RESEARCH ARTICLE

Prevalence of lifestyle risk factors and clinical manifestations of gastroesophageal reflux disease among medical students: a cross-sectional study

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Abstract

Aim: To explore attitudes of medical students towards GERD risk factors and to find prevalence of its clinical manifestations. **Methods:** A cross-sectional study was conducted using a structured questionnaire as a Google form at the Department of Community Medicine, Nishtar Medical University, Multan, from December 2025 to March 2026. After informed consent, data were collected from students of the university. **Results:** The study included 215 participant including 135 (62.8%) males and 80 (37.2%) females. The mean age was 21.21 ± 4.763 years. The weight of the participants varied as: 1.4% below 40 kg, 17.2% between 40–50 kg, 30.2% between 51–60 kg, 27.9% between 61–70 kg, 13.5% between 71–80 kg, and 9.8% above 80 kg. Regarding spicy foods, 13.5% took daily, 43.3% took spicy food 2–3 times a week, 40.8% rarely consumed. 12.1% were found to drink carbonated drinks daily, 27% drank 2–3 times a week, and 45.1% drank once a week. 20.5% of participants consumed more than the desired meal. 19.5% perfomed exercise daily, 21.4% never performed any exercise, and 59.1% exercised rarely. In total, 51% of participants slept immediately after taking meals. Food regurgitation was found in 43.7% of participants, heartburn in 43.7%, acid reflux in 34.4% and, nausea in 28.8%. Only 8.8% were diagnosed cases of GERD. **Conclusion:** Food regurgitation and heartburn are the most common signs of GERD. Regular exercise and healthy meals reduced the frequency of GERD symptoms. GERD symptoms were more prevalent in participants with bad and irregular dietary habits and in smokers.

Keywords: Gastroesophageal reflux disease (GERD) • food regurgitation • acid reflux • heartburn • risk factors • medical students

Received:26-09-2026 Accepted :26-10-26 Published:03-11-26

Introduction

GERD is a disease pertaining to the gastrointestinal tract (GIT) motility. In this ailment, gastric contents of the stomach are regurgitated back into the esophagus [1,2]. It is basically the manifestation of exposure of the esophagus to the gastric contents [3]. The pathophysiology of GERD is different in obese as compared with non-obese people [4]. It is because obese people suffer vagal abnormalities which cause a higher bile and pancreatic output, making the refluxate more toxic to the esophagus [5]. Demographics play a vital role in reflux. According to some studies, the prevalence of reflux is somewhat higher in females than in males [6].

The prevalence is higher in North America with a rate of 18.1%–27.8%, with half of the affected people being adults [7]. The prevalence of GERD in Pakistan is between 24–35% [8,9].

GERD is a multifactorial disorder. The main risk factors for GERD are lifestyle and physiological factors. Among the physiological factors are increased compliance of the esophagus-gastric junction (OGJ), higher pressure gradient across this junction, and weakness of the lower esophageal sphincter (LES) [10–12]. Genetic factors also play a critical role in the development of GERD [13]. A significant role is played by lifestyle in the development of GERD. Among the important lifestyle factors resulting in GERD are smoking, dietary factors (spicy foods, carbonated drinks), stress, alcohol intake, obesity, lack of exercise, and family history [14,15].

Regular physical activities like running and swimming reduce the risk of development of GERD [16]. It has been found that individuals who go on a walk after dinner are less prone to GERD [17]. A meta-analysis study in 2020 showed that reflux associated with GERD is more common in smokers than in non-smokers [18].

Among the typical symptoms of GERD are heartburn, belching, acid regurgitation, chest pain, and dyspepsia. Dysphagia and odynophagia are among less common symptoms of GERD. Sore throat, laryngitis, halitosis, and chronic cough are atypical symptoms of GERD. If the disease is left untreated, the symptoms aggravate and result in undesirable consequences like esophagitis and Barrett's esophagus [19].

In China, chest discomfort is the most common extra-esophageal manifestation of GERD. In Japan, GERD causes severe esophagitis which has been linked to asthma. As per reports, 45 million Americans suffer from the problem of heartburn due to GERD.

GERD in the long term has been identified to reduce the quality of life. It leads to digestive problems making life problematic. GERD can be easily prevented by identifying the risk factors. As mentioned earlier, it is caused by a number of factors. However, it can be prevented by identifying the modifiable risk factors. Some of the modifiable risk factors include avoidance of spicy foods and carbonated drinks, regular exercise, going on a night walk after dinner, and avoiding smoking and alcohol intake.

The rationale of this study is to estimate the prevalence of GERD among the medical students of the university. This study will also help to determine the frequency of GERD symptoms and frequency of its risk factors among the mentioned population group. It will also help understand the long-term effects of GERD on the quality of life.

Materials & methods

Study design and setting

It was a cross-sectional study conducted at the Department of Community Medicine, Nishtar Medical University, Multan, from December 2025 to March 2026. A structured questionnaire was used as a Google form to collect responses from the participants.

Ethical approval

Before the actual data collection procedure, an application was submitted to the office of the Ethical Review Board of the institution. After taking ethical approval, the actual data collection procedure was started.

Participants and sampling

The sample size was assessed using WHO sample size calculation criteria, keeping the confidence level at 95%, margin of error at 5%, and population proportion at 50%. A non-probability random sampling technique was used. Data were collected on Google forms from the medical students of Nishtar Medical University. A total of 215 students participated in the study after providing informed consent.

Exclusion criteria

Students who were suffering from any GIT-related disorder were excluded from the study. Also excluded were the students who were taking medications on a regular basis and those who were occupied with any sort of mental illness.

Statistical analysis

After data collection, data were analyzed using the Statistical Package for Social Sciences (SPSS) software, version 27. Frequency and percentages were calculated for each variable. The chi-square test was used to study the association between the predisposing factors and symptoms of GERD. A p-value of 0.05 was taken as significant. Mean and standard deviation values were calculated using Microsoft Excel 2010.

Results

The study included 215 participants. Out of these, 135 (62.8%) were male and 80 (37.2%) were female. All of them were students of Nishtar Medical University, Multan. The mean age was 21.21 ± 4.763 years. The weight of the participants varied as: 1.4% below 40 kg, 17.2% between 40–50 kg, 30.2% between 51–60 kg, 27.9% between 61–70 kg, 13.5% between 71–80 kg, and 9.8% above 80 kg. All of them were non-alcoholics. Family history of GERD was found in 14.9% of participants. Frequency of eating spicy foods was: 13.5% daily, 43.3% took spicy food 2–3 times a week, 40.8% rarely consumed spicy foods, and 2.8% never took spicy foods. Among the participants, 12.1% took fried food items daily, 47% took fried food 2–3 times a week, 38.1% rarely took fried items, and 2.8% never had fried foods. In total, 20.5% of participants consumed more than desiered meal. Among the participants, 12.1% were found to drink carbonated drinks daily, 27% drank 2–3 times a week, and 45.1% drank once a week. In total, 6% of the participants were found to be daily smokers, 87% were non-smokers, 4.2% smoked 2–3 times a week, and others had smoked occasionally. Stress was experienced by 54.4% of the participants. In total, 51% of participants slept immediately after taking meals. Food regurgitation was found positive in 43.7% of participants. All these risk factors are tabulated in table-1. Heartburn was also found in 43.7% of them. Food regurgitation was found positive in 43.7% of participants. Acid reflux was present in 34.4% of the participants. Nausea was experienced by 28.8% of the participants. A total of 8.8% were diagnosed cases of GERD. All these signs and symptoms are tabulated in table-2. Regular exercise was the habit of 19.5% of participants, 21.4% never performed any exercise, and 59.1% exercised rarely.

Table 1. Behavioural habits and lifestyle characteristics of study participants (n = 215)

Variable	Category	n	%
Frequency of spicy food consumption	Daily	29	13.5
	2–3 times/week	93	43.3
	Rarely	87	40.5
	Never	6	2.8
Frequency of fried or fatty food intake	Daily	26	12.1
	2–3 times/week	101	47.0
	Occasionally	82	38.1
	Never	6	2.8
Frequency of carbonated drink consumption	Daily	31	14.4
	2–3 times/week	58	27.0
	Once a week	97	45.1

Variable	Category	n	%
	Never	29	13.5
Frequency of alcohol consumption	Daily	5	2.3
	2–3 times/week	5	2.3
	Occasionally	3	1.4
	Never	202	94.0
Smoking frequency	Daily	13	6.0
	2–3 times/week	9	4.2
	Occasionally	6	2.8
	Non-smoker	187	87.0
Exercise frequency	Daily	42	19.5
	Occasionally	127	59.1
	Never	46	21.4
Hours between last meal and sleep	Less than 1 hour	36	16.7
	1 hour	49	22.8
	2–3 hours	130	60.5
Quantity of meal consumed	Small meal	113	52.6
	Large meal	58	27.0
	More than desired	44	20.5
Experience of stress	Yes	117	54.4
	No	98	45.6

Table 2. Occurrence of GERD symptoms among study participants (n = 215)

Variable	Category	n	%
Food regurgitation	Yes	94	43.7
	No	120	55.8
Heartburn (burning sensation in chest)	Yes	91	42.3
	No	124	57.7
Acid reflux (sour taste in mouth)	Yes	74	34.4
	No	141	65.6
Nausea or vomiting	Yes	62	28.8
	No	153	71.2
Frequency of GERD symptoms	Daily	7	3.3
	2–3 times/week	18	8.4
	Occasionally	60	27.9
	Never	130	60.5
Endoscopy or pH monitoring test for GERD	Yes	13	6.0
	No	202	94.0
Diagnosed with GERD	Yes	19	8.8
	No	196	91.2
Quantity of meal consumed	Small meal	113	52.6
	Large meal	58	27.0
	More than desired	44	20.5
Regular medication use (PPIs, stress-relieving agents, etc.)	Yes	32	14.9
	No	182	84.7

Discussion

This study included 215 participants, 135 being males and 80 being females. This study indicates that low physical activity, obesity, smoking, desserts and sweet intake in large quantities, alcohol consumption, depression, and visceral obesity are among the critical risk factors for GERD.

Studies in the past have shown a positive interaction between GERD and high intake of sweets and desserts. A review study shows that fatty, fried, and spicy foods, carbonated drinks, canned tomatoes, coffee, and chocolate are the main trigger factors for GERD [20]. Certain factors such as frequency of meal intake, consumption of mint tea, and indulging in a substantial dinner were identified as risk factors for the development of GERD [21].

Several studies in the past have reported an inconsistent relationship between GERD and consumption of alcohol and smoking. The odds of GERD are 23% higher in smokers than in non-smokers [22]. A previous study also showed that smokers are at a higher risk of developing GERD [14]. A positive correlation between daily alcohol intake and Barrett's esophagus has been reported [23]. Furthermore, it was reported that there is no significant difference in the prevalence of reflux based on the amount of alcohol being consumed [18].

A significant relationship has been indicated between GERD and sleep duration. It was found that individuals with GERD have a shorter sleep duration [22]. A study in Sweden also indicated that inadequate sleep increased the reflux associated with GERD [24]. There is a two-way connection between GERD and sleep. GERD is linked to various sleep disorders. A lack of sleep can aggravate GERD and nighttime GERD can affect sleep. An improvement in GERD can cause better sleep, which in turn can alleviate GERD [25].

A significant relationship between waist hip ratio (WHR), visceral fat area (VFA), and GERD has been studied, and these factors were found to increase the odds of GERD [22]. A study in Korea stated that abdominal obesity is an independent risk factor for reflux that later resulted in esophagitis [26]. Hence, weight management reduces the complications and symptoms of GERD.

The effects of GERD have also been successfully linked to depression. The odds of GERD are 46% higher in depressed individuals [22]. A retrospective cohort study indicated high levels of anxiety and depression among the individuals with GERD [27]. A study with Mendelian randomization indicated a two-way relationship between GERD and increased risk of anxiety and depression [28]. It is therefore suggested that clinical specialists in the treatment of GERD should also focus on depression and anxiety-related symptoms.

Our study supports the previous results that physical activity reduces the risk of GERD. A recent study indicated that individuals with moderate and high levels of exercise

have a 29–31% lower chance of experiencing GERD [22]. The effects of physical activity on the symptoms of GERD such as reflux depend on the type of exercise and its duration [29,30]. It was reported that physical activity can lower the chances of GERD among obese individuals [31]. Some studies claim that heavy exercise and physical activity after taking meals can reduce the occurrence of GERD in healthy individuals and athletic people [32]. Increased physical activity level is recommended as a preventive measure against reflux

This study provides readers information about the prevalence, risk factors, and symptoms of gastroesophageal reflux disease among medical students. Firstly, the sample size was relatively small and limited to a single institution. Secondly, all the results are based on data provided by the participants through a self-reported questionnaire, so there are chances of recall bias. Thirdly, the study population consisted only of medical students of Nishtar Medical University, Multan, so the results may not be generalized to other populations or regions. Fourthly, data were collected during a specific period of time, so there may be differences in results at different time frames. Moreover, the diagnosis of GERD was based on self-reported symptoms rather than confirmed by endoscopy or pH monitoring, which limits the clinical accuracy of the findings. Future researchers need to perform case-control or cohort studies on larger and more diverse populations for a better understanding of this topic.

Conclusion

Food regurgitation and heartburn are the most common signs of GERD. Going to sleep immediately after taking a meal increased the frequency of GERD. Smoking and alcohol consumption also aggravated GERD symptomigns of GERD. Obesity was also found to have increased the frequency of GERD. Regular consumption of spicy and fried food items also increased heartburn, food regurgitation, and acidity. Regular consumption of carbonated drinks caused acidity and pain in the epigastrium. GERD symptoms were more prevalent in participants with bad and irregular dietary habits and in smokers. Regular exercise was found to relieve the symptoms of GERD.

Data availability statement

The raw data supporting the conclusions cannot be made publicly available due to ethical restrictions and the privacy of participants, as the dataset contains personal information of the participants.

Ethical considerations

This study was approved by the Institutional Ethical Review Board (IERB) of Nishtar Medical University, Multan via reference no. 13020/NMU.

Consent for participation

All participants gave informed consent for participation in this study.

Consent for publication

All participants gave consent for the publication of the results of this study.

Declarations

Ai (Claude Sonnet 4.6) was used for improving language and grammatical errors.

Conflict of interest: None.

Funding: None.

Acknowledgements: Not applicable.

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Authors' contributions

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