

## Prevalence of gastro esophageal reflux disease among medical students in Chennai, South India

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### Abstract

**Introduction:** The prevalence of gastro esophageal reflux disease (GERD) has been increasing worldwide. Earlier it was thought that GERD prevalence in Asian countries is lower compared to western countries. But recent studies have shown that it's on par with the west. The purpose of this study was to determine the prevalence of gastro esophageal reflux disease among medical students and the risk factors associated with it.

**Materials and Method:** The study was done as a cross sectional study using the Gastro esophageal Reflux Disease – Health Related Quality of Life (GERD-HRQL) questionnaire developed by Velanovich et al among Medical College students in Chennai during February to March 2017.

**Results:** Out of the 263 medical students who participated in this study, 92 (35%) were male and 171 (65%) were female. 25 % of study population had a positive family history of GERD, while majority (63.9%) of study participant's skipped meals. A large majority of them preferred eating outside (82.9%) and liked eating spicy foods (81.4%). The prevalence of GERD in the study population was 14.4%. The association between GERD and family history, history of drug intake, skipping meals, alcohol consumption, and smoking was found to be statistically significant. (p<0.05)

**Conclusion:** There is high prevalence of GERD in this population. There is a need for more population-based studies on GERD in India to provide insight into the various risk factors which increase the chance of developing gastro esophageal reflux disease.

**Keywords:** Gastroesophageal Reflux Disease, Health-related quality of life, Medical students

### Introduction

The prevalence of gastro esophageal reflux disease (GERD) has been increasing worldwide.<sup>(1)</sup> GERD has traditionally been considered less common in Asian countries in comparison to western world.<sup>(2,3)</sup> Recent studies indicate that its prevalence in India ranges between 8-20% which is comparable to that in the west.<sup>(4,5)</sup>

The disease affects the patients' quality of life,<sup>(6)</sup> reduces their functional activity,<sup>(7)</sup> increases the economic burden<sup>(8)</sup> and predisposes them to more serious conditions as in Barrett esophagus and esophageal adenocarcinoma.<sup>(2)</sup>

GERD is a multi-factorial disease with both environmental and genetic risk factors, and several epidemiological studies lend support to this concept.<sup>(9)</sup> Various lifestyle factors are thought to be associated with GERD symptoms, including dietary factors, alcohol consumption, smoking, the intake of NSAIDs and sleeping position.<sup>(10)</sup> Dietary factors predisposing to the condition include coffee, vitamin C supplements, cruciferous vegetables, alcohol, carbonated soft drinks, while drugs aggravating the symptoms are beta 2 agonists, aminophyllines, nitrates and calcium channel blockers. Numerous studies indicate that increased body mass index (BMI) is also a risk factor for GERD.<sup>(11)</sup>

Symptom analysis is a practical and inexpensive approach to the diagnosis of GERD. It enables identification of most patients with GERD who present

with typical symptoms.<sup>(6)</sup> This is the rationale for the increasing use of structured questionnaires in the diagnosis of GERD.

The 2006, Montreal consensus meeting defined GERD as "a condition that develops when the reflux of stomach contents causes troublesome symptoms and/or complications".<sup>(12)</sup> As GERD is a chronic disease, assessment of quality of life is another important aspect of the disease evaluation. Questionnaire based evaluation for GERD have been utilized for assessment of the patient's symptomatology, assessment of symptom severity and frequency and assessment of health-related quality of life. This has been so because symptom improvement and improvement of health-related quality of life (HRQOL) are the main goals of treatment of GERD.

### Aim

To determine the prevalence of gastro esophageal reflux disease among medical students and the risk factors associated with it.

### Objectives

1. To study the prevalence of Gastro Esophageal Reflux Disease among medical students.
2. To find out the socio-demographic & lifestyle determinants of Gastro Esophageal Reflux Disease.

## Materials and Method

This was a cross-sectional questionnaire-based study done among medical college students in Chennai. The study was conducted over a period of two months from February 1, 2017 to March 31, 2017. Informed consent was obtained from all the participants who were included.

We used the Gastro esophageal Reflux Disease – Health Related Quality of Life (GERD-HRQL) questionnaire developed by Velanovich et al.<sup>(13,14,15)</sup> The GERD-HRQL questionnaire was actually developed and validated to measure changes of typical GERD symptoms such as heartburn and regurgitation in response to surgical or medical treatment.

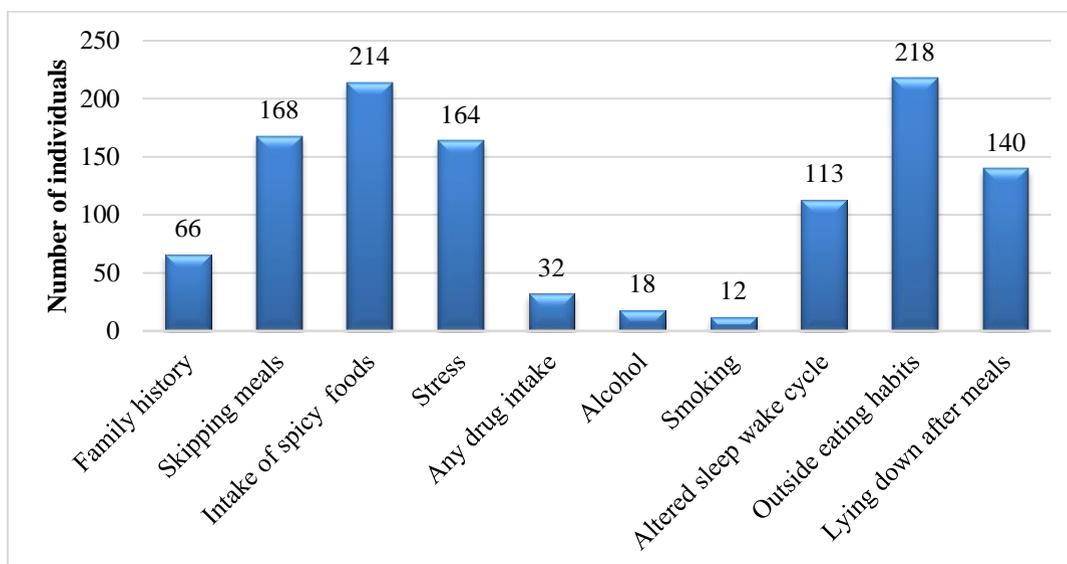
The GERD-HRQL consists of 15 questions that specifically address GERD symptoms – each scored on a 0 to 5 scale – and an additional question which evaluates the patient's satisfaction with his or her current condition. The best possible aggregate score is 0 (absence of symptoms), and the worst is 75 (very severe symptoms). Total score of  $\leq 30$ , with each individual question not exceeding 2 indicate GERD elimination.<sup>(13)</sup>

Sample size was calculated using the formula  $N = Z_{\alpha}^2 * p * (1-p) / d^2$ . The prevalence of GERD in India varies from 15% to 25%.<sup>(17,18,19)</sup> Considering an average prevalence,  $p = 20\%$ , absolute precision,  $d = 5\%$ , at 95% confidence limits ( $Z_{\alpha} = 1.96$ ), the sample size is estimated to be 245. Assuming 5% of the population maybe non responsive which equals 12. Hence  $SS = 245 + 12 = 257$ .

**Statistical analyses:** The data collected was entered in Microsoft Excel and analyzed using SPSS v21. The univariate analysis were done by Chi-square test. Probability levels of less than 0.05 were considered significant. Multivariate analysis after adjusting for all variables was using binomial logistic regression.

## Results

**Socio-Demographic variables:** Total students who participated in this study was 263 of whom, 92 (35%) were male and 171 (65%) were female. The study participants were of 18-25 age groups. (Table 1) Mean age of students was  $20.6 \pm 1.8$  years.



**Fig. 1: Frequency distribution of demographic variants**

Fig. 1 shows that 25% of study population had a positive family history of GERD. Almost 62.4% of students in our study population were suffering from some form of stress.

About 63.9% of study participants reported they skipped meals due to lot of varied reasons like late for class, dieting etc. Majority of the study participants (81.4%) preferred spicy food and frequently ate outside food (82.9%) rather than their home food. Almost half of the study population had a habit of lying down after having meals.

12% of the subjects had history of some drug intake and less than 10% of the participants were indulged in smoking and alcohol consumption.

**Table 1: GERD & Associated factors**

Characteristic	GERD		Chi sq	p value	
	Frequency	%			
Age	<=20	23	16.8%	1.27	0.26
	>20	15	11.9%		
Gender	Male	13	34.2%	0.01	0.914
	Female	25	65.8%		
Family history	Yes	21	55.3%	21.51	0.001
	No	17	44.7%		
Skipping meals	Yes	30	78.9%	4.37	0.037
	No	8	21.1%		
Any drug intake	Yes	10	26.3%	8.32	0.004
	No	28	73.7%		
Stress	Yes	26	68.4%	0.70	0.404
	No	12	31.6%		
Smoking	Yes	5	13.2%	7.54	0.006
	No	33	86.8%		
Alcohol	Yes	9	50%	19.75	0.001
	No	29	11.8%		
Altered sleep wake cycle	Yes	20	52.6%	1.69	0.193
	No	18	47.4%		
Outside eating habits	Yes	33	86.8%	0.49	0.484
	No	5	13.2%		
Lying down after meals	Yes	24	63.2%	1.76	0.185
	No	14	36.8%		

Table 1 shows the association between gastro esophageal reflux disease and family history, skipping meals, any drug intake, smoking, alcohol was found to be statistically significant. ( $p < 0.05$ ).

Stress, altered sleep wake cycle, outside eating habits and lying down after meals have been considerably associated with GERD but in our study the association is not statistically significant.

**Table 2: Binary Logistic Regression for prediction of GERD among medical students**

GERD Predictors	B	p value	Odds ratio	95% CI Lower	95% CI Upper
Family History	1.395	<0.001	4.034	1.91	8.519
Alcohol	1.598	0.003	4.942	1.702	14.349
Constant	-3.523	0.001	0.030		

Table 2 shows the logistic regression for the prediction of GERD among medical students shows that alcohol consumption has higher odds (4.94) followed by family history with 4.03 odds for getting GERD.

### Discussion

In our study the prevalence of GERD was 14.4%. The prevalence of GERD in southern India is comparable with the range found in Western countries (8.8–27.8 %).<sup>(16)</sup> In another study done among hospital employees in North India the prevalence of GERD was found to be 16.2%.<sup>(17)</sup> Similar studies done in Chennai and Jaipur have reported prevalence rates of 24% and 22% respectively.<sup>(18,19)</sup> In another study done in Nigeria the prevalence of GERD was found to be 26.34%.<sup>(20)</sup>

In Asia the prevalence of GERD has been increasing gradually,<sup>(21)</sup> which may be attributed to the rapidly developing economy and consequent change in diet and lifestyle taking place in many Asian countries.

In our study majority of the study participants who had GERD symptoms were female (65%). But the association between gender and GERD symptoms was found to be statistically not significant ( $p$ -value = 0.914) which is similar to other studies.<sup>(22,23,24)</sup>

In our study the association between family history of gastrointestinal disease and GERD symptoms was statistically significant ( $p = 0.001$ ). The findings of this study are similar to a study done in Western population.<sup>(25)</sup>

In our study the association between gastro esophageal reflux disease and skipping meals was

found to be statistically significant. ( $p = 0.0037$ ) which is similar to a study done in Korea.<sup>(26)</sup>

Medical students are prone for higher stress levels due to their study curriculum. In a study done by Baker *et al.*, a positive relationship was found between psychological stress and a subgroup of patients with gastroesophageal reflux disease in the general population.<sup>(27)</sup> Similar positive association was found in two more studies done in China.<sup>(28,29)</sup> But in our study no association was found between stress and GERD. ( $p = 0.404$ )

In our study the association between intake of drugs like NSAIDs and GERD symptoms was statistically significant ( $p = 0.004$ ). The findings of this study are similar to a study done in France.<sup>(30)</sup>

In our study, the association between cigarette smoking and GERD was found to be statistically significant ( $p$ -value = 0.006), our results were similar to a study done in North India, Japan and Indonesia.<sup>(17,31,32)</sup> In another study done among general population in Wellington, New Zealand, Current and ex-smokers had a higher prevalence of GERD symptoms.<sup>(33)</sup>

In this study, the association between consumption of alcohol and GERD was found to be statistically significant. ( $p = 0.001$ ). Another population based study done in New Zealand showed positive association between alcohol consumption and GERD symptoms.<sup>(33)</sup> A study done in Korea also showed similar results.<sup>(26)</sup>

### Limitations of the study

This study did not take into account the atypical symptoms, any prior medical treatment taken for GERD, any lifestyle or dietary modification made if the subject had earlier been experiencing GERD.

### Conclusions

In conclusion, GERD may not be rare in Asians as previously thought. There is a high prevalence of GERD in South Indian medical students. Awareness program on GERD should be encouraged to reduce the burden of disease. There is a need for more population-based studies on GERD in India to provide insight into the various risk factors which increase the chance of developing gastro esophageal reflux disease.

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The authors declare no conflicts of interest related to this article.

### References

1. Kennedy T, Jones R. The prevalence of gastro-oesophageal reflux symptoms in a UK population and the consultation behaviour of patients with these symptoms. *Aliment Pharmacol Ther.* 2000; 14(12):1589–94. doi: 10.1046/j.1365-2036.2000.00884.x.
2. Gaddam S, Sharma P: Shedding light on the epidemiology of gastroesophageal reflux disease in India-

- a big step forward. *Indian J Gastroenterology.* 2011; 30(3):105-7.
3. Shaw MJ, Talley NJ, Beebe TJ, Rockwood T, Carlsson R, Adlis S et al. Initial validation of a diagnostic questionnaire for gastroesophageal reflux disease. *Am J Gastroenterol.* 2001; 96(1):52–7. doi: 10.1111/j.1572-0241.2001.03451.x.
4. Chen M, Xiong L, Chen H, Xu A, He L, Hu P. Prevalence, risk factors and impact of gastroesophageal reflux disease symptoms: a population-based study in South China. *Scand J Gastroenterol.* 2005; 40(7):759–67. doi: 10.1080/00365520510015610.
5. Wahlqvist P. Symptoms of gastroesophageal reflux disease, perceived productivity, and health-related quality of life. *Am J Gastroenterol.* 2001; 96(8Suppl): S57–61. doi: 10.1016/S0002-9270(01)02590-4.
6. Sandler RS, Everhart JE, Donowitz M, Adams E, Cronin K, Goodman C. et al. The burden of selected digestive diseases in the United States. *Gastroenterology.* 2002; 122(5):1500–11. doi: 10.1053/gast.2002.32978.
7. Lagergren J, Bergstrom R, Lindgren A, Nyren O. Symptomatic gastroesophageal reflux as a risk factor for esophageal adenocarcinoma. *N Engl J Med.* 1999; 340(11):825–31. doi: 10.1056/NEJM199903183401101.
8. Stein HJ, DeMeester TR, Hinder RA. Outpatient physiologic testing and surgical management of foregut motility disorders. *Curr Probl Surg.* 1992; 29:415-555.
9. Belhocine K, Galmiche JP. Epidemiology of the complications of gastroesophageal reflux disease. *Dig Dis* 2009; 27:7-13.
10. Nocon M, Labenz J, Willich SN. Lifestyle factors and symptoms of gastro-oesophageal reflux - a population-based study. *Aliment Pharmacol Ther.* 2006; 23(1):169-174.
11. Sharma P, Wani S, Romero Y, Johnson D, Hamilton F. Racial and geographic issues in gastroesophageal reflux disease. *Am J Gastroenterol.* 2008; 103(11):2669–80.
12. Locke GR, Talley NJ, Fett SL, Zinmeister AR, Melton LJ. Prevalence and clinical spectrum of gastro esophageal reflux disease: A population based study in Olmsted County, Minnesota. *Gastroenterology.* 1997; 112(5): 1448-56.
13. Velanovich V. The development of the GERD-HRQL symptom severity instrument. *Dis Esophagus* 2007; 20(2):130-4.
14. Velanovich V, Vallance SR, Gusz JR, Tapia FV, Harkabus MA. Quality of life scale for gastroesophageal reflux disease. *J Am CollSurg* 1996; 183(3):217-224.
15. Velanovich V. Using quality-of-life measurements to predict patient satisfaction outcomes for antireflux surgery. *Arch Surg* 2004; 139(6):621-5.
16. 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): 871–80.
17. Sharma PK, Ahuja V, Madan K, Gupta S, Raizada A, Sharma MP. Prevalence, severity, and risk factors of symptomatic gastroesophageal reflux disease among employees of a large hospital in northern India. *Indian J Gastroenterol.* 2011; 30(3):128–34.
18. Suresh KP, Karthik SM, Jayanthi V. Prevalence of symptoms of gastro-esophageal reflux amongst medical students. *Indian J Gastroenterol.* 2006; 25:168-69.
19. Rai RR, Sharma M. Prevalence and clinical spectrum of GERD in a healthy population. *Indian J Gastroenterol.* 2004; 23Suppl 2:A12
20. Nwokediuko SC. "Gastroesophageal reflux disease, a population-based study," *Gastroenterology Research.* 2009; 2(3):152–6.

21. Ho KY. From GERD to Barrett's esophagus: is the pattern in Asia mirroring that in the West? *J Gastroenterol Hepatol.* 2011; 26(5):816–24.
22. Locke GR, Talley NJ, Fett SL, Zinmeister AR, Melton LJ. Prevalence and clinical spectrum of gastro esophageal reflux disease: A population based study in Olmsted county, Minnesota *Gastroenterology* 1997; 112(5): 1448-56.
23. Isolauri J, Laippala P. Prevalence of symptoms suggestive of Gastroesophageal Reflux Disease in an Adult Population. *Ann Med.* 1995; 27(1): 67-70.
24. Wang JH, Luo JY, Dong L, Gong J, Tong M. Epidemiology of gastroesophageal reflux disease: a general population-based study in Xi'an of Northwest China. *World J Gastroenterol.* 2004; 10 (11):1647–51.
25. Mohammed I, Nightingale P, Trudgill NJ. Risk factors for gastroesophageal reflux disease symptoms: a community study. *Aliment Pharmacol Ther.* 2005; 21(7): 821-7.
26. Song JH, Chung SJ, Lee JH, Kim YH, Chang DK, Son HJ, et al. Relationship between gastroesophageal reflux symptoms and dietary factors in Korea. *J Neurogastroenterol Motil.* 2011; 17(1): 54-60.
27. Baker LH, Lieberman D, Oehlke M. Psychological distress in patients with gastroesophageal reflux disease. *Am J Gastroenterol.* 1995; 90(10):1797-803.
28. Wong WM, Lai KC, Lam KF, Hui WM, Hu WHC, Lam CLK, et al. Prevalence, clinical spectrum and health care utilization of gastro-oesophageal reflux disease in a Chinese population: a population-based study. *Alimentary pharmacology & therapeutics.* 2003; 18(6):595-604.
29. Hu WH, Wong WM, Lam CL, Lam KF, Hui WM, Lai KC, et al. Anxiety but not depression determines healthcare-seeking behaviour in Chinese patients with dyspepsia and irritable bowel syndrome: a population-based study. *Aliment Pharmacol Ther.* 2002; 16(12):2081-8.
30. Ruzniewski P, Soufflet C, Barthelemy P. Nonsteroidal anti-inflammatory drug use as a risk factor for gastro-oesophageal reflux disease: an observational study. *Aliment Pharmacol Ther* 2008; 28(9): 1134–9.
31. Hansen JM, Wildner-Christensen M, Schaffalitzky de Muckadell OB. Gastroesophageal reflux symptoms in a Danish population: A prospective follow-up analysis of symptoms, quality of life, and health-care use. *Am J Gastroenterol.* 2009; 104(10):2394-403.
32. Syam AF, Hapsari FCP, Makmun D. The Prevalence and Risk Factors of GERD among Indonesian Medical Doctors. *Makara J. Health Res.* 2016; 20(2): 35-40
33. Haque M, Wyeth JW, Stace NH, Talley NJ, Green R. Prevalence, severity and associated features of gastro-oesophageal reflux and dyspepsia: a population based study. *N Z Med J.* 2000; 113(1110):178–81.