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REVIEW

Insight into global burden of gastroesophageal reflux disease: Understanding its reach and impact

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Abstract

The exact worldwide prevalence of gastroesophageal reflux disease (GERD) remains uncertain, despite its recognition as a common condition. This conundrum arises primarily from the lack of a standardized definition for GERD. The gold standard diagnostic tests for GERD, such as pH impedance testing and endoscopy, are cumbersome and impractical for assessing community prevalence. Consequently, most epidemiological studies rely on symptom-based screening tools. GERD symptoms can be both esophageal and extraesophageal, varying widely among individuals. This variability has led to multiple symptom-based definitions of GERD, with no consensus, resulting in prevalence estimates ranging from 5% to 25% worldwide. Most systematic reviews define GERD as experiencing heartburn and/or regurgitation at least once weekly, yielding a calculated prevalence of 13.98%. In 2017, the global age-standardized prevalence of GERD was estimated at 8819 per 100000 people (95% confidence interval: 7781-9863), a figure that has remained stable from 1990 to 2017. Prevalence increases with age, leading to more years lived with disability. GERD significantly impairs quality of life and can lead to multiple complications. Additionally, it imposes a severe economic burden, with the United States alone estimated to spend around 10 billion dollars annually on diagnosis and treatment. In summary, GERD prevalence varies greatly by region and even within different areas of the same province. Determining the exact prevalence is challenging due to inconsistent diagnostic criteria. However, it is well-documented that GERD poses a significant global burden, affecting the quality of life of individuals and creating a substantial healthcare cost.

Key Words: Gastroesophageal reflux disease; Global; Prevalence; Heartburn; Screening

Core Tip: Globally, the prevalence of gastroesophageal reflux disease (GERD) and GERD symptoms vary depending from country to country and region to region. Defining GERD and pinpointing its prevalence are problematic due to its diagnostic issues. However, understanding the differences in prevalence will help us identify the differences in associated risk factors, such as genetics and diet, that lead to an individual's susceptibility to suffering from GERD and its symptoms.

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INTRODUCTION

Effortless reflux of gastric contents into the esophagus is a normal physiological process termed gastroesophageal reflux. However, when such reflux occurs frequently and for a prolonged duration, it can lead to symptoms such as heartburn and regurgitation. Gastroesophageal reflux can lead to complications such as esophagitis or strictures. This is termed gastroesophageal reflux disease (GERD)[1,2]. GERD is a multifactorial disease with a complex pathophysiology, usually simplified to a malfunctioning lower esophageal sphincter[3]. It is linked with many genetic and behavioral risk factors such as diet, obesity, mental stress, and medications[4-9]. It is discussed extensively as a common condition[10]. However, its exact worldwide prevalence is not estimated, despite many attempts. The main reasons are the lack of uniform diagnostic criteria and the diversity of underlying symptoms. This article attempts to shed light on the epidemiology of GERD, its impact, and related issues.

Clinical features of GERD

GERD gives rise to a wide range of unpleasant symptoms, both gastrointestinal and extraintestinal. The most common symptoms of GERD are listed in Table 1. Of them, heartburn is recognized as the commonest symptom and the strongest indicator of GERD[11,12]. While heartburn is defined in the Montreal consensus as "a burning sensation in the retrosternal area"[13], the interpretation of "heartburn" and its perception vary in each culture, country, and language, as there are no direct translations of the term "heartburn" in many languages[14]. This issue can confound research[15]. Some non-English speaking populations and Asian cultures like Chinese do not have a term equivalent to heartburn, and dyspeptic symptoms can be counted as part of the diagnosis. Heartburn can also be due to several disorders other than GERD, such as heart disease, gallstones, and eosinophilic esophagitis[16-18]. Despite such issues, heartburn is said to have a 78% sensitivity and 60% specificity[19]. The second commonly described symptom is regurgitation[20], which is defined as the "perception of the flow of refluxed gastric content to the mouth or hypopharynx" or can simply be described as the feeling of a sour taste inside the mouth or fluid moving up in the chest[13,20]. This symptom can also be present in other disorders such as achalasia cardia and rumination syndrome[13,21,22].

GERD classification

GERD can be classified as erosive reflux disease (ERD) and non-ERD (NERD)[23]. When reflux-induced esophageal inflammation/ulceration is noted on endoscopy, it is diagnosed as esophagitis[23]. Esophagitis is graded based on the Los Angeles classifications A, B, C, and D[24], with only Grades C and D considered ERD (Table 2)[25]. Patients with NERD have no endoscopic changes but still show abnormal acid exposure time (AET) in 24-hour multichannel intraluminal impedance and pH monitoring (MII-pH). Approximately 50%-85% of all GERD cases are said to be classified as NERD[26].

Differential diagnoses of GERD

Many diseases can mimic GERD. Some of these conditions are listed in Table 3. Two important differential diagnoses of GERD presenting with symptoms of heartburn and regurgitation are reflux hypersensitivity (RH), where normal physiological refluxes elicit symptoms and functional heartburn (FH), where there is no evidence either on the ambulatory pH monitoring or endoscopy, but the patient still complains of heartburn[27,28]. A further problem is that RH and FH can overlap with GERD, as patients can continue to suffer from symptoms despite improvement of reflux and esophagitis[29].

DIAGNOSIS OF GERD

The initial diagnosis of GERD is usually symptom-based but can be confirmed by upper gastrointestinal endoscopy or combined multichannel intraluminal impedance and pH monitoring (MII-pH)[30].

Symptom-based diagnosis of GERD

Clinical history plays a large part in the first-time diagnosis of GERD and is also the main tool used in epidemiological

Table 1 Common symptoms of gastroesophageal reflux disease

Ref.	Symptom
[97]	Non cardiac chest pain
[11]	Heartburn
[20]	Regurgitation
[98]	Dysphagia
[99]	Globus sensation
[13]	Epigastric pain
[100]	Dyspepsia
[101]	Belching
[102]	Gall bladder disease
[33]	Nausea
[103]	Headache
[104]	Disturbance of sleep
[13]	Dental erosions
[105]	Increased salivation
[106]	Temporomandibular dysfunction
[107]	Chronic cough
[108]	Laryngitis
[109]	Asthma
[110]	Chronic otitis media
[111]	Chronic sinusitis
[112,113]	Taste and smell changes
[114]	Asymptomatic

Table 2 Los Angeles classification of reflux esophagitis

Grade	Criteria
A	One or more mucosal breaks < 5 mm that do not extend between the tops of two mucosal folds
B	One or more mucosal breaks > 5 mm that do not extend between the tops of two mucosal folds
C	One or more mucosal breaks that are continuous between the tops of two or more mucosal folds but that involve < 75% of the circumference

studies[13]. Since investigations used to confirm GERD are invasive and uncomfortable, the symptom criteria play a very significant role in the diagnosis of this condition. From the vast array of symptoms, heartburn and/or regurgitation have a somewhat higher sensitivity and specificity for the diagnosis of GERD and are considered "typical" symptoms[13]. However, diagnosing GERD by clinical history alone is inaccurate since some patients with GERD are asymptomatic or have atypical symptoms other than typical symptoms such as heartburn and regurgitation[31,32]. The Diamond Study findings showed that even a history taken by an expert (*e.g.*, a gastroenterologist) has a sensitivity and specificity of just 70% and 67%, respectively, compared with pH impedance testing or endoscopy[33].

The lack of universally recognized criteria to grade the severity of GERD is another major issue in assessing the burden of this condition. Vakil *et al*[13], in the Montreal classification with 44 content experts, defined patients with GERD as those who have mild symptoms occurring on ≥ 2 days of the week or those having moderate to severe symptoms occurring on ≥ 1 day of the week. However, according to a review by Nirwan *et al*[34] in 2020, only 10 studies have used this definition when studying GERD. Many tools and questionnaires are developed and used for GERD screening (Table 4), but the majority, including questionnaires such as the GERD Questionnaire (GerdQ) and Reflux Disease Questionnaire, do not have the sensitivity and specificity of pH impedance studies[33]. The systematic review by Nirwan *et al*[34] identified 14 different definitions of GERD being used together with 12 different tools and questionnaires (Table 4). These can measure different or similar dimensions, including symptoms, frequency, and severity, and are used in various regions and countries of the world in various languages. These cultural changes lead to issues regarding interpretation as well[15]. Furthermore, some studies, despite using the same tool, had used different cut-offs, leading to further confusion

[34]. The screening tools can also give different results based on the duration questioned, with the highest and lowest GERD prevalence found in those tools that collected data for the past 12 months and 1 month, respectively[34].

One of the most used questionnaires worldwide is the GerdQ[35]. This is utilized worldwide and has been translated into many languages[36]. It questions the frequency of heartburn and regurgitation as well as sleep disturbance and use of medication for those two symptoms for the past week and gives positive marks, while non-cardiac chest pain and nausea give negative points. GERD is diagnosed if the marks are equal or more than 8[36]. One of the eight questions in GerdQ is "How often does a patient use medication for heartburn or reflux other than what the doctor prescribed?" In countries where the prescribing is not streamlined, self-medication is common, and the ability to buy "prescription drugs" over the counter without a doctor's prescription is rampant, this question might not be relevant. Despite all the criticisms of decreased sensitivity and specificity, diagnosis of GERD based on usual symptoms is practical and affordable, and many international guidelines support it[1].

Confirmatory tests for GERD

Endoscopy: Endoscopy can identify erosive esophagitis and its complications[23]. Erosive esophagitis is the most common endoscopic manifestation seen in GERD and is reported in 3%-16% of patients, with most having mild esophagitis[37]. However, most GERD patients do not have visible mucosal lesions. Patients with a negative result on endoscopy are recommended to undergo pH impedance testing to confirm the diagnosis of NERD.

24-hour pH impedance: MII-pH can identify the retrograde bolus movement, number of reflux events, total reflux time, the association between symptoms and reflux episodes, and acidic, weakly acidic, and alkaline refluxes[38]. Thus, it is the most sensitive and specific investigation in diagnosing GERD[38]. It can also differentiate GERD from FH and RH. There are many controversies in using 24-hour pH impedance in diagnosing GERD. The Lyon consensus in 2018 proposed that an AET of less than 4% for 24 hours be considered normal and that those above 6% are definitively abnormal and considered GERD. Those within 4% to 6% are recommended to have an adjunctive measure to prove GERD. The consensus also proposes that more than 80 reflux episodes lasting 24 hours are considered abnormal, while less than 40 is normal[25]. However, there are many limitations regarding diagnosis *via* AET, as cut-off values have been rebutted or contradicted by research done worldwide with high variability in studies that calculated normal values for AET[39,40].

MII-pH also had many regional differences which were further complicated by the different analytic systems and software used in different countries[41]. Cut-offs and normal values for MII-pH are further controversial due to other reasons as well. One is that their values rely on very small cohorts of healthy volunteers from only a few countries[42,43]. Another reason is that there is significant inter-reviewer variability due to technical issues related to analysis such as artifacts and subjective identification of reflux events[44]. Thus, it is problematic that despite all these differences related to different systems and regional differences, the GERD categorization is still related to the Lyon consensus with a fixed cut-off[25]. Furthermore, different systems were used to detect MII-pH metrics, and a significant number of false-positive refluxes in automated analyses of these systems were identified[45,46]. Some experts now recommend lower AET values to diagnose GERD than the Lyon consensus, going as low as 3.2%[47].

High-resolution manometry of the esophagus: High-resolution manometry (HRM) is not a diagnostic test for GERD and most GERD patients have a normal manometric study. However, there can be abnormalities in the LES or the esophageal body that can be detected by HRM[25]. It is recommended in patients with treatment-resistant GERD as it can identify conditions such as achalasia, hiatal hernia, abnormal LES pressures, and esophageal dysmotility that can give rise to GERD symptoms[48]. Manometry also helps identify the exact location of the LES, which helps with the accurate placement of pH sensors[48]. Combined impedance and HRM can also differentiate GERD from rumination[49].

Updates to consensus in diagnosis of GERD

Figure 1 summarizes the currently accepted GERD diagnostic guidelines published by leading authorities in gastroenterology, including the Lyon consensus, Porto consensus, British society, and American College of Gastroenterology guidelines[1,25,50,51].

GLOBAL PREVALENCE OF GERD

Conundrum in obtaining global prevalences

The global prevalence of GERD remains unclear, despite its frequent mention as a common condition. This uncertainty primarily arises from the absence of a universally accepted definition of GERD. A key issue is that the gold standard for diagnosing GERD, the combined pH impedance testing (MII-pH), is underutilized. This limitation is due to both the invasive nature of the procedure and the limited availability of facilities equipped to perform it. MII-pH as well as endoscopy is cumbersome and cannot be carried out in a practical setup to identify the community prevalence of a country or region. Furthermore, despite endoscopy being more widely utilized than ambulatory pH studies, with its inability to identify NERD[53], it cannot be utilized to identify community prevalence, especially in pediatric age groups. Thus, most of the studies on the epidemiology of GERD used various questionnaires as screening tools to assess the symptoms of GERD. The symptoms of GERD can be both esophageal and extraesophageal with much variation, with also an added component of asymptomatic patients[54].

These account for the wide variety of prevalence estimates presented, ranging from 5% to 25% worldwide[6]. Some systematic reviews by experts have used heartburn and or regurgitation at least once weekly as their cut-off for GERD

Table 3 Diseases with symptoms overlapping with gastroesophageal reflux disease

Ref.	Diseases with overlapping symptoms
[115]	Eosinophilic esophagitis
[116]	Infectious esophagitis
	Esophageal candidiasis
	Herpes and cytomegalovirus esophagitis
[117]	Drug-induced esophagitis
[118]	Achalasia and esophageal motility disorders
[119]	Pharyngeal and esophageal diverticula, rings, and webs
[120]	Disorders of gastric motility/ gastroparesis
[121]	Gastritis & peptic ulcer disease
[122]	Gluten-related disorders
[123]	Functional gastrointestinal disorders: Functional chest pain, functional heartburn, reflux hypersensitivity, globus sensation, functional dysphagia, functional dyspepsia, postprandial distress syndrome, epigastric pain syndrome, belching disorders, and rumination syndrome
[124]	Functional abdominal bloating/distension and esophageal and gastric carcinoma
[125]	Cardiac disease
[126]	Gall bladder and pancreatic diseases

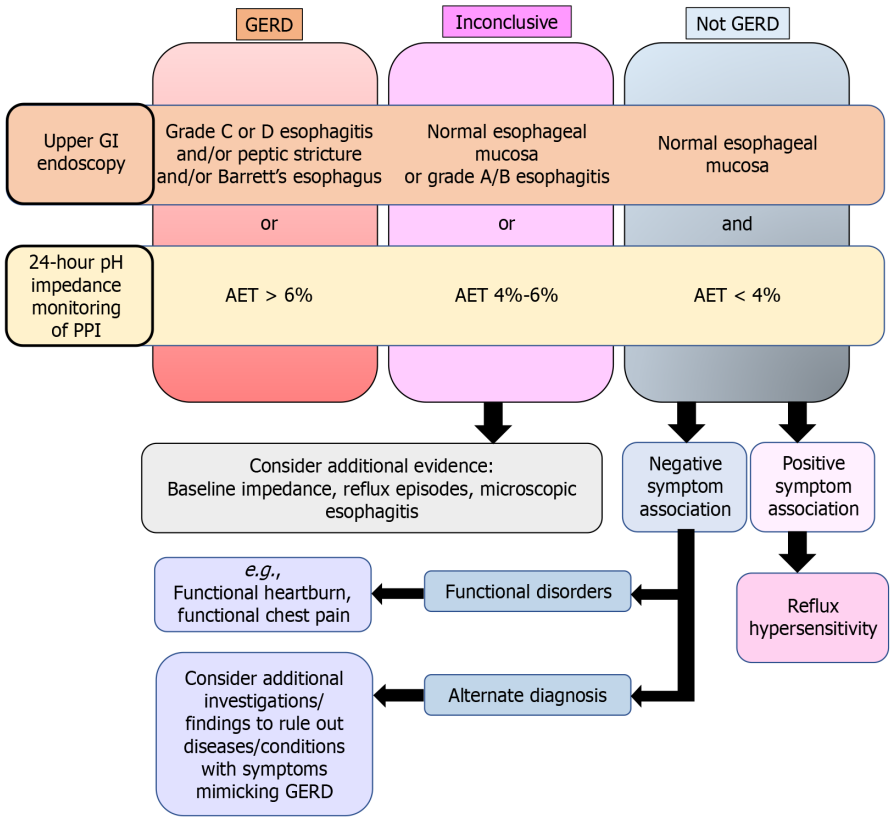

Figure 1 Pathway for diagnosing gastroesophageal reflux disease. GERD: Gastroesophageal reflux disease; GI: Gastrointestinal; PPI: Proton pump inhibitor; AET: Acid exposure time.

when going through studies worldwide[55]. The latest comprehensive systematic review and meta-analysis on GERD was conducted by Nirwan *et al*[34] in 2020. The definition was "having heartburn and/or regurgitation at least once weekly". However, this does not represent the other multitude of GERD patients who might be asymptomatic or have other symptoms other than heartburn or regurgitation as well as those who fit into other differential diagnoses of GERD such as RH and FH.

Table 4 Tools and questionnaires developed and used for gastroesophageal reflux disease screening

Tool or questionnaire	Abbreviation
Gastroesophageal reflux disease questionnaire	GerdQ
Reflux Disease Questionnaire	RDQ
Carlsson-Dent Questionnaire	CDQ
Bowel Disease Questionnaire	BDQ
Frequency Scale for the Symptoms of GERD	FSSG
General Health Questionnaire-28	GHQ-28
Gastrointestinal Symptom Rating Scale	GSRS
Domestic/International Gastroenterology Surveillance Study	DIGEST
Subjective Symptom Assessment Profile	SSA-P
GERD Symptom and Medication Questionnaire	GERD-SMQ
Chest Pain Questionnaire	CPQ
Quality of Life and Utility Evaluation Survey Technology	QUEST
Infant Gastro-Esophageal Reflux Questionnaire	I-GERQ
GERD Activity Index	GRACI
Esophageal Symptom Questionnaire	
Standardized Esophageal Symptom Questionnaire	
Ulcer Esophagitis Subjective Symptoms Scale	UESS
GERD Activity Index	GRACI
Digestive Health Status Instrument	DHSI
Modified Bowel Disease Questionnaire	BDQ
GERD Symptom Assessment Scale	GSAS
GERD Screener	

GERD: Gastroesophageal reflux disease.

Prevalences of GERD global, regional, and country-wise

The recent systematic review conducted by Nirwan *et al*[34], reported a global prevalence of 13.98%, using 102 studies. The highest pooled prevalence of GERD is reported in Turkey (22.4%). The lowest GERD prevalence has been reported in China (4.16%). The prevalence of GERD in North America and Europe is 19.55% and 14.12%, respectively[34]. Pooled prevalence was not calculated in some regions such as Asia in this systematic review. Even though several few South Asian studies (from Bangladeshi and India) were cited in this systematic review, the pooled prevalence was not calculated for this region[34]. When the definition of heartburn and/or regurgitation at least once a week was used, the prevalence of GERD in Bangladeshi was 5.25%[56] and in Indian studies it was 7.6%[57] and 23.6%[58], respectively. A recent study from Sri Lanka in 2024[59], using the same definition as that used by Nirwan *et al*[34], reported a country-wide prevalence of 25.3%, which is higher than that of Turkey, the country with the highest pooled prevalence reported by Nirwan *et al*[34]. Table 5 shows the data on regional and country GERD prevalences around the world updated with the latest data using the definition used by Nirwan *et al*[34].

When one moves away from the definition of GERD as heartburn and/or regurgitation once a week and analyzes the studies done with other questionnaires, the prevalence is even more variable. The Western hemisphere has a higher prevalence of GERD, with prevalence rates of 27.8% in North America, 25.9% in Europe, and 23% in South America given as examples[6,60]. A prevalence of 19.55% was noted in the North American region[34], with at least 30% of the United States population having GERD symptoms at least one time in their life[61]. An Australian study reported a prevalence of GERD symptoms of 12% in their subjects[62], while another estimated it at 9.2%[63]. Studies done in Latin America have shown that GERD prevalence is around 11.9% and 31.3%[64].

GERD was reported traditionally as being less common in Asian countries, with the prevalence ranging around 2% to 7%[6,37,65,66]. But over the last decades, it has been noted to be increasing in Asia, most probably due to the westernization of diets[14,67]. In Eastern Asian countries, the prevalence, which was around 2.5% to 4.8% in 2005 increased to 5.2% and 8.5% in 2010. This rise is seen higher in Southeast and Western Asian countries where in 2010 the prevalence was noted to be around 6.3% to 18.3%[65]. This rise is also noted by many studies done in China where the current estimate is pooled at 4.16%[34,68]. While the above-quoted number is quite small, surprisingly studies done in

Table 5 Pooled prevalence of gastroesophageal reflux disease according to geographical location

Geographical location	Number of studies used for calculation by Nirwan *et al*[34], 2020	Number of participants	GERD prevalence, %
Global			
Overall	102	469899	13.98
Male	50	122849	15.69
Female	50	138435	17.17
Hemisphere			
Western			10-20[6,55]
Eastern			2-7[6,127]
Continents			
Asia	54	240451	12.92
Europe	29	90057	14.12
North America	9	20525	19.55
Latin America and the Caribbean	4	12756	12.88
Oceania	4	3760	13.78
Africa	2	2350	NA
Countries			
China	10	36887	4.16
Japan	7	27912	13.81
South Korea	7	43897	5.84
Taiwan	1	1238	NA
Indonesia	1	278	NA
Bangladesh	1	2000	5.25[56]
India	3	6296	NA
Iran	16	102295	18.43
Turkey	4	13332	22.4
Israel	2	3008	NA
Saudi Arabia	2	3308	NA
Poland	1	850	NA
Romania	1	184	NA
Russia	2	8877	NA
Albania	1	845	NA
Italy	2	2032	NA
Greece	1	700	NA
Spain	3	5365	NA
Switzerland	2	7736	NA
Netherlands	1	502	NA
France	2	46377	NA
Germany	1	268	NA
Sweden	4	8120	16.15
Finland	1	1700	NA

Norway	1	44997	NA
United Kingdom	4	12467	14.53
Denmark	1	48027	NA
United States	8	19489	21.04
Canada	1	1036	NA
Argentina	1	839	NA
Brazil	1	3934	NA
Uruguay	1	1141	NA
Colombia	1	6842	NA
Australia	3	2982	12[62], 9.2[63]
New Zealand	1	778	NA
Nigeria	1	410	NA
Côte d'Ivoire	1	1940	NA
Sri Lanka	1	1200	23.5[59]

GERD: Gastroesophageal reflux disease; NA: Not available.

neighboring Taiwan meanwhile showed a prevalence of around 25%[69]. Far Eastern countries such as China, Japan, and South Korea had a prevalence that was very much lower, while in the Middle Eastern region, the quoted prevalence rates are quite higher[6]. A study done in Saudi Arabia showed the prevalence of GERD at 45.4%[70], while a study done in Iran quoted 43.07% as the percentage of the population having GERD symptoms[71]. The prevalence studies done in India show varying percentages ranging from 10%[72] to 19%[73], and even 22.2% in South India[74].

Prevalences of different GERD symptoms

Except for heartburn or regurgitation, which are the typical GERD symptoms, the others are considered atypical GERD symptoms[13]. We compared various aspects of the symptom profile of studies done around the world using the same GERD definition used by Nirwan *et al*[34]. The prevalence of symptoms other than heartburn and regurgitation in those with GERD was wide and varied among studies worldwide[75]. For instance, a study from Sri Lanka found that bloating, affecting 55.6% of GERD patients, was the most troublesome symptom after heartburn and regurgitation[59]. This finding contrasts with a Korean study, where only 15.2% of GERD patients reported bloating[76]. In Turkey, dysphagia affected 11.9% of those with GERD[77], whereas a study from China reported a significantly higher dysphagia rate of 35.7% among GERD patients[78].

Even the prevalence of those who suffer from daily heartburn and regurgitation differs from country to country. In a study in Turkey, which has a similar sample size (n = 1345) and a similar GERD prevalence (19.3%) as the study conducted in Sri Lanka, the prevalence of daily symptoms of heartburn and regurgitation was 1.2% and 1.2%, respectively, which is lower than reported from Sri Lanka (25.3% and 15.8%, respectively)[59,77]. Studies show conflicting results on whether heartburn or regurgitation is the most common typical symptom in patients with GERD. Some researchers have suggested that heartburn is more frequent than regurgitation[56], while others have reported regurgitation to be more frequent[79].

Prevalence of confirmed GERD

Due to the unavailability of conducting endoscopy and pH-impedance testing to diagnose and identify GERD in the general population, the prevalence of confirmed GERD is still not available as of now. The global age-standardized prevalence of GERD in 2017 was calculated to be 8819 cases per 100000 population (95% confidence interval: 7781-9863). This prevalence has been stabled from 1990 to 2017, but with increased prevalence in older age groups and increased years lived with disability[80]. The Global Burden of Diseases Study 2019 calculated that from 1990 to 2019, the total number of prevalent cases and incident cases increased by 77.53% (from 441.57 million in 1990 to 783.95 million in 2019) and 74.79%, respectively[81].

FACTORS ASSOCIATED WITH GERD

GERD has many associated factors as well as risk factors[5]. These are summarized in Table 6. These factors, especially diet, could be the reason for the wide variations of prevalence in countries worldwide.

Table 6 Factors associated with gastroesophageal reflux disease symptoms

Factor	Evidence
Age	With increasing age, the elasticity of the pharyngoesophageal membrane reduces, progressively leading to hiatal hernias, predisposing to GERD[128]; the prevalence of GERD symptoms is highest in those aged 40 to 59 years in the systematic review by Nirwan *et al*[34]
Gender	Females had a slightly higher prevalence of GERD than males in systematic reviews by Nirwan *et al*[34] and Friedland *et al*[128]
Education level	Those with the lowest education level had the highest GERD prevalence, whilst those with the highest level of education had the lowest GERD prevalence[34,129]
Ethnicities	Ethnicities can play a role in development of GERD even in the same country[14], though some studies did not find any significant difference[59]
Economic strata	Lower-income groups are reported to have a significantly higher prevalence of GERD[34,128]
Urban or rural	GERD is reported to be higher in urban populations[34,74,130]
Obesity	Obesity is an identified risk factor for GERD[34,131,132]
Mental stress	Mental stress is shown to increase GERD symptoms[9,133]
Diet	Common food items associated with GERD are: Spices[10], carbonated beverages[134], wheat products[135], tea[136], coffee[137], sour and acidic food[138], alcohol[78], chocolate[139], dietary sugar[140]
Habits	Habits associated with GERD include: Large meals[141], sleeping after eating a meal[142], eating a meal fast[135], habit of midnight snacks[143], skipping meals[143], inadequate sleep[134], exercise[142,144], smoking[145]
Diseases and treatments	Some diseases such as asthma[146], diabetes mellitus[147], and different medications[148-151] are known to be associated with GERD symptoms

GERD: Gastroesophageal reflux disease.

IMPACTS OF GERD

Economic burden on healthcare cost

The United States is estimated to spend more than 10 billion dollars per year on the diagnosis and treatment of GERD [25], with an estimated number of up to 4663644 annual hospital visits made for GERD and reflux esophagitis just for the year 2016[82]. A mean ± SD of dollars 6955 ± 35880 was estimated to be the annual disease-related cost per patient for GERD in the United States for the year 2020[83]. Another study in the United States noted that a mean incremental cost of 3355 dollars per employee was associated with GERD, with 17% of it accounting for prescription drug costs and 19% for indirect costs[84]. Increasing severity and complications of the GERD spectrum towards dysplasia and carcinoma result in further expenses as well[83]. The average monthly medical costs for proton pump medications were estimated to be approximately 163 dollars in South Korea[85].

Quality of life

GERD affects the quality of life (QoL) of its sufferers. The Global Burden of Diseases Study 2019 has calculated that between the years 1990 and 2019, the estimated years lived in disability has increased by 77.19%[81]. Patients with GERD have lower physical and mental health scores, increased work absenteeism, reduced percent productivity, increased healthcare utilization, and more concomitant diseases. The QoL parameters invariably deteriorate if the severity of GERD increases[86]. Due to its effect on daily life, several QoL questionnaires have been developed alongside screening tools and diagnostic questionnaires[87,88]. Studies using these questionnaires have shown that the QoL of GERD sufferers become worse with increasing age and obesity[89].

Complications

GERD leads to many complications such as reflux esophagitis, Barret's esophagus, and strictures[90,91]. The damage to the esophagus that leads to esophagitis and dysplasia was initially thought to be due to the chemical injury caused by refluxed stomach acid, bile salts, and other erosive and noxious materials in gastric secretions[92]. But now the school of thought is more toward acid-mediated inflammation through cytokines than direct injury[93]. Receptors mediating nociception such as protease-activated receptor-2, also cause inflammation of the mucosa through cytokines such as interleukin-8 (IL-8)[94]. Its levels increase with the progression of the disease, while they decrease with treatment[95]. IL-1β and IL-6 are other cytokines noted to be expressed at high levels in the esophageal mucosa of GERD patients[96]. This inflammatory process of the mucosa of the esophagus is what causes reflux esophagitis or ERD[24].

Continuous inflammation can sometimes change the normal esophageal stratified squamous epithelium into a metaplastic columnar epithelium, leading to Barrett's esophagus (BE). BE is diagnosed if the columnar epithelium is more than 1 cm proximal to the gastroesophageal junction, together with confirmation from biopsies. BE is a concerning situation, as there could be a progression from metaplastic to dysplastic epithelium and even to carcinoma[91]. Mucosal damage and chronic inflammatory changes can also cause fibrosis, scarring, and loss of esophageal distensibility, leading to an esophageal stricture with dysphagia as a symptom[90].

CONCLUSION

GERD is a common disorder with high worldwide prevalence. Its burden on some regions of the world is still not clear due to a lack of research and variations in screening tools and diagnostic criteria. When studied, the prevalence is estimated using GERD symptoms, and the exact prevalence of confirmed GERD (using endoscopy and gastrointestinal physiology investigations) is unknown. Accurate knowledge on GERD prevalence is crucial for allocating resources effectively. This includes ensuring access to gastroenterology specialists and diagnostic tools such as endoscopy, pH impedance testing, and esophageal manometry, as well as medications and facilities for surgical treatment options like fundoplication. GERD is a lifelong debilitating disorder with poor QoL, high health care costs, and multiple complications. Early diagnosis and effective treatment are essential to reduce the burden of this disease on the healthcare system and to improve the QoL. A global consensus must be reached to develop highly sensitive symptomatic diagnostic criteria for screening GERD patients as well as for effective management of this cumbersome and complicated disease.

FOOTNOTES

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