International Journal of Innovative Research and Advanced Studies (IJIRAS)
Volume 10 Issue 9, September 2023

ISSN: 2394-4404

Prevalence And Risk Factors Of Gerd In A Sample Population Of Kerala

Dr Anju Mullath

Junior Consultant, Department of Gastroenterology, Alchemist Hospital, Panchkula, Haryana

Abraham Koshy

MD, DM
Senior Consultant, Department of Gastroenterology, Lakeshore Hospital and Research Centre, Cochin

Roy J Mukkada

MD, DNB, MNAMS, FASGE, FRCP
Senior Consultant and Head of Department, Department of Gastroenterology, Lakeshore Hospital and Research Centre, Cochin

Antony Paul Chettupuzha

MD, DM, FRCP
Consultant, Department of Gastroenterology, Lakeshore Hospital and Research Centre, Cochin

Shelly C Paul

MD, DM, PhD
Consultant, Department of Gastroenterology, Lakeshore Hospital and Research Centre, Cochin

Pradeep G Mathew

MD (General Medicine)
Consultant, Department of Gastroenterology, Lakeshore Hospital and Research Centre, Cochin

Abstract:

Background: Gastro-oesophageal reflux disease has a very high prevalence in Western countries. Though there are several isolated studies regarding the incidence and prevalence of GERD in Indian subcontinent the exact data is not known. This study aims to estimate the prevalence and risk factors for GERD in a sample population in Kerala.

Methods: Interview-based prospective observational study carried out in Maradu grama panchayath between July 2017 and march 2019. Diagnosis of GERD was made using GerdQ questionnaire. Further details regarding various known risk factors was also collected.

Results: Total of 515 individuals were interviewed. Majority was from 30-60 years age group. 113 out of 515 had GerdQ score of more than 8. Smoking, increased age, higher educational status, increased BMI, increased consumption of tea were found to be significant.

Conclusion: The prevalence of GERD in the index population was 21.9% and several significant risk factors were noted.

Keywords: GERD, Epidemiological study, Kerala

I. INTRODUCTION

Gastro-oesophageal reflux disease (GERD) is a very common disease in Western countries. Common symptoms of the disease are heartburn and regurgitation. The estimated prevalence of the disease in Western countries vary with ethnicity and geography: 18.1–27.8 % in North America, 8.8–25.9 % in Europe, and 2.5–7.8 % in East Asia, as estimated from 28 studies(1).

Epidemiological studies regarding the prevalence of GERD in the Indian subcontinent have been less common. In a country with a wide variation in culture and food habits, the prevalence is bound to be variable. A study conducted in North Indian population showed a prevalence of 16.2% (2)

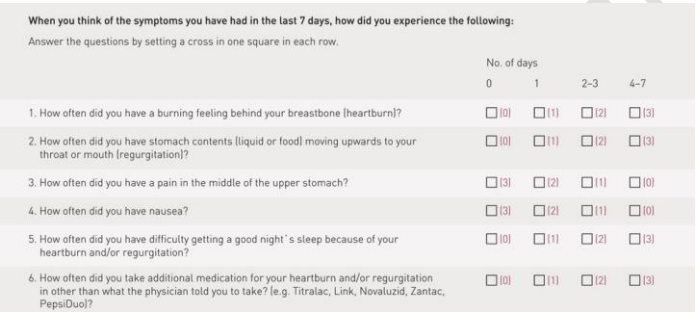
ISSN: 2394-4404

whereas a study in the south Indian population showed a prevalence of 22.2% (3). Though GERD is often considered a disease of Western countries the above studies show that the prevalence in the Indian subcontinent is also about the same. This study aims to assess the prevalence and associated risk factors of Gastroesophageal reflux disease in a sample population of Kerala.

II. MATERIALS AND METHODS

The study was an interview-based prospective observational study carried out in residents of Maradu grama panchayath block 10 and 11 between July 2017 and March 2019 with the help of community health workers. All individuals consenting for the study and above 18 years of age were included in the study. Individuals less than 18 years and those not giving consent were excluded. The diagnosis of GERD was made based on GerdQ score of more than or equal to 8. Patients with GerdQ score > 12 will be re-evaluated on OPD basis and if required will be subject to OGD scopy or 24 hr pH monitoring.

Risk factors taken into account were consumption of alcohol, history of cigarette smoking, history of chewing tobacco, history of taking painkillers, history of taking ayurvedic drugs, consumption of >4 cups of tea/coffee, consumption of carbonated drinks more than once a month, dietary preferences: Veg/Non-veg, Spicy/non-spicy, history of fewer than 6 hours of sleep, history of physical activity (30 minutes for thrice a week). The presence of comorbidities such as Diabetes mellitus, hypertension and allergy were also recorded.



When you think of the symptoms you have had in the last 7 days, how did you experience the following:

Answer the questions by setting a cross in one square in each row.

	No. of days			
	0	1	2-3	4-7
1. How often did you have a burning feeling behind your breastbone (heartburn)?	☐ [0]	☐ [1]	☐ [2]	☐ [3]
2. How often did you have stomach contents (liquid or food) moving upwards to your throat or mouth (regurgitation)?	☐ [0]	☐ [1]	☐ [2]	☐ [3]
3. How often did you have a pain in the middle of the upper stomach?	☐ [3]	☐ [2]	☐ [1]	☐ [0]
4. How often did you have nausea?	☐ [3]	☐ [2]	☐ [1]	☐ [0]
5. How often did you have difficulty getting a good night`s sleep because of your heartburn and/or regurgitation?	☐ [0]	☐ [1]	☐ [2]	☐ [3]
6. How often did you take additional medication for your heartburn and/or regurgitation in other than what the physician told you to take? (e.g. Titralac, Link, Novaluzid, Zantac, PepsiDuo)?	☐ [0]	☐ [1]	☐ [2]	☐ [3]

Figure 1: GerdQ questionnaire

STATISTICAL ANALYSIS

The sample size was calculated using Cochran formula. SPSS version 20 was used for the statistical analysis. Qualitative (categorical) variables were represented using frequency and percentage. Quantitative (continuous) variables were represented using mean and standard deviation. Binary logistic regression was performed to compare the study parameters between no GERD and GERD. A p-value of less than 0.05 was taken as statistically significant.

III. RESULTS

A total of 515 individuals were interviewed as part of the study. Demographic variables of the participants are given in Table 1. More than 50% of the study population belonged to the age group of 30-60 years. Male to female distribution was almost equal. Among the risk factors assessed, smoking, alcohol consumption, spicy food, non-vegetarian diet were the most common. Out of the 515 individuals, 113 had a GerdQ score of more than or equal to 8 and were diagnosed to have GERD. The distribution of symptoms of GERD is given in Table 2. Heartburn was the most frequent symptom of GERD with 13.6 % having symptoms almost daily. Regurgitation was the next common symptom.3.9% of cases took over the counter proton pump inhibitors at least once weekly. The association of variables with GERD is given in Table 3. Among the demographic variables, the age group of 31-40 years and above 70 years was found to have a significant association. Other significant factors included higher educational status, smoking, consumption of more than 4 cups of tea/coffee and intake of carbonated beverages.

Demographic variables		n (%)
Age	Up to 20	18 (3.5%)
	21-30	59 (11.5%)
	31-40	115 (22.3%)
	41-50	82 (15.9%)
	51-60	85 (16.5%)
	61-70	104 (20.2%)
	Above 70	52 (10.1%)
Sex	Male	247 (48%)
	Female	268 (52%)
Socio-economic status	APL	509 (98.8%)
	BPL	6 (1.2%)
Education	School level	12 (2.3%)
	Matriculation	95 (18.4%)
	Graduate	221 (42.9%)
	Post graduate	187 (36.3%)
Risk factors	Alcoholic	35 (6.8%)
	Smoker	44 (8.5%)
	Tobacco	3 (0.6%)
	Painkiller	2 (0.4%)
	Ayurvedic drugs	26 (5%)
Other activities	Tea/coffee (>4 cups/days)	126 (24.5%)
	Spicy foods	374 (72.6%)
	Non-vegetarian foods	435 (84.5%)
	Carbonated drinks	118 (22.9%)
	Less than 6 hours sleep	1 (0.2%)
	Physical activity	32 (6.2%)
Comorbidities	Diabetes mellitus	42 (8.2%)
	Hypertension	56 (10.9%)
	Allergy	1 (0.2%)
BMI	Underweight	6 (1.2%)
	Normal	157 (30.5%)
	Overweight	228 (44.3%)
	Obese	124 (24.1%)
GerdQ score	≥ 8	113 (21.9%)
	<8	402 (78.1%)

Table 1: Demographic variables

GERD	Grade 0	Grade 1	Grade 2	Grade 3
Heartburn	365 (70.9%)	33 (6.4%)	47 (9.1%)	70 (13.6%)
Regurgitation	449 (87.2%)	22 (4.3%)	28 (5.4%)	16 (3.1%)
Pain	8(1.6%)	19(3.7%)	26(5%)	462(89.7%)
Nausea	2(0.4%)	19(3.7%)	29(5.6%)	465(90.3%)
Sleep Disturbance	488 (94.8%)	14 (2.7%)	10 (1.9%)	3 (0.6%)
OTC PPI	473 (91.8%)	20 (3.9%)	19 (3.7%)	3 (0.6%)

Table 2: GERDq score

Demographic variables		No GERD	GERD	p value
Age	Up to 20	16	2	0.258
	21-30	50	9	0.187
	31-40	82	33	**0.047**
	41-50	59	23	0.144
	51-60	66	19	0.920
	61-70	79	25	0.562
	Above 70	50	2	**0.001**
Sex	Male	184	63	
	Female	218	50	0.060
Socio-economic status	APL	399	110	0.095
	BPL	3	3	
Education	School level	12	0	0.358
	Matriculation	77	18	0.435
	Graduate	176	45	0.453
	Post graduate	137	50	**0.047**
Risk factors	Alcoholic	26	9	0.575
	Smoker	27	17	**0.005**
	Tobacco	2	1	0.631
	Painkiller	2	0	0.453
	Ayurvedic drugs	18	8	0.263
Other activities	Tea/coffee (>4 cups/days)	60		**0.000**
	Spicy foods	288	66	0.347
	Non-vegetarian foods	335		0.180
	Carbonated drinks	70	86	**0.000**
	Less than 6 hours sleep	1	100	0.596
	Physical activity	26	48	0.653
			0	
			6	
Comorbidities	Diabetes mellitus	34	8	0.638
	Hypertension	46	10	0.435
	Allergy	0	1	0.059
BMI	Underweight	5	1	0.757
	Normal	140	17	0.348
	Overweight	185	43	0.131
	Obese	72	52	**0.000**

Table 3: Association of variables with GERD

IV. DISCUSSION

Gastroesophageal reflux disease is one of the common medical condition affecting the population. The spectrum of disease can range from occasional retrosternal burning to troublesome reflux and premalignant condition like Barrett's oesophagus. To tackle this upcoming epidemic, a sound understanding of the distribution of disease and associated risk factors need to be known. Several population-based studies have been conducted all over the world and risk factors associated with GERD established. It was earlier thought that GERD is primarily a disease of the Western population with prevalence ranging from 10-20%. It was probably due to a lack of Indian studies that the estimated prevalence earlier was thought to be less than 5% (4).

Population-based studies on the Indian population for GERD are still limited. However, the studies which have been conducted show that the actual prevalence of GERD almost mirrors that of the Western population (Table 4). Within the Indian population also there is a wide variation in cultural practices and diet. Dietary preferences such as the use of more spices in south Indian population can have an impact on diseases such as GERD. A population-based study conducted by Wang et al in 2018 included 1072 participants from south India. The prevalence noted was 22.2% with increasing age, BMI, urban environment, lower education level and pan masala chewing having a significant association with GERD. The present study was also undertaken in a south Indian population. The prevalence noted was 21.9%. Also, factors such as smoking, tea/coffee, carbonated drinks and BMI were found to have a significant association with GERD.

Studies	Study Population	Prevalence
Bhatia et al (2011) (5)	3224 rural and urban	7.6 %
Sharma et al (2011) (2)	4039 employees of tertiary hospital	16.2%
Kumar et al (2011) (6)	905 rural and urban	18.7%
Wang et al (2016) (3)	1072 rural and urban	22.2%
Arivan et al (2018) (7)	358 medical students	5%
Present study (2019)	515 rural and urban	21.9%

Table 4: Similar studies

The relation of age with GERD is controversial. Several studies are showing a positive correlation (8, 9) and almost an equal number of studies showing a negative correlation (10). Most of the times, the study design is at fault. For example, a study conducted by Sylvester (11) examined the prevalence of GERD among students in Nigeria. The mean age was 25.3 +- 3.5 years. Probably due to such a narrow range of age, there was no correlation between age and GERD. Another recent article by Wang et al (3) studied the prevalence of GERD in south Indian population. This study had a more robust distribution of age with a range from 20- 86 years. The present study also had a wide range of age distribution with a minimum age of 18 years and maximum age of 85 years. Though no significant association was noted between age and GERD the maximal prevalence (28.7%) was in age group 31-40 years maybe because of increased risk factors in that age group.

Though the spectrum of GERD varies between the two sexes, whether gender has any role to play in it is doubtful. Severe GERD symptoms and Barrett's esophagus are more prevalent in males whereas reflux symptoms and non-erosive reflux disease (NERD) more common in females (12). The sex difference in GERD has been partly attributed to estrogen (13). Estrogen has shown to have an anti-inflammatory effect (14) and also play a part in controlling the LES. The difference in pathophysiology has also been attributed to a host of other factors such as esophageal epithelial barrier function, esophageal nociception, the difference in esophageal acid exposure and psychological factors (12). This has been

ISSN: 2394-4404

confirmed by endoscopic studies also which shows that NERD is more common in females (15, 16). However, epidemiological studies have failed to show a positive correlation of gender with GERD (17-19). In the present study also the association of GERD with gender was not significant.

GERD is more prevalent in urban community and also in an affluent population (3, 20). The difference can be attributed to other factors which affect GERD and are also more prevalent in urban dwellers. These include obesity, type A personality, alcoholism and smoking. Also, *Helicobacter Pylori* can be an important cause for lower GERD prevalence in the low-income group. *H. pylori* is known to be more common in rural settings and it also has a negative impact on acid production (21). This could lead to reduced symptom caused by reflux. Our study failed to show an association of APL/BPL divide with GERD. It could be due to the fact that the study population almost entirely comprised of urban population and only 1.2 % were below the poverty line.

Previous studies have shown that patients with higher education level had a lower prevalence of GERD. Two other studies have also confirmed the association of GERD with level of education (8, 22). In the study by Wang et al, cut-off for low level of education was considered as less than 8 years of schooling and 33% of the study population belonged to this group. In our study, only 2.3% of the population had less than 10 years of schooling. Majority of the study population (79.2%) comprised of graduates and postgraduates. Postgraduates had a significant p value of <0.05 in association with GERD. The exact etio-pathogenesis, however, could not be explained.

The study examined several factors for their association with GERD. These included consumption of alcohol, history of smoking and tobacco chewing, history of use of painkillers and ayurvedic drugs. It also examined the dietary habits of the study population like preference for spicy food, vegetarian or non-vegetarian diet, daily consumption of tea/coffee and drinking of carbonated drinks. Also, physical activity and sleep habits of the study population was noted. Among all these factors, smoking, having more than 4 cups of tea/coffee and consumption of carbonated drinks were found to have a significant correlation with GERD as compared to non-GERD.

Smoking is a well-established risk factor for GERD (23, 24). However, the exact pathophysiology has still not been elucidated. Smoking is supposed to cause relaxation of the lower esophageal sphincter and cause an increase in reflux episodes associated with straining. It is also believed to play a role in reduced acid clearance secondary to decreased salivation.

The effect of coffee on GERD is controversial. The exact association is still not known. In-depth studies have been conducted to understand the correlation. Coffee is known to cause relaxation of lower oesophageal sphincter. The association of coffee with gastric acid secretion has also been studied, but it has failed to show any relation (25).

Literature shows that carbonated drinks do not have a clear cut correlation with GERD. Though carbonated drinks have a very low pH, the physiological effects it has on gastric pH and pathophysiology of GERD is still not clear. Few studies have shown that carbonated drinks can aggravate the symptoms of GERD. Gaseous distension after drinking carbonated drinks can lead to relaxation of lower esophageal sphincter and increase exposure to acid. It was also shown to have an effect on gastric emptying time. In spite of the low pH, carbonated drinks have no impact complications of GERD and have shown to cause no injury to esophageal mucosa.

BMI and GERD have a dose-response relationship. GERD symptoms are known to increase with an increase in BMI(26). The present study also showed the same. In this study, BMI was classified using WHO and Asian criteria. By both criteria, obesity was found to have a significant association to GERD. A recent study by Vaishnav et al (27) also showed that the severity of symptoms of GERD and erosive esophagitis had a positive correlation with BMI. The study by Bhatia et al(5) also showed a positive correlation between BMI and GERD.

The present study showed that diabetes, hypertension and allergy did not correlate with GERD. This is in contradiction to other studies, which showed a significant association between diabetes and hypertension with GERD (28). The difference in results could be due to the small sample size. Among the 515 participants, only 42 suffered from diabetes and only 56 had hypertension.

Only 3 subjects with GERDQ more than 12 followed up to the OPD. One underwent 24 hour pH monitoring and was found to have significant acid reflux disease (DeMeester score 38). The other two subjects underwent OGDscopy, one had Grade B reflux esophagitis, while the other was a normal study.

V. CONCLUSION

The prevalence of GERD in the present study was 29.1%. Risk factors with significant association to GERD included older age group, higher educational status, smoking, intake of more than 4 cups of tea/coffee, intake of carbonated drinks and obesity.

Conducting an epidemiological study is by itself a mammoth task. Adding to the difficulty is the varied nature of individuals with whom an epidemiologist has to interact. The responses vary from inviting inside for a warm meal to being shooed away mistaking for salesgirl. But it is by only trudging these hard miles can we understand the disease distribution and bring about the desired change in the health care setup.

REFERENCES

[1] 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.
[2] 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.
[3] Wang HY, Leena KB, Plymoth A, Hergens MP, Yin L, Shenoy KT, et al. Prevalence of gastro-esophageal reflux disease and its risk factors in a community-based

population in southern India. BMC Gastroenterol. 2016;16:36.
[4] 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.
[5] Bhatia SJ, Reddy DN, Ghoshal UC, Jayanthi V, Abraham P, Choudhuri G, et al. Epidemiology and symptom profile of gastroesophageal reflux in the Indian population: report of the Indian Society of Gastroenterology Task Force. Indian J Gastroenterol. 2011;30(3):118-27.
[6] Kumar S, Sharma S, Norboo T, Dolma D, Norboo A, Stobdan T, et al. Population based study to assess prevalence and risk factors of gastroesophageal reflux disease in a high altitude area. Indian J Gastroenterol. 2011;30(3):135-43.
[7] Arivan R, Deepanjali S. Prevalence and risk factors of gastro-esophageal reflux disease among undergraduate medical students from a southern Indian medical school: a cross-sectional study. BMC Res Notes. 2018;11(1):448.
[8] Cela L, Kraja B, Hoti K, Toci E, Muja H, Roshi E, et al. Lifestyle characteristics and gastroesophageal reflux disease: a population-based study in Albania. Gastroenterol Res Pract. 2013;2013:936792.
[9] Stanghellini V. Three-month prevalence rates of gastrointestinal symptoms and the influence of demographic factors: results from the Domestic/International Gastroenterology Surveillance Study (DIGEST). Scand J Gastroenterol Suppl. 1999;231:20-8.
[10] Locke GR, 3rd, Talley NJ, Fett SL, Zinsmeister AR, Melton LJ, 3rd. Prevalence and clinical spectrum of gastroesophageal reflux: a population-based study in Olmsted County, Minnesota. Gastroenterology. 1997;112(5):1448-56.
[11] Nwokediuko S. Gastroesophageal Reflux Disease: A Population Based Study. Gastroenterology Res. 2009;2(3):152-6.
[12] Kim YS, Kim N, Kim GH. Sex and Gender Differences in Gastroesophageal Reflux Disease. J Neurogastroenterol Motil. 2016;22(4):575-88.
[13] Ashcroft GS, Mills SJ, Lei K, Gibbons L, Jeong MJ, Taniguchi M, et al. Estrogen modulates cutaneous wound healing by downregulating macrophage migration inhibitory factor. J Clin Invest. 2003;111(9):1309-18.
[14] Masaka T, Iijima K, Endo H, Asanuma K, Ara N, Ishiyama F, et al. Gender differences in oesophageal mucosal injury in a reflux oesophagitis model of rats. Gut. 2013;62(1):6-14.
[15] Asanuma K, Iijima K, Shimosegawa T. Gender difference in gastro-esophageal reflux diseases. World J Gastroenterol. 2016;22(5):1800-10.
[16] Boeckxstaens G, El-Serag HB, Smout AJ, Kahrilas PJ. Symptomatic reflux disease: the present, the past and the future. Gut. 2014;63(7):1185-93.
[17] Nusrat S, Nusrat S, Bielefeldt K. Reflux and sex: what drives testing, what drives treatment? Eur J Gastroenterol Hepatol. 2012;24(3):233-47.
[18] 18. Jung HK, Halder S, McNally M, Locke GR, 3rd, Schleck CD, Zinsmeister AR, et al. Overlap of gastro-oesophageal reflux disease and irritable bowel syndrome: prevalence and risk factors in the general population. Aliment Pharmacol Ther. 2007;26(3):453-61.
[19] Chiocca JC, Olmos JA, Salis GB, Soifer LO, Higa R, Marcolongo M, et al. Prevalence, clinical spectrum and atypical symptoms of gastro-oesophageal reflux in Argentina: a nationwide population-based study. Aliment Pharmacol Ther. 2005;22(4):331-42.
[20] Farjam M, Sharafi M, Bahramali E, Rezaei S, Hassanzadeh J, Rezaeian S. Socioeconomic Inequalities in Gastroesophageal Reflux Disorder: Results from an Iranian Cohort Study. Middle East Journal of Digestive Diseases. 2018;10(3):180-7.
[21] Gisbert JP, Pajares JM, Losa C. Helicobacter pylori and gastroesophageal reflux disease: friends or foes? Hepatogastroenterology. 1999;46(26):1023-9.
[22] Zheng Z, Nordenstedt H, Pedersen NL, Lagergren J, Ye W. Lifestyle factors and risk for symptomatic gastroesophageal reflux in monozygotic twins. Gastroenterology. 2007;132(1):87-95.
[23] Kahrilas PJ, Gupta RR. Mechanisms of acid reflux associated with cigarette smoking. Gut. 1990;31(1):4-10.
[24] Pandolfino JE, Kahrilas PJ. Smoking and gastro-oesophageal reflux disease. Eur J Gastroenterol Hepatol. 2000;12(8):837-42.
[25] Zhang Y, Chen, S. Effect of Coffee on Gastroesophageal Reflux Disease. Food Sci Technol Res. 2013;19(1):1-6.
[26] El-Serag H. The association between obesity and GERD: a review of the epidemiological evidence. Dig Dis Sci. 2008;53(9):2307-12.
[27] Vaishnav B, Bamanikar A, Maske P, Reddy A, Dasgupta S. Gastroesophageal Reflux Disease and its Association with Body Mass Index: Clinical and Endoscopic Study. J Clin Diagn Res. 2017;11(4):OC01-OC4.
[28] Khodamoradi Z, Gandomkar A, Poustchi H, Salehi A, Imanieh MH, Etemadi A, et al. Prevalence and Correlates of Gastroesophageal Reflux Disease in Southern Iran: Pars Cohort Study. Middle East J Dig Dis. 2017;9(3):129-38.