

# Risk Factors Associated with Oral Manifestations and Oral Health Impact of Gastro-Oesophageal Reflux Disease

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## ABSTRACT

**Background and aim:** The association of gastro esophageal reflux disease with oral health manifestations faced major challenges in terms of invasive investigative approaches to be performed on patients for necessary treatment. The current study aimed to evaluate the risk factors and impact of gastro-oesophageal reflux disease on oral health.

**Materials and Methods:** The cross-sectional study was carried out on 194 gastro-oesophageal reflux disease in Gastroenterology department of Isra University Hospital, Hyderabad for duration of six from July 2020 to December 2020. The individuals underwent duodenoscopy for oesophago-gastro-reflux disease and met the inclusive criteria were enrolled. The gastro-oesophageal reflux disease patients were categorized into two group's namely chronic gastro-oesophageal reflux disease as a group I (97 patients), while mild GORD was group II (97). The exclusion criteria for this study was individuals with limited mouth opening and unconscious patients. Mucosa oral lesion and abnormal conditions were measured as primary and secondary outcomes. Oral Health Impact Profile-14 was utilized for assessment of life quality changes with hard and soft tissue.

**Results:** Of the total 194 patients, 113 (58.2%) were male while 81 (41.8%) were females. The mean age was 48.32±7.56 years with an age range of 20-80 years. The socioeconomic status of the participants was as follows; urban residents 127 (65.5%) and rural 67 (34.5%). The gastro-oesophageal reflux disease prevalence was found 35.6% (n=69) out of which 34.8% (24) were dental erosion (DE). Group I and II had 97 patients each. The group I was comprised of significantly common diseases such as ulceration 52 (53.6%), Oral submucous fibrosis 59 (60.8%), and xerostomia 42 (43.3%). Chronic gastro-oesophageal reflux and dental erosion diseases were statistically significant with an unhealthy pattern of diets such as ulceration, nausea/vomiting, gingivitis, angular cheilitis, and oesophagitis. The prevalence of overall oral tobacco and smoking addiction was 59 (30.4%) and 52 (26.8%). Tea was the most prevalent consumed beverage 141(72.7%). Gastro-oesophageal reflux and dental erosion diseases were positively correlated with oral health assessment scale-14 (p-value <0.05). The psychological discomfort, psychological disability, physical disability, and functional limitation were the notable impacts with their respective ranks correlation coefficient (rs) 0.29, 0.26, 0.28, and 0.19.

**Conclusion:** Gastro-oesophageal reflux and dental erosion disease had higher severity among patients of oral manifestation compared to those with no gastro-oesophageal reflux and dental erosion disease. The systemic and oral disease severity needs to be assessed routinely with dental checkup.

**Keywords:** Oral manifestations, Gastro-oesophageal reflux disease

## INTRODUCTION

Gastro-oesophageal reflux disease is a common syndrome that accounts for 10-20% population. The dental erosion prevalence increased with Gastro-oesophageal reflux disease, especially on palatal and lingual tooth surfaces. The association of gastro esophageal reflux disease with oral health manifestations faced major challenges in terms of invasive investigative approaches to be performed on patients for necessary treatment [1]. The symptoms of extra-oesophageal and oesophageal disease was referred to as entity manifestation by the Montreal consensus [2]. Barrett's oesophagus, chest pain regurgitation, laryngitis, strictures, adenocarcinoma, symptomatology comprised of reflux, and asthma, and dental erosion were the symptomatology of oesophageal [3]. Reduced saliva secretion or harmful gastric reflux caused oral cavity protective buffering capacity compromised leads to dental erosion as a multifunctional phenomenon [4]. Gastro-oesophageal reflux causes dental

erosion appearance as common injuries [5]. The dental erosion prevalence varies from 2%-77% [6].

Tooth surface losses due to non-bacterial origin electrolytes or chemicals produced acids cause dental erosion [7]. The intrinsic origin acids and extrinsic usually come from regurgitated gastric juice and dietary, occupational, medicinal, and recreational sources respectively. Duodenogastroesophageal regurgitated juice produced alkaline bile which leads to dental erosion [8]. Acid regurgitation mostly causes the majority of symptoms of extraesophageal compared to DGER. Dental erosion severity had a direct association with gastric acid contact time with enamel upon which prevalence and reflux problem duration could be evaluated [9, 10]. A significant association between chronic gastro-oesophageal reflux disease and dental erosion was hypothesized. Gastro-oesophageal reflux severity would be lower due to dental erosion absence and shorter duration. The posterior teeth palatal surfaces damage due to tooth involvement with

42% prevalence reported [11]. Many studies determined the effects of the gastroduodenal content on oral pathology (soft tissue) and their dental erosion causing tendency with other parameters such as soft the palate, burning mouth syndrome, voice hoarseness, uvula and erythema, xerostomia, aphthoid, epithelial atrophy, and glossitis. Oesophageal and oral cavity epithelium caused by GORD intensification due to xerostomia and epithelial atrophy [12]. The purpose of the current study was to evaluate the risk factors and impact of gastro-oesophageal reflux disease on oral health.

**MATERIALS AND METHODS**

The cross-sectional study was carried out on 194 gastro-oesophageal reflux disease in Gastroenterology department of Isra University Hospital, Hyderabad for duration of six from July 2020 to December 2020. The individuals underwent duodenoscopy for oesophago-gastro-reflux disease and met the inclusive criteria were enrolled. The gastro-oesophageal reflux disease patients were categorized into two group's namely chronic gastro-oesophageal reflux disease as a group I (97 patients), while mild GORD was group II (97). The exclusion criteria for this study was individual with limited mouth opening and unconscious patients. Mucosa oral lesion and abnormal conditions were measured as primary and secondary outcomes. Oral Health Impact Profile-14 was utilized for assessment of life quality changes with hard and soft tissue. Prior to conduct the study, ethical approval was taken from the institution ethical board. The demographic characteristics such as medical history, gastro-oesophageal reflux disease's risk factors such as addiction profile, GI disorders, tea consumption, BMI changes, and dietary pattern) and drug history was recorded.

A comprehensive gastro-intestinal examination was conducted on all the participants with investigation results on laboratory baseline and their medical prescription routine details. Endoscopy findings and clinical features were used for GORD diagnosis. Oesophageal accurate diagnosis could be obtained through clinical symptoms, dysphagia, plasma biomarker (Erythrocyte sedimentation rate), ulceration and inflammation, and erythema signs. Decayed tooth of the participants, of oral submucous fibrosis (OSF) presence, stage index, mouth opening status and missed filled teeth (DMFT) index value with dental and oral examinations were carried out based on the world health organization standard. SPSS version 20 was used for data analysis. Frequency and percentage were calculated for categorical variables such as the association between GORD oral manifestation and gastrointestinal symptoms.

**RESULTS**

Of the total 194 patients, 113 (58.2%) were male while 81 (41.8%) were females as shown in Figure-1. The mean age was 48.32±7.56 years with an age range of 20-80 years. The socioeconomic status of the participants was as follows; urban residents 127 (65.5%) and rural 67 (34.5%) as shown in Figure 1. The gastro-oesophageal reflux disease prevalence was found 35.6% (n=69) out of which 34.8% (24) were dental erosion (DE). Group I and II had 97 patients each. The group I was comprised of significantly

common diseases such as ulceration 52 (53.6%), Oral submucous fibrosis 59 (60.8%), and xerostomia 42 (43.3%) as shown in Table-1/Figure-2. Chronic gastro-oesophageal reflux and dental erosion diseases were statistically significant with an unhealthy pattern of diets such as ulceration, nausea/vomiting, gingivitis, angular cheilitis, and oesophagitis. The prevalence of overall oral tobacco and smoking addiction was 59 (30.4%) and 52 (26.8%). Tea was the most prevalent consumed beverage 141(72.7%). Gastro-oesophageal reflux and dental erosion diseases were positively correlated with oral health assessment scale-14 (p-value <0.05). The psychological discomfort, psychological disability, physical disability, and functional limitation were the notable impacts with their respective ranks correlation coefficient (rs) 0.29, 0.26, 0.28, and 0.19 as shown in Table 2.

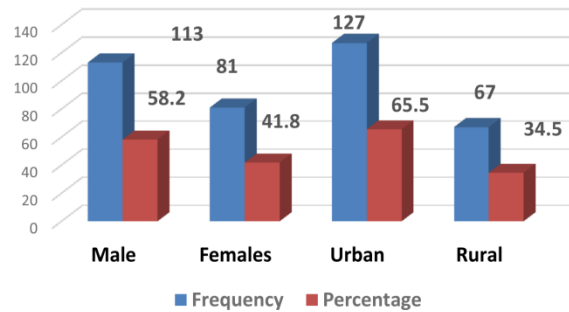


Figure-1 Baseline characteristics Distribution

Table-1 Oral manifestation of group I (GORD patients)

Common Disease	Frequency (n)	Percentage (%)
Ulceration	52	53.6%
Oral submucous fibrosis	59	60.8%
Xerostomia	42	43.3
Gingivitis	76	39.2
Angular cheilitis	37	19.1
Candidiasis	42	21.6
Leukoplakia	8	4.1

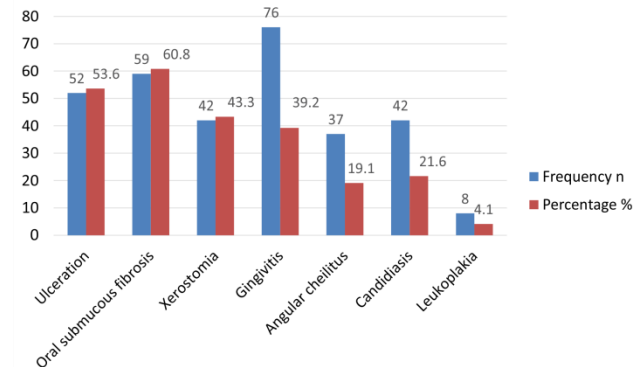


Figure-3 Oral manifestation of Group I

Table-2 Association of GORD with DE calculated based on Oral Health Impact Profile-14

Characteristics OHIP-14	Group-I (97) (with DE)	Group-II 97 (without DE)	Correlation value Spearman ranks (rs)
Physical Pain	1.17 (1.34)	0.736 (0.97)	0.174
Psychological disability	4.61 (1.75)	3.657 (1.954)	0.26
Psychological discomfort	5.241 (1.94)	4.08 (1.993)	0.29
Functional Limitation	3.47 (2.28)	2.601 (1.96)	0.19
Physical disability	5.982 (2.68)	3.986 (2.791)	0.27

## DISCUSSION

The present study tends to determine the risk factors for oral manifestation and oral health impact of gastro-oesophageal reflux disease patients. Various researchers investigated the dental erosion caused by stomach contents reaching the mouth and gastro-oesophageal reflux [13-15]. Dental erosion was found in 20-30% patients having gastro-oesophageal reflux disease. Most of the clinical studies also reported the GORD as confirmed evidence for tooth or dental erosion and found statistically significant association between these two [16-19]. Placebo group had higher enamel lesion of erosion compared to treated group confirmed by double blind three weeks optical coherence tomography [20]. Another study found a significant association between oral manifestations such as mucosal erythema, burning mucosal sensation and halitosis with gastro-oesophageal refluxes [21]. Silent regurgitation accounted for 25% cases of GORD and dental erosion as reported by another study [22].

In our study, we focused on the risk factors, prevalence, severity and distribution of relatively large sample size gastro-oesophageal reflux patients with or without dental erosion. In recent years, the risk factors of GORD with dental erosion has been mainly focused by many researchers. Gastro-oesophageal reflux disease and its impact on dental or oral tissue has been considerably investigated for its periodontal effects [23]. The present study reported GORD prevalence 35.6% with dental erosion while others found the GORD prevalence range (6% to 59%) [24, 25]. Globally, the GORD prevalence varies from 3% to 78% due to various factors such as gender, age, risk factors, and ethnicity [26]. In this particular population, the effect of prominent risk factors (such as metabolic syndrome, obesity, and strong addiction pattern) on GORD development and negligible DE, which provisions the statistic that DE prevalence reported in present study was comparatively low. Additionally, This study investigated the GORD patients who attended tertiary care hospitals for severe ailments. About 43% patients with GI pathologies besides GORD eminent comorbidities were contributed by 34% hepatitis C and 19% CLD as a chronic/severe illness. Moreover, obesity or weight gain was lower in about 75% of the population being the risk factor.

The present study results in terms of ulceration, angular cheilitis, xerostomia, and gingivitis had higher prevalence and association with gastro-oesophageal reflux disease with dental erosion. Our findings matched the previous study results [27]. Saliva plays a prominent role in

oesophageal mucosa protection against qualitative, quantitative abnormalities and gastric reflux associated with GORD [28]. Our study included GORD symptomatological extraoesophageal parameter known as xerostomia due to decreased saliva production as a GORD pathogenesis appearance. Refluxed acid corrosive effect causes aphthoid lesions' as a soft tissue but soft and hard mucosa account for 60% ulcerative lesions participants. Other soft and hard palates are uvula, buccal mucosa and tongue.

Another study reported that dental erosion was caused by lower production of buffering capacity saliva in chronic GORD patients. Similarly, lower dental caries prevalence contributed in chronic GORD patient's saliva lower pervasiveness of cariogenic bacteria [29]. For future studies, confirmation of dental erosion in GORD patients could be associated with each other. However, another study findings regarding dental caries contradict our results which reported the higher index value (DMFT) in chronic GORD patients with dental erosion. Our study also postulated that dental erosion or tooth decay caused significantly by buffering capacity, saliva lower production, and opportunistic bacterial population's increased and direct acid injuries. However, poor hygienic status caused by the prevalence of overall oral tobacco and smoking addiction was 59 (30.4%) and 52 (26.8%). Tea was the most prevalent consumed beverage 141(72.7%). In the GORD population, lack of a healthy dietary was found with an acidic diet pattern [30]. Lower oral pH and an opportunistic bacteria favorable environment was provided due to higher prevalence of tea 72.7% causing dental erosion or tooth decay.

Another study validated the impact of severe GORD with dental erosion on oral health through oral health impact profile 14 based on wellbeing and psychological oral symptoms prospective [31]. This tool has not yet been tested on this population. Using the OHIP-14, we discovered that GORD with DE was significantly correlated ( $p < 0.05$ ) with the following OHIP-14 psychometric characteristics: psychological discomfort, physical disability, psychological disability, functional limitation, handicap, and physical pain. The results matched our findings regarding oral manifestation and gastrointestinal symptoms and conditions. Particularly, GORD prevalence was 43.3% alone while the remaining were GI symptoms and conditions such as portal gastropathy, GORD-related oesophagitis, hernia, gastritis, and PUD believed to be GORD progression or initiation factors [32].

## CONCLUSION

The present study found strong association between chronic Gastro-Oesophageal Reflux Disease and reinforced dental erosion. A positive association was found between chronic GORD and oral manifestation such as ulceration, xerostomia, angular cheilitis, and gingivitis. Oral health is compromised due to increased chances of GORD development with dental erosion by vomiting/nausea affecting soft tissue lesions. Gastro-oesophageal reflux and dental erosion disease had higher severity among patients of oral manifestation compared to those with no gastro-oesophageal reflux and dental erosion disease. The systemic and oral disease severity needs to be assessed routinely with dental checkup.

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