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Original Article

Prevalence and Risk Factors of Gastroesophageal Reflux Disease Among Medical and Dental Students of Rawalpindi/Islamabad

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ABSTRACT

Objective: To determine the prevalence of gastroesophageal reflux disease among medical and dental students of Rawalpindi Islamabad Pakistan and to find the associated risk factors.

Study Design: Analytical cross-sectional study.

Place and Duration of Study: Students of medical colleges in Rawalpindi Islamabad Pakistan, from March to May 2021.

Methodology: Non-probability convenience sampling technique was used. Sample size was found to be 352 using Rao soft. Only undergraduate students from Rawalpindi Islamabad Pakistan were included whereas postgraduate students were excluded. The data was collected via online distributed google forms and analyzed by SPSS version 25.0.

Results: There were 157(44.6%) males and 195(55.41%) females among whom 296(84.1%) were enrolled in medical program and 56(15.9%) in dental program. 94 students (26.7%) reported having symptoms of gastroesophageal reflux disease .Based on a GERD score of >=4, 35(9.94%) students were diagnosed with gastroesophageal reflux disease .Use of analgesics (OR=3.11[95% CI 1.32-7.36]; $p \leq 0.010$), family history of gastroesophageal reflux disease (OR=6.48[95% CI 3.09-13.57]; $p \leq 0.000$), family history of peptic ulcer (OR=2.85[95%CI 1.18-6.83] $p \leq 0.038$), frequent use of non-steroidal anti-inflammatory drugs ($p \leq 0.013$) had a significant association with the presence of gastroesophageal reflux disease .

Conclusion: Gastroesophageal reflux disease was diagnosed in approximately 10% of students. There was a significant association of Gastroesophageal reflux disease with use and frequent consumption of non-steroidal anti-inflammatory drugs and family history of peptic ulcer/Gastroesophageal reflux disease

Keywords: Gastroesophageal reflux disease, Prevalence, Risk factors.

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INTRODUCTION

Gastro-esophageal reflux disease (GERD) is a condition that develops when there is a retrograde flow of stomach contents back into the esophagus.[1]

The clinical signs of GERD include heartburn which is an uncomfortable burning feeling in the chest. There may also be acid reflux or regurgitation that causes a sour or bad taste in the back of the mouth.[2] The extra esophageal manifestations of GERD include hoarseness of voice, chronic cough, asthma.[3]

A study published in the journal gut reported the highest prevalence of gastro-esophageal reflux symptoms in Central America (19.6%) and the lowest in Asia (10.0%), particularly in Southeast Asian countries (7.4%).[4] Hospital-based studies on GERD from Pakistan have reported a prevalence of 22.2% to 24.0%.[5]

The environmental factors and the genetic makeup of an individual have been found to play a pivotal role in the development of GERD.[6] Students are exposed to many of the risk factors found to be associated with GERD such as ingestion of caffeinated drinks(coffee/tea) and carbonated drinks,[7] self-prescribed use of painkillers such as non-steroidal anti-inflammatory drugs (NSAIDs), smoking habits, increased Body Mass Index(BMI),[8] and stress.[9]

We conducted this study to determine the prevalence of GERD among undergraduate medical and dental students to highlight the magnitude of this problem and find the risk factors with which it is linked, as there has been a paucity of research on this health issue in this study setting in Pakistan.

It is necessary to find these risk factors to create awareness and decrease the prevalence of this disease in this population as chronic GERD may lead to metaplastic changes in the esophagus such as Barrett's esophagus, Esophageal Adenocarcinoma, esophageal ulcerations, and perforations.[10]

METHODOLOGY

We conducted an analytical cross-sectional study based on a validated questionnaire,[11] previously used in the GERD study conducted in an Indian Medical

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school, JIPMER. The participants were undergraduate medical and dental students from public and private medical colleges of Rawalpindi Islamabad Pakistan. This survey was conducted from March-May 2021. Sample size was found to be 260 using Rao soft calculator with a precision of 95% and 22% GERD prevalence as estimated by a hospital-based study in Pakistan.

Only the undergraduate medical and dental students from Rawalpindi and Islamabad Pakistan were included in the study. Postgraduate students and students at medical colleges outside the research setting were excluded from the research. The sampling technique used was non-probability convenience sampling.

The questionnaire was distributed to the students in an online format. Informed consent was taken from the participants before filling the survey. We used a structured, validated questionnaire for this study consisting of two parts The initial part included questions on basic demographic information such as age, gender, BMI, year of study, college sector, and hostel residence. The following part consisted of questions on lifestyle factors, medical, and drug history (see Appendix A).

Statistical software SPSS 25.0 was used for analysis. Frequencies and percentages for the categorical variables were calculated, and a Chi-Square test was applied for finding the associations between them. Mean scores were calculated for continuous variables and an independent sample T-test was applied to compare means among them. One way ANOVA test was applied to compare means among three different groups. All tests were two-sided, and we considered $p \leq 0.05$ statistically significant.

Research was approved by Ethical Review Committee of Army Medical College, Rawalpindi, ERC certificate no.163.

RESULTS

A total of 352 responses were collected via an online questionnaire. Out of these, there were 157 (44.6%) males while the rest were females i.e., 195 (55.41%). There were 296(84.1%) MBBS students and 56(15.9%) were from BDS. The numbers of participants from each study year are shown in the following bar chart. 248(70.5%) students belonged to public colleges whereas 104(29.5%) belonged to private colleges.

The mean (SD) age of the participants was 20.99 (±1.33) years whereas the mean BMI of the participants was found to be 21.91±2.75) kg/m^2.

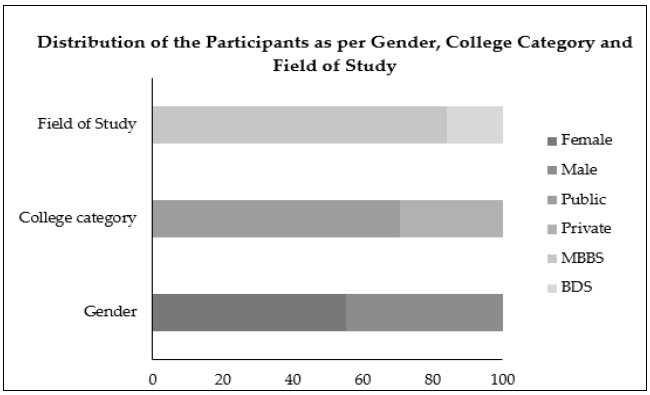

Figure-1: Demographic variables

Medical and Drug History

75(21.3%) students reported suffering from at least one diagnosed medical illness. Consumption of antacids such as PPIs and H2 Blockers was reported by 66(18.8%) of the study participants, among whom 4(1.1%) were taking them daily.

The frequency of intake of over-the-counter analgesics such as paracetamol were reported by 217 of the participants among whom 13 participants were taking them at a frequency of more than twice/week.

Spontaneous remission (43.8%) was the most common method of relief of symptoms of GERD followed by usage of medications (antacids) (32.6%), eating (11.2%), herbal medications (7.1%), and consumption of dairy products (4%).

GERD Symptom Scores and Association with demographic and lifestyle factors:

Out of 352 study participants, 94(26.7%) reported having experienced symptoms of GERD i.e., heartburn and regurgitation.

Out of these, 81(23%) students experienced heartburn at a frequency of fewer than 2 times/week whereas 78(22.2%) students experienced heartburn at a frequency of fewer than 2 times/week. Regarding the severity of these symptoms, 69(19.6%) and 70(19.9%) students experienced heartburn and regurgitation of mild severity respectively. Diagnosis of GERD was made in those who had a final GERD score of ≥4. The final score for each symptom (heartburn and regurgitation) was obtained by multiplying the scores for severity and frequency. The total score was obtained by adding final scores of individual symptoms. Thus, the total scores could range from 0 to 18. The presence of GERD was defined as a score ≥4.

35(9.94%) students were found to have a GERD score ≥4 and were thus diagnosed with GERD. Out of these, 29(82.8%) had a mild GERD score whereas 6(17.14%) had a moderate GERD score.

Table-I: Grading of GERD

Score	Grading of GERD
<4	No GERD
4-8	Mild GERD
9-13	Moderate GERD
14-18	Severe GERD

There was a significant difference in the mean GERD score of those who skip breakfast daily and those who never skip breakfast (1.66±2.52 vs. 0.34±0.96, *p*=0.005)

Among the lifestyle and demographic factors considered, the following showed a significant association with the presence of symptoms of GERD (heartburn and regurgitation; female gender (OR=0.457 [95% CI 0.277-0.75] *p*=0.002), college category (OR=0.53[95% CI 0.32-0.88] *p*=0.017), frequency of consumption non-veg food (*p*=0.013).

Table II: Comparison of demographic/lifestyle factors between students with/without presence of GERD

Demographic and lifestyle Factors	GERD present (n=34)	No GERD (n=318)	*p*-value*
Female gender	21(61.8%)	174(54.7%)	0.472
Private college category	15(44.1%)	89(28.0%)	0.073
Hostel living	23(67.6%)	217(68.2%)	1.000
Non-veg diet	29(85.3%)	260(81.8%)	0.814
Daily consumption of non-veg food	12(35.3%)	90(28.3%)	0.656
Daily consumption of fast food	0(0.00%)	5(1.6%)	0.527
Frequent consumption of soft drinks	7(20.6%)	98(30.8%)	0.228
Frequent mid-night snacking	10(29.4%)	70(22.0%)	0.630
Frequent skipping of breakfast	5(14.7%)	24(7.5%)	0.066
Less than 3-hour sleep at night	1(2.9%)	6(1.9%)	0.060
Smoking	1(2.9%)	6(1.9%)	0.797
Lack of physical exercise	13(38.2%)	112(35.2%)	0.967
Frequent usage of over-the-counter analgesics	4(15.4%)	9(5%)	0.013*
Family history of peptic/duodenal ulcer	8(23.5%)	31(9.7%)	0.038*
Family history of GERD	19(56%)	52(16.4%)	0.000*
Usage of over-the-counter analgesics	27(79.4%)	176(55.3%)	0.010*

Use of over-the-counter analgesics such as paracetamol/diclofenac etc., (OR=3.11[95% CI 1.32-7.36]; $p < 0.010$), family history of GERD (OR=6.48[95% CI 3.09-13.57]; $p \leq 0.000$), family history of peptic ulcer (OR=2.85[95%CI 1.18-6.83] $p \leq 0.038$), frequent use of NSAIDS ($p \leq 0.013$), had a significant association with the presence of GERD (GERD score ≥ 4). There were no other significant associations between the other lifestyle factors and the presence of GERD.

Table-III: Comparison of demographic/lifestyle factors among students with/without presence of heartburn and regurgitation

Demographics and lifestyle factors	Presence of heartburn and regurgitation (N=94)	Absence of heartburn and regurgitation (N=257)	*p*-value
Female Gender	66(69.1%)	130(50.6%)	0.002*
Private college category	37(39.4%)	66(25.7%)	0.017*
Daily consumption of non-veg food	23(24.5%)	79(30.7%)	0.019*

p-value ≤ 0.05= significant

DISCUSSION

We found that 22.6% of undergraduate medical and dental students of Rawalpindi/Islamabad in Pakistan experienced heartburn and regurgitation at least once a week and 9.94% of students were found to have GERD based on symptom score >=4, which is higher than the prevalence found in a study conducted in a medical college in South India (5%).[11] A study from government medical college from Karachi, Pakistan,[12] reported a lower prevalence of weekly symptoms of heartburn i.e. 7% although the results were not based on symptom score and there was no data regarding the severity of symptoms.

Participants who reported usage of over-the-counter analgesics were more likely to have GERD (symptom score >=4) in our study. Moreover, a greater frequency of usage of these drugs was associated with a higher GERD score. NSAID use was a risk factor for developing GERD symptoms in a study conducted in Madrid, Spain.[13]

GERD symptoms were found to be significantly more common in NSAID users in an observational study in Clichy, France ($p \leq 0.001$).[14] NSAIDs cause gastrointestinal damage by inhibition of COX-1 and protective PG among other factors. This is important due to the high frequency of self-medication of NSAIDS by medical students due to common complaints such as headache, body aches, fever, dysmenorrhea, etc.

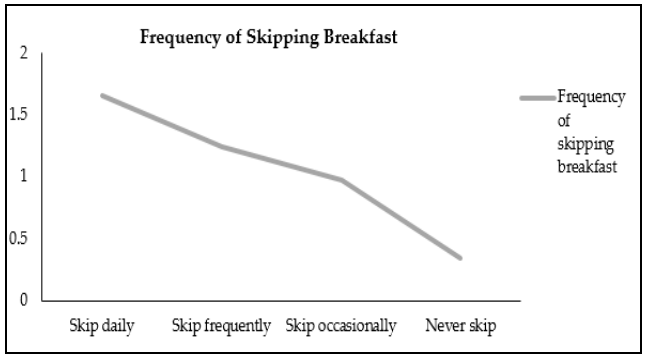

Figure-2: Frequency of skipping breakfast and mean GERD score

The presence of GERD in students was found to be significantly associated with a family history of GERD and peptic ulcer in our study. A study in West Bromwich, UK, [15] suggested a strong association of GERD with a family history of upper GI disorders ($p \leq 0.0001$). A genome-wide association study by the Institute of Human Genetics, University of Bonn, Germany,[16] showed that there are at least 30 disease-associated genetic risk loci that are associated with biological pathways of potential relevance to GERD pathophysiology such as the regulation of ion channels, transport functions, and cell-cell adhesions which maintain mucosal epithelial integrity.

Students from private medical colleges were more likely have symptoms such as heartburn/regurgitation compared to students from public medical colleges ($p \leq 0.017$). The students from private colleges were also significantly more likely to be overweight. ($p \leq 0.001$) As per a study on students of intermediate-level colleges in Karachi, Pakistan,[17] the proportion of underweight participants was higher (36.8%) in government college students, whereas overweight students being higher in the private colleges (23.8%). This could be due to the higher socioeconomic status of students of the private sector due to higher expenses, which may lead to more frequent consumption of fast food and processed food, thus contributing to the increased BMI. Increased BMI is a major contributing factor in causing symptoms like heartburn/regurgitation.[18]

Female students were more likely to have symptoms like heartburn/regurgitation as compared to male students ($p \leq 0.002$) as noted in this study which is due to increased perception of symptoms of GERD by women,[19] However, as shown by a study in Tohoku University,[20] there's a decreased prevalence of symptoms of GERD in females owing to the protective effect of estrogen in premenopausal life.

Our study has also shown that people who consume non-vegetarian food frequently are more likely to experience symptoms such as heartburn/ regurgitation ($p \leq 0.013$). As per a report published by the Indian Society of Gastroenterology Task Force, consumption of non-vegetarian food is an independent predictor of symptoms of GERD.[21] The possible reason could be that non-vegetarian food is often high in fat content which delays gastric emptying,[22] and relaxes the lower esophageal sphincter tone leading to an increased risk of reflux.[23]

There were no significant associations between presence of GERD and BMI >=25 kg/m^2 in our study ($p \leq 0.942$), however a significant relation between these two variables was noted by several studies.[24] There was also no significant relationship between intake of caffeinated soft drinks,[25] which is supported by another study.

This is the first study estimating the prevalence of GERD in medical and dental students of Rawalpindi/ Islamabad Pakistan. Using a validated questionnaire, we have found an accurate estimation for the prevalence of GERD among medical and dental students, as the score-based questionnaire avoided overestimation of the prevalence by misdiagnosing mild/moderate symptoms as GERD.

The results of our study supported our hypothesis as we found several links between lifestyle and demographic factors to which medical and dental students are exposed to and increased risk of GERD and its symptoms like heartburn/regurgitation.

LIMITATIONS OF STUDY

Most of our data was collected from 4th year students; inadequate data had been collected from 1st year and final year. This has decreased our mean age and may have led to an underestimation of GERD as these students usually have difficulties adjusting and a hectic, stressful routine respectively. There was also a lack of data from private medical colleges owing to difficulties in accessibility due to COVID-

19 limitations. We cannot create inferences about the prevalence of GERD in the general population due to the limited sample size lower mean age of our study group.

CONCLUSION

Our study has shown a significant association between use as well as increased consumption of over-the-counter NSAIDS, family history of peptic ulcer/GERD, and prevalence of GERD. Moreover, female gender, frequent consumption of non-vegetarian food, the private sector of college is significantly associated with the presence of heartburn and regurgitation. The mean GERD score was found to be significantly higher in those who skipped breakfast daily.

Conflict Of Interest: None.

Author's Contribution

Following authors have made substantial contributions to the manuscript as under:

AS: Supervision, Conception of Research idea and teechniques, revising artcle for final intellectual improvements, data interpretations & final apporval of the version to be published.

SFM; MS: Co- Supervision, Conception of Research idea and teechniques, revising artcle for final intellectual improvements, data interpretations & final apporval of the version to be published.

SK: Literature review, Introduction writing, data collection, data entery, discussion writing, conclusion writing & final apporval of the version to be published.

AR: Data collection, data entery on SPSS, data and graph analysis, results wrinting, Discussion writing & final apporval of the version to be published.

AM; IA: Data collection, data entery on SPSS, data and graph analysis, conclusion writing & final apporval of the version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

REFERENCES

1. Fuchs KH. Definition and Pathophysiology of Gastroesophageal Reflux Disease. In: Horgan, S., Fuchs, KH. (eds) Management of Gastroesophageal Reflux Disease. Springer, Cham. [Internet] available at: https://doi.org/10.1007/978-3-030-48009-7_1
2. Kellerman R, Kintanar T. Gastroesophageal Reflux Disease. Prim Care 2017; 44(4): 561–573.
3. Durazzo M, Lupi G, Cicerchia F, Ferro A, Barutta F, Beccuti G, et al. Extra-Esophageal Presentation of Gastroesophageal Reflux Disease: 2020 Update. J Clin Med 2020; 9(8): 2559-2562.
4. Eusebi LH, Ratnakumaran R, Yuan Y, Solaymani-Dodaran M, Bazzoli F, Ford AC. Global prevalence of, and risk factors for, gastro-oesophageal reflux symptoms: a meta-analysis. Gut 2018; 67(3): 430–440.
5. Butt AK, Hashemy I. Risk factors and prescription patterns of gastroesophageal reflux disease: HEAL study in Pakistan. J Pak Med Assoc 2014; 64(7): 751-753
6. Argyrou A, Legaki E, Koutserimpas C, Gazouli M, Papacons-tantinou I, Gkiokas G, et al. Risk factors for gastroesophageal reflux disease and analysis of genetic contributors. World J Clin Cases 2018; 6(8): 176–182.
7. Mehta RS, Song M, Staller K, Chan AT. Association Between Beverage Intake and Incidence of Gastroesophageal Reflux Symptoms. Clin Gastroenterol Hepatol Off Clin Pract J Am Gastroenterol Assoc 2020; 18(10): 2226-2233.e4.
8. Rasool MF, Sarwar R, Arshad MS, Imran I, Saeed H, Majeed A, et al. Assessing the Frequency and Risk Factors Associated with Gastroesophageal Reflux Disease (GERD) in Southern Punjab, Pakistan. Risk Management And Health Poli 2021; 4614(2): 4619.
9. Awadalla NJ. Personal, academic & stress correlates of gastroesophageal reflux disease among college students in southwestern Saudi Arabia: A cross-sectional study. Ann Med Surg 2019; 47(1): 61–65.
10. Mikolašević I, Bokun T, Filipec Kanižaj T. Gastroesophageal reflux disease, Barrett esophagus, and esophageal adenocarcinoma– where do we stand. Croat Med J 2018; 59(3): 97–99.
11. Arivan R, Deepanjali S. Prevalence, and risk factors of gastroesophageal reflux disease among undergraduate medical students from a southern Indian medical school: a cross-sectional study. BMC Res Notes 2018; 11(1): 448-500.
12. Riaz H, Kamal SW, Aziz S. Gastroesophageal reflux disease (GERD) in students of a government medical college at Karachi. JPMA J Pak Med Assoc 2010; 60(2): 147–150.
13. Martín-de-Argila C, Martínez-Jiménez P. Epidemiological study on the incidence of gastroesophageal reflux disease symptoms in patients in acute treatment with NSAIDs. Expert Rev Gastroen-terol Hepatol 2013; 7(1): 27–33.
14. Ruszniewski P, Soufflet C, Barthélémy P. Nonsteroidal anti-inflammatory drug use as a risk factor for gastro-oesophageal reflux disease: an observational study. Aliment Pharmacol Therapeut 2008; 28(9): 1134-1139.
15. Mohammed I, Nightingale P, Trudgill NJ. Risk factors for gastro-oesophageal reflux disease symptoms: a community study. Aliment Pharmacol Ther 2005; 21(7): 821–827.
16. Böhmer AC, Schumacher J. Insights into the genetics of gastroesophageal reflux disease (GERD) and GERD-related disorders. Neurogastroenterol Motil Off J Eur Gastrointest Motil Soc 2017; 29(2) doi: 10.1111/nmo.13017.
17. Rashid M, Noor S, Salam KA, Irfan R, Siddique A. Dietary Habits, Perceptions and Barriers Among Government and Private College Intermediate Students in Karachi: A Cross-Sectional Survey. J. Bahria Univ. Med. Dent. Coll 2021; 11(2): 81-86.
18. El-Serag HB, Graham DY, Satia JA, Rabeneck L. Obesity is an independent risk factor for GERD symptoms and erosive esophagitis. Am. J. Gastroenterol | ACG 2005; 100(6): 1243-1250.
19. Kim YS, Kim N. Sex and Gender Differences in Gastroesophageal Reflux Disease. J Neurogastroenterol Motil 2016; 22(4): 575–588.
20. Honda J, Iijima K, Asanuma K, Ara N, Shiroki T, Kondo Y, et al. Estrogen Enhances Esophageal Barrier Function by Potentiating Occluding Expression. Dig Dis Sci 2016; 61(4): 1028–1038.
21. 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 Off J Indian Soc Gastroenterol 2011; 30(3): 118–127.
22. Vriesman MH, Benninga MA. Constipation and the Efficacy of Fluid, Fat, Fibers, and Prebiotics. Pediat Nutri Practice 2022; 124(1): 308-314.
23. Nebel OT, Castell DO. Lower esophageal sphincter pressure changes after food ingestion. Gastroenterol 1972; 63(5): 778–783.
24. Chowdhury SD, George G, Ramakrishna K, Ramadass B, Pugazhendhi S, Mechenro J, Jeyaseelan L, Ramakrishna BS. Prevalence and factors associated with gastroesophageal reflux disease in southern India: a community-based study. Indian J Gastroenterol 2019; 38(1): 77-82.
25. Lim SX, Brownlee IA. Assessment of the Acute Effects of Carbonated Beverage Consumption on Symptoms and Objective Markers of Gastric Reflux. Gastrointestinal Disorders 2018; 1(1): 30-38.