e-ISSN: 0976-822X, p-ISSN:2961-6042

Available online on http://www.ijcpr.com/

International Journal of Current Pharmaceutical Review and Research 2026; 18(2); 659-664

Original Research Article

Association of Dental Erosion with Gastroesophageal Reflux Disease (GERD) in Adult Patients

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Received: 01-11-2025 / Revised: 15-12-2025 / Accepted: 21-01-2026

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Conflict of interest: Nil

Abstract

Background: One chronic gastrointestinal disorder that manifests extra-esophageal is gastroesophageal reflux disease (GERD), and complicated mouth-related problems like dental erosion which is seldom recognized. Dental erosion is the dissolution of the structural components that comprise a tooth caused by an acid attack.

Objective: Assess dental erosion consequences of gastroesophageal reflux disease in adult patients.

Methods: The study was cross-sectional and observational in design done in one year in one hospital with 100 adults diagnosed with GERD. A comprehensive five-sectioned questionnaire was completed encompassing the participant's demographics, medical history, GERD-related factors (duration and severity), dietary, and oral hygiene behaviors. Clinical oral assessment was done and dental erosion scoring was performed using the Basic Erosive Wear Examination (BEWE) index. Data were analyzed using descriptive statistics with Chi-square and SPSS software. A p-value < 0.05 was accepted as statistically significant.

Results: Of the total study participants, 62% had dental erosion. There was a higher prevalence of dental erosion observed in patients with a longer duration and greater severity of GERD symptoms. Among study participants, the correlation of dental erosion and severity of GERD symptoms was statistically significant ($p < 0.05$).

Conclusion: The research identifies a clear link between GERD and dental erosion among adult patients. Tooth erosion and GERD are often overlooked in dental assessments. Early dental evaluations and interdisciplinary approaches are pivotal in obtaining a diagnosis and managing care to enhance outcomes.

Keywords: Gastroesophageal reflux disease; Dental erosion; Adult patients; Oral manifestations; Acid reflux.

DOI: 10.25258/ijcpr.18.2.106

Introduction

Gastroesophageal reflux disease (GERD) is a long-term medical condition in which the contents of the stomach reflux into the esophagus. This causes various symptoms and complications. One of the classic symptoms of GERD is heartburn in which backflow of the stomach acid into the esophagus causes a burning feeling [1]. The complications of GERD is something that affects a majority of the adult population on the globe.

Classic complications that are esophageal in nature include Regurgitation (bringing swallowed food back up) and a feeling of discomfort in the chest and trouble swallowing. Other than the classics manifestations the leads to problems in the respiratory and the otolaryngological and the oral systems. Other systems that are impacted by GERD are at a greater risk for bone disease due to lower bone density [2]. Of most concern is damage to the stomach and esophagus that results from acid reflux. The pathophysiology of GERD entails sclerosus of the lower esophageal sphincter, esophageal clearance insufficiency, atonic gastric emptying, or elevation of intra-abdominal pressure resulting in recurrent contact of the stomach acid esophageal and buccal tissues [3].

Refluxed contents are usually comprised of hydrochloric acid and pepsin, both of which are erosively potent. When such acid reflux enters the mouth, it can modify the oral cavity and make the salivary pH low, and exceed the buffering capacity

of the saliva [4]. Repeated and long-standing contact of the oral cavity with intrinsic are acids the evokes irreversible destruction of the hard tissues of the teeth and more distinctly the enamel, leading to an ulcerated mouth. Several oral complications have been associated with gastroesophageal reflux disease (GERD), including burning mouth syndrome, altered taste, concern regarding dry mouth (xerostomia), hypersensitivity of teeth, mucosal redness (erythema), and dental erosion [5]. Measurable dental erosion (DE) is one of the most significant oral complications of this disease. DE is described as the irreversible loss of dental hard tissue caused by chemical actions, excluding the action of bacteria [6]. While dental caries are caused by bacterial activity, dental erosion, seen in GERD patients, is caused by direct contact of the tooth surfaces to the acid. The patients with GERD generate the DE that rises to the level of mouth during teaching. 2 The gastric acid stroimedy autogenously by stomach in GEttD patient is most corrosive acid beby use of harmful retux and it has low est pH. In GERD, the dental erosion results from the acid attack on enamel and dentin after repeated contact with gastric acidic fluid and due to frequent demineralization. Enamel, containing worse these cells in the mammal organism consists of calcium-phosphate, particularly of hydroxyapatite which is dissolved when contacting with stomach acid and as a result the structure declines. This is a slow process, producing erosion of enamel and exposure of dentin first and characteristic lesions on the "palatal" surfaces of maxillary teeth later. The lesions are shiny and smooth, and may be cupped.

GERD erosion is a multifactorial problem. Factors such as reflux frequency and duration, salivary flow, diet, and oral hygiene can all contribute to erosion [7].It is thought that intrinsic gastric acid reflux is more erosive than extrinsic dietary acid due to the lower pH and proximity of the acids, especially at night.

As the adult population continues to grow, the next biggest challenge is the oral manifestations of GERD. Obesity, stress, and bad dietary habits have led to a state of unrecognized dental erosion which is a concerning remote esophageal complication of GERD that often goes unrecognized because there is simply not enough tooth structure remaining to be identified by a dentist [8].

As initials signs of undiagnosed reflux disease, the early dental diagnosis of erosion in patients with GERD is particularly relevant in the context of patients with silent or atypical symptoms of GERD. Erosion is one of “the first signs of damage, and as such, dentists are in a unique position as the first healthcare professionals to note signs of erosion and initiate the first referral and appropriate management [9]. Early interventions will limit the extent of tooth damage, control the degree of hypersensitivity, and provide better health for the individual’s mouth as well as the erosion to the teeth. Consequently, the socioeconomic status of the patient will increase as the overall quality of the person's health improves. The problem is that even though the awareness of the problem is increasing, there are still no oral screening protocols for patients with GERD, and this is where research and its clinical implications should focus.

National and international studies have documented a significant relationship between GERD and dental erosion, but prevalence rates vary across populations [10]. Certain studies have documented the erosion of teeth to a greater extent and more severely in individuals with long-standing and severe GERD, while other studies have documented more modest correlations [11]. These differences could be a result of study design, sample and criteria, and evaluation, and method of dental erosion assessment. Furthermore, there is a paucity of studies that focus solely on adults, especially in the developing world and in regional health systems. The majority of studies have been limited in sample size and poor diagnostic criteria, with indiscretions with dental erosion and GERD, and with no index criteria to help assess erosion. These design flaws illustrate the need for more thoughtful studies on the relationship between adult patients’ GERD and dental erosion [12]. The goal of the current study is to examine the correlation between gastroesophageal reflux disease and dental erosion among adult patients, and provide clinically significant data to advocate for early diagnosis and collaborative management.

Aim and Objectives

Aim: Evaluate the relationship between adult patients' gastroesophageal reflux disease and erosion dental.

Objectives:

- Establishing the extent of dental erosion among adult patients with GERD.
- Determining the extent of dental erosion.
- Assessing the relationship between the duration/severity of GERD and dental erosion.
- Examining the impact of age, sex, nutrition, and oral behavior as potential contributing factors.

Methodology

Study Design: The current research was planned as an observational study within a single medical institution to analyze the relationship between dental erosion and gastroesophageal reflux disease (GERD) in adults.

Since this is a cross-sectional study, it is possible to evaluate both the exposure and outcome at the same time, thus it is appropriate to calculate the prevalence of and describe the relationships within a specified population within a given timeframe.

Study Setting and Duration: The research was carried out in the Department of Dentistry and Department of Gastroenterology at a tertiary care teaching hospital. -Adult patients visiting the outpatient department for the management of Gastroesophageal Reflux Disease (GERD) were included. The study spanned over a year which was sufficient for the adequate recruitment of participants and thorough collection of data.

Study Population: The participants for this study were adults with gastroesophageal reflux disease who were seen in the outpatient department during the study period. The diagnosis of GERD was made by the physician as per the evaluation of the patient's clinical presentation and history. The patients had a variety of demographic characteristics as would be expected in a typical outpatient clinical demographic at a hospital.

Sample Size and Sampling Technique: A total of one hundred adult patients were studied. Due to the time constraint and feasibility issues at the health care setting, this determined the sample size. There was a convenience consecutive sampling method utilized. Every patient who eligible to take part, met the inclusion criteria, and provided consent to participate, was enrolled and this was carried on until the health care setting reached the desired sample size.

Inclusion Criteria

- Participants in the age group 18 years and older
- Participants with a clinical diagnosis of GERD
- Participants who are willing to take part in the study and provide informed consent

Exclusion Criteria

- Individuals suffering from eating disorders (bulimia and anorexia)
- Individuals with a history of chronic vomiting not related to GERD (gastroesophageal reflux disease)
- Patients with occupational exposure to acid
- Patients with extensive restorative dental treatment concealing erosion

Data Collection Tools and Procedure:

All participants were given the same questionnaires which were previously tested and structured the same way, and then underwent the same clinical examination protocols conducted by the same trained examiner, under, the same standardized conditions, and the same dental tools. The Basic Erosive Wear Examination (BEWE), which is valid as well as recognized as a professional tooth wear erosion measure, and examines the systematic erosive wear level across the different sextants, was the dental erosion examination used. The questionnaires used included demographics, medical history and symptoms of gastrointestinal reflux disease (GERD) in addition to the eating and oral hygiene habits of the participants.

Diagnostic Criteria: A clinical diagnosis and the presence of the heartburn and regurgitation complaints from the patient led to the diagnosis of gastroesophageal reflux disease. Regarding the steady erosion, it was diagnosed and classified using the BEWE scoring system which grades erosive wear from the most severely altered surface in each sextant. Participants were individually assessed to determine the overall severity of dental erosion using the cumulative BEWE score.

Ethical Considerations: Pretreatment ethical clearance was taken from the local Institutional Ethical Committee before starting the study. All participants were informed of the details of the study and its purposes, and written consent was obtained from each participant. Patient data were analyzed at all times anonymously, exclusively for the purpose of research, and patient identification was strictly recorded confidential.

Statistical Analysis: The collected data was entered into Microsoft Excel and analysed using SPSS software.

Descriptive statistics were conducted for reporting the mean, frequency and percentage of demographic and study variables. Associations between variables GERD and dental erosion were assessed using Chi-square distribution and correlation analyses to obtain the correlation coefficients. > 0.05 was considered to be not significant).

Results

Demographic Characteristics: One hundred adult subjects with a diagnosis of GERD were included in the study. Subjects were aged between 18-65 years, with the majority falling between 31 and 50 years old.

The mean age of the respondents was 42.6 years (SD = 11.2). Regarding the demographics of the sample, males outnumbered females slightly.

Table 1: Age Distribution of Study Participants (n = 100)

Age Group (years)	Frequency	Percentage (%)
18–30	18	18.0
31–40	26	26.0
41–50	29	29.0
51–65	27	27.0
Total	**100**	**100.0**

Table 2: Gender Distribution of Study Participants

Gender	Frequency	Percentage (%)
Male	56	56.0
Female	44	44.0
Total	**100**	**100.0**

GERD-Related Findings: Duration of GERD, as reported by participants differed from less than one year to more than five years. Among most of the patients, disease duration was documented from 1 to 5 years. GERD was divided into mild, moderate and severe according to the clinical evaluation and degree of symptoms.

Table 3: Duration of GERD among Participants

Duration of GERD	Frequency	Percentage (%)
< 1 year	22	22.0
1–3 years	38	38.0
3–5 years	26	26.0
> 5 years	14	14.0
Total	**100**	**100.0**

Table 4: Severity of GERD Symptoms

Severity	Frequency	Percentage (%)
Mild	34	34.0
Moderate	44	44.0
Severe	22	22.0

Prevalence of Dental Erosion: In the study population, 62% experienced dental erosion. However, among those affected, severity levels differed according to BEWE score. The most frequently noted finding was mild erosion, followed by, in order, moderate and severe erosion.

Table 5: Prevalence and Severity of Dental Erosion (BEWE Scores)

Dental Erosion Severity	Frequency	Percentage (%)
No erosion	38	38.0
Mild erosion	30	30.0
Moderate erosion	20	20.0
Severe erosion	12	12.0
Total	**100**	**100.0**

Association between GERD and Dental Erosion: The presence of dental erosion shows a statistically significant correlation with the duration and severity of GERD. Patients with a longer duration of the disease and more severe symptoms of GERD had higher BEWE scores. Among the patients, 78.6% had dental erosion when the duration of GERD was more than five years. There was a statistically significant correlation between the severity of GERD and dental erosion with the Chi-square method ($p < 0.05$).

Table 6: Association between GERD Severity and Dental Erosion

GERD Severity	Dental Erosion Present	Dental Erosion Absent	p-value
Mild	14	20	
Moderate	28	16	
Severe	20	2	**0.002**

Additional Observations:

There was a greater occurrence of dental erosion among patients with reported frequent consumption of acidic foods and drinks including soft drinks and citrus fruits. While poor oral hygiene and infrequent dental check-ups were associated with greater erosion severity, these findings were not significant.

Discussion

Summary of Key Findings

The current research investigated the connection between GERD and dental erosion among adults. There was a significant report of dental erosion (62%) among the population with GERD, and thus a significant relationship between these two variables. With respect to the duration and severity of the GERD symptoms, dental erosion was more prevalent. Most presentational erosion was 'slight erosion'; this was the only consideration, however, erosive impacts were posted from of a significant cohort of the patients with moderated and severed impacts and thus a greater erosive chronic acid exposure differential . Furthermore, the statistical results highlighted further evidence of the GERD and dental erosion relationship, motivating and justifying the considerations of the oral symptoms along with the GERD syndrome.

Comparison with Previous Studies

This research is in alignment with both global and national research which states that patients with GERD suffer more dental erosion in comparison to others. Previous research has described erosion prevalence to be between 30% and 80% with regard to the population and the criteria for diagnosing the condition [13]. More erosion has also been documented in both European and Asian populations with more chronic reflux disease. 62% prevalence in the present research is also in support of the other evidence of GERD and erosive tooth wear [14]. Case studies documented varying periods of prevalence which can be attributed to the variance in population age, eating habits, diagnostic tools, and criteria used to define dental erosion, along with the regional lifestyle and feeding habits also attributed to erosion [15]. This is also evident in the studies documenting these variances.

Limitations of the Study

What is noteworthy are the study's constraints which must be kept in mind in light of the findings. Conclusons drawn from the study are based on a limited sample and therefore lack generalizability. Due to the study's design, particpants may have displayed more pronounced and/or symptomatic disease manifestations which may have caused selection bias. There are several potential factors that could impact disease classification, particularly that the symptoms were either self-reported, and then subsequently, physician diagosed, or clinically assessed. These concerns merit care in interpreting the analysis and the results.

Recommendations for Future Research

In the future, larger, multicentric populations should be used to obtain higher external validity of the findings. Studies with a longitudinal design would also be useful in determining the time sequence between tooth erosion and GERD progression. Preventive strategies, salivary tests and the established criteria for dental erosion diagnosis would allow greater recognition of oral manifestations associated with GERD.

Conclusion

The current research shows GERD and its comorbid condition, dental erosion in adults, has important findings. Most people with erosive dental damage reported longer disease duration and more severe symptoms. This research contributes to the knowledge of dental erosion as a complication of GERD that is not related to the esophagus. Monitoring changes in the dental structures of GERD patients, as a way to track erosive changes resulting from the reflux disease, is reasonably justified. The fusion of gastroenterology and dentistry most likely will best solve the issue of dental erosion.

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