

Study design and setting

The present study was an observational, cross-sectional study conducted at Goa Medical College and Hospital, Bambolim for a period of 2 months between September and November 2021.

Target population and sampling method

The participants chosen for this study were postgraduate MD/MS students studying in various pre-clinical and clinical disciplines of a medical college in Goa. A list of all the postgraduate medical students was collected from the academic section of the college. All the PGs who had completed one year of residency were included and there was no exclusion criterion. Universal sampling method was used for this study.

Since the duty hours for both male and female residents were similar in the respective departments, sex was not considered as a confounding factor. A suitable time was requested from the PGs for conducting the interview wherein the purpose of the study was explained and informed consent was taken. 186 PGs out of the total 210 at the time of the study consented for participation.

Using 10% as prevalence of GERD in the Asian region ($p=0.1$)⁶, the minimum sample size for the study was estimated to be 138 with ^{9,7-10} particularly obesity and tobacco smoking, which also threatens the patient's general health. GERD carries the risk of several adverse outcomes and there is widespread use of potent acid-inhibitors, which are associated with long-term adverse effects. The aim of this systematic review was to assess the role of lifestyle intervention in the treatment of GERD. \nMETHODS: Literature searches were performed in PubMed (from 1946 5% confidence interval and 5% margin of error ($d=0.05$).

Tools of study

A pre-designed semi-structured questionnaire in the English language which was prepared with assistance from previously published literature was provided to the study participants^{7,8,11-14} and various lifestyle as well as psychological factors are recognized as risk factors for GERD. Undergraduate medical students are exposed to lifestyle changes and psychological stressors. We aimed to study the prevalence of GERD among undergraduate students of a medical school in southern India in a cross-sectional survey using a validated symptom score. Results: A total of 358 undergraduate medical students participated in the study. There were 188 (52.5%). Data was collected using Google forms after taking written informed consent owing to the hectic duty schedules of resident doctors.

The research questionnaire consisted of sociodemographic data, frequency and symptoms of GERD and possible risk factors associated with GERD.

The operational definitions ⁵“container-title”:“John Hopkins Medicine”,“language”:“en”,“title”:“Gastroesophageal Reflux Disease (GERD) used were as follows:

Heartburn –A fiery or burning sensation felt in one’s chest, and

Regurgitation –Spewing out of sour or bitter liquids or solids to the throat or mouth.

The study participant was diagnosed of having GERD if he/she complained of either of the above two symptoms.

A Likert scale was included and validated using the Cronbach alpha coefficient to study stress underwent by study participants.

Statistical analysis

The procured data was entered in Google sheets and analysed using STATA software version 14 (StataCorp. 2015. Stata Statistical Software: Release 14. College Station, TX: StataCorp LP).

Categorical variables were expressed as frequencies and percentages. Bivariate analysis was done using log binomial regression analysis to discover any association between GERD and other

selected categorical variables. Multivariate analysis was done for significantly associated variables with GERD using modified Poisson regression analysis with robust variance estimation after adjusting for all variables to predict the probability of risk of developing GERD. Crude and adjusted prevalence ratios with 95% confidence intervals were calculated respectively and a p-value of <0.05 was taken as level of significance.

Ethical approval was obtained from Institutional Ethics Committee of the concerned medical college on 15/09/2021 with reference no. GMCIEC/2021/09.

Results

A total of 186 postgraduate medical students participated in this study, 68 (36.4%) were males and 118 (63.6%) were females. Age of the study participants ranged between 24 - 33 years with mean age being 27.25 ± 1.803 years. The students belonged to various disciplines such as Medicine & Allied (42%), Surgery & Allied (60, 32.2%) and pre-clinical branches (25.8%). Majority of the students had “O positive” blood group (33.8%). More than two-thirds of the students (87.1%) had mixed diet.

Nearly half of the study participants reported symptoms of GERD (51.6%). The most characteristic symptoms of GERD i.e., heartburn and reflux of gastric contents were reported by 75 (40.32%) and 64 (34.40%) of the participants respectively as shown in Figure 1.

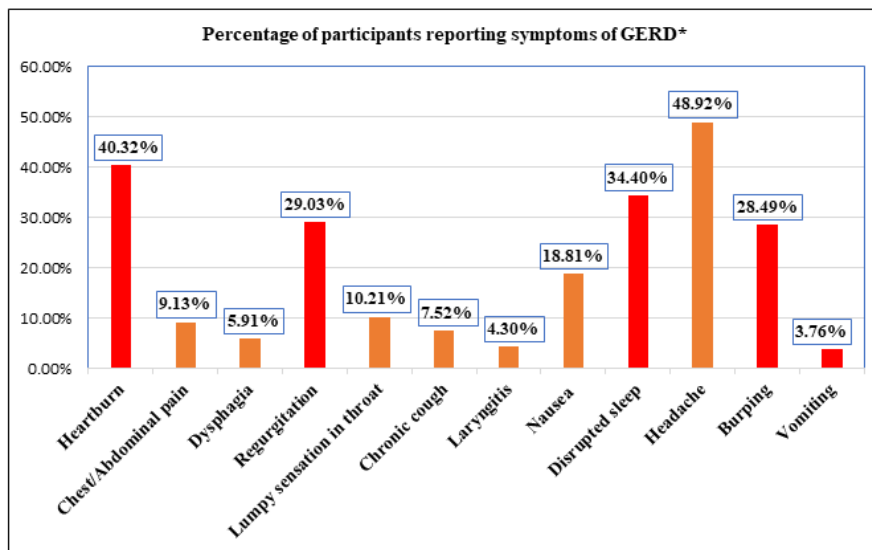


Figure 1: Symptoms of GERD experienced by the study participants

*Multiple responses noted

Table 1: Association of lifestyle factors with symptoms of GERD among the study participants

Study variable	Symptoms of GERD*		cPR (95% CI)†	P value‡
	Present	Absent		
<i>Average hours of work in a day</i>				
Less than 8 hours	6 (33.3)	12 (66.7)	1.00 (ref)	--
8 – 14 hours	70 (53)	62 (47)	1.59 (0.81-3.11)	0.176
More than 14 hours	20 (55.6)	60 (44.4)	1.66 (0.81-3.40)	0.162
<i>Average hours of sleep on duty</i>				
Less than 6 hours	54 (59.3)	37 (40.7)	1.34 (1.01-1.78)	0.041
6 hours or more	42 (44.2)	53 (55.8)	1.00 (ref)	--
<i>Average time for a meal on duty</i>				
Less than 30 minutes	52 (40.6)	76 (59.4)	1.72 (1.17-2.52)	0.005
30 minutes or more	38 (65.5)	20 (34.5)	1.00 (ref)	--
<i>History of smoking in the past 1 year</i>				
Yes	9 (45)	11 (55)	0.85 (0.51-1.42)	0.555
No	87 (52.4)	79 (47.6)	1.00 (ref)	--
<i>History of alcohol intake in the past 1 year</i>				
Yes	32 (47)	36 (53)	0.87 (0.64-1.18)	0.383
No	64 (54.2)	54 (45.8)	1.00 (ref)	--
<i>Family history of GERD</i>				
Yes	43 (65.2)	23 (34.8)	1.51 (1.13-2.01)	0.004
No	43 (43)	57 (57)	1.00 (ref)	--
Don't know	10 (50)	10 (50)	1.16 (0.71-1.90)	0.549
<i>Perceived stress underwent by study participants§</i>				
No stress	18 (37.5)	30 (67.5)	1.00 (ref)	--
Rarely stressed	32 (47.7)	35 (52.3)	1.27 (0.81-1.98)	0.284
Sometimes stressed	24 (60)	16 (40)	1.6 (1.02-2.49)	0.038
Often stressed	17 (70.8)	7 (29.2)	1.88 (1.20-2.95)	0.005
Always stressed	5 (71.4)	2 (28.6)	1.90 (1.05-3.45)	0.034

§Perceived stress tested using Likert scale (Cronbach's alpha = 0.861)

Table 2: Association of dietary factors with symptoms of GERD among the study participants

Study variable	Symptoms of GERD*		cPR (95% CI)†	P value‡
	Present	Absent		
<i>Average number of meals skipped last week</i>				
3 times or less	72 (54.2)	61 (45.8)	1.00 (ref)	--
4 times to everyday	24 (45.3)	29 (54.7)	0.83 (0.59-1.16)	0.296
<i>Average number of cups of tea/coffee in a day</i>				
Less than 2 cups	78 (49.7)	79 (50.3)	1.00 (ref)	--
2 cups or more	18 (62.1)	11 (37.9)	1.24 (0.90-1.72)	0.180
<i>Average number of orders from a restaurant/fast food centre per week</i>				
Less than 5 times per week	47 (44.8)	58 (55.2)	1.00 (ref)	--
5 times per week or more	49 (60.5)	32 (39.5)	1.35 (1.02-1.78)	0.032

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<i>Average frequency of consumption of deep-fried items per week</i>				
3 times or less	56 (46.3)	65 (53.7)	1.00 (ref)	--
4 times to everyday	40 (61.5)	25 (38.5)	1.32 (1.01-1.74)	0.04
<i>Average frequency of consumption of salads per week</i>				
3 times or less	59 (56.2)	46 (43.8)	1.23 (0.91-1.64)	0.164
4 times to everyday	37 (45.6)	44 (54.4)	1.00 (ref)	--
<i>Average frequency of consumption of aerated drinks per week</i>				
3 times or less	65 (48.5)	69 (61.5)	1.00 (ref)	--
4 times to everyday	31 (59.6)	21 (40.4)	1.22 (0.92-1.63)	0.154

*Frequencies and row percentages (in parentheses)

†Crude (unadjusted) prevalence ratios with 95% confidence intervals from log binomial regression analysis

‡p values from log binomial regression analysis; p value < 0.05 (in bold) considered significant

Table 3: Generalized linear model to estimate predictors of GERD among the study participants

Study variable	aPR (95% CI)*	P value†
Family history of GERD	1.40 (1.06-1.84)	0.017
Time < 30 minutes to have a meal on duty	1.51 (1.02-2.23)	0.038
Often stressed	1.80 (1.17-2.25)	0.007

*Adjusted prevalence ratios with 95% confidence intervals from Modified Poisson regression analysis

†p values from Modified Poisson regression analysis; p value < 0.05 (in bold) considered significant

Table 1 shows the bivariate regression analysis of selected personal and lifestyle factors associated with GERD symptoms. Students with family history of GERD were at a significantly greater risk to develop GERD compared to those who didn't (cPR = 2.06, 95% CI: 1.24-3.46). Similarly, the risk was greater among those with less sleep hours on duty (PR = 1.34, 95% CI:1.01-1.78) and those with less time for meals on duty (cPR = 1.72, 95% CI:1.17-2.52). Stress underwent by study participants was tested and validated using a Likert scale with Cronbach's alpha = 0.861 and was found to be statistically significant, notably often times perceived stress (cPR = 1.88, 95% CI:1.20-2.95).

Table 2 shows the bivariate regression analysis of certain dietary habits associated with GERD symptoms. Study participants who frequently consumed food from restaurants/fast food centres per week had significantly higher risk of developing GERD (cPR = 1.35, 95% CI:1.02-1.78). Similarly, those who ingested deep-fried food items more than 4 times per week were significantly associated with GERD (cPR = 1.32, 95% CI:1.01-1.74).

Table 3 shows multivariate regression analysis using generalized linear model for predictors of GERD symptoms among the study participants. Using modified Poisson regression with robust variance estimation, it was revealed that study participants had significantly higher risk of developing GERD symptoms when associated with the following three independent risk factors; family history of GERD (aPR = 1.40, 95% CI: 1.06-1.84), less time to have meals while on duty (aPR = 1.51, 95% CI: 1.02-2.23) and often times perceived stress (aPR = 1.80, 95% CI: 1.17-2.25).

Discussion

Gastroesophageal reflux disease (GERD) is the most common gastrointestinal disease diagnosed during patient visits to non-emergency clinics. The present study aimed at evaluating the prevalence of GERD symptoms and associated factors among postgraduate medical students.

As per a systematic review conducted in 2020, the global pooled prevalence of GERD was 13.98% with variations owing to distinct criteria used to define GERD symptomatology in the respective studies.⁶

As per a meta-analysis conducted in 2017, the pooled prevalence of GERD was 13.3% (95% CI 12.0%-14.6%) upon consideration of studies using an operational definition of weekly frequency of heart burn or regurgitation.¹⁵ but there has been no definitive systematic review and meta-analysis of data from all studies to estimate their global prevalence, or potential risk factors for them. Design Medline, Embase and Embase Classic were searched (until September 2016) The pooled prevalence of GERD in the Indian population is 15.6 (95% CI 11.04%-20.71%) as per a meta-regression study conducted in 2021.¹⁶ India shows a comparatively higher prevalence of GERD irrespective of geographical or rural/urban location than other Asian regions.

Previously published studies have suggested that medical students, higher prevalence of GERD as compared to the general population. In our study, we found a relatively high prevalence of GERD symptoms among postgraduate medical students i.e., 52% which is higher compared to studies done amongst undergraduate medical students by Arivan R et al (30%)⁷ and various lifestyle as well as psychological factors are recognized as risk factors for GERD. Undergraduate medical students are exposed to lifestyle changes and psychological stressors. We aimed to study the prevalence of GERD among undergraduate students of a medical school in southern India in a cross-sectional survey using a validated symptom score. Results: A total of 358 undergraduate medical students participated in the study. There were 188 (52.5% and Karthik RC et al (16.1%)⁸. This finding in our study could be attributed to changes in lifestyle such as hectic work schedule in addition to erroneous food habits and abrupt sleep patterns.

As per multivariate modified Poisson regression analysis with robust variance estimation, only three associated risk factors with presence of GERD symptoms were found i.e., family history of GERD, less time for meals while on duty and oftentimes perceived stress.

As far as dietary habits are concerned, study participants with less time for meals on duty are at 1.51 (95% CI: 1.02-2.23) times more risk of developing reflux symptoms and resort to fast eating as observed in other studies conducted among

students by Abhilasha S et al⁹ Alrashed AA et al¹⁰. Consumption of large food volumes in short span of time due to fast eating, increases gastric pressure while irritating gastric mucosa leading to excess secretion of hydrochloric acid while lessening LES rigidity and gastrointestinal motility causing reflux.¹⁷ A significant association of reflux symptoms was found with frequent consumption of fast foods in the present study as observed by studies done by Majeed HK et al¹¹ among female medical students in Lahore. Arivan R et al⁷ also noted that frequent consumption of carbonated drinks and beverages such as tea or coffee were significantly associated with a diagnosis of GERD.

As per our study findings, a significant proportion of study participants complained of disrupted sleep pattern (34.40%) and those with less than 6 hours of sleep on duty were significantly more prone to develop GERD symptoms. This finding was similar to a study conducted among medical students in Iran by Teimouri A et al¹² irregular dietary and sleep schedules, medical students are at increased risk of developing gastrointestinal disorders, gastroesophageal reflux (GERD) wherein impaired sleep quality and prevalence of GERD showed a mutually significant association towards each other.

Our study has revealed no significant association of smoking and alcohol intake with the occurrence of GERD symptoms. This finding could be due to a meagre number of smokers and alcohol consumers in this study. However, a strongly positive association has been noted by Karthik RC et al⁸ among medical students in Chennai.

In our study, reporting history of symptoms of reflux experienced by a close family member or near relative significantly exposed study participants to 1.40 (95% CI: 1.06-1.84) times more at risk of developing symptoms of GERD. Studies done by Atta MM et al¹⁴ King Abdul-Aziz University, Saudi Arabia. Subjects and methods: A cross-sectional study was conducted at the Faculty of Medicine in Rabigh, King Abdul-Aziz University, Saudi Arabia. The study included 197 medical students from Rabigh and Jeddah branches of the university. The study employed a Gastroesophageal Reflux Disease Questionnaire which is derived from a self-administered validated GERD questionnaire (GerdQ

in Saudi Arabia also concluded that a positive family history was significantly associated with increased symptoms of GERD. Twin and family studies suggest that 31% of those having relatives with positive family history show genetic predisposition to GERD with risk strongly associated with numerous single-nucleotide polymorphisms in various genes like FOXF1, CCND1, MHC, anti-inflammatory cytokine and DNA repair genes.¹⁸

In the present study, perceived stress was a significant factor associated with the prevalence of GERD symptoms, where the participants often times stressed had 1.88 (95% CI: 1.20-2.95) times more risk of developing GERD symptoms as compared to those without any stress. Similar findings were noted in a study done among college students by Awadalla NJ¹⁹ and among primary health care attendants by Alsaleem MA et al²⁰ Saudi Arabia. \nMethod: A descriptive cross-sectional study was performed using GerdQ as diagnostic tool for the GERD. The GerdQ consisted of six questions. Four questions were about the positive GERD predictors. The other two questions were about the negative GERD predictors. The scoring of GerdQ relies on the frequency of GERD symptoms during the last seven days. Using stratified random sample technique a representative sample was selected from the study PHCCs taking into consideration the relative catchment population in each center among adult males and females attending the selected PHCCs for any reason. \nResults: The present study included 320 persons. The study showed a prevalence of GERD of 67.8%. The prevalence of GERD with high impact on daily life (HIDL) in south western Saudi Arabia. Current research reveals that acute stress induced esophageal hypersensitivity enhances the perceptual responses to intra-esophageal acid stimulation central mechanisms without increasing the amount of acid reflux resulting in exacerbation of GERD symptoms.²¹

Our study has certain limitations as these results cannot be applied to the entire population of Goa due to the nature of study design. Moreover, the severity of GERD symptoms was not confirmed using invasive procedures as upper GI endoscopy in our study. The symptoms were self-reported by study participants and could be subjected to recall bias.

Conclusion

The current study showed a high prevalence of GERD symptoms among postgraduate medical students of Goa. The most common symptoms reported were heart burn and regurgitation. Family history of GERD, less time for meals on duty and stress were found to be strong positive predictors of GERD symptoms among these students. Hence, effective educational strategies and stress management programs should be implemented to minimize the burden of GERD. Further research is also deemed necessary to explore the role of related risk factors in the causation of GERD among the general population.

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Conflict of interest: None

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