

Prevalence, Etiology and Gender Distribution of Palatal Erosion: A Cross-Sectional Study

Shazia Naz¹, Ayesha Bashir¹, Salman Ashraf², Naureen Sarwar³, Babra Marium Anwari⁴, Kashif Adnan⁴

ABSTRACT

Introduction: Dental erosion is a condition prevalent throughout the world and results in demineralization of enamel and dentine due to non bacterial acids of extrinsic and intrinsic origin. The most frequently affected areas are the palatal surfaces of maxillary incisors and the occlusal surfaces of mandibular first molars. The objective of this study was to find out prevalence, etiology and gender distribution of palatal erosion of maxillary incisors among the patients visiting University College of Dentistry.

Material and methods: This descriptive cross sectional study was conducted at University College of Dentistry, The University of Lahore, during the period of November 2010 to April 2011. After informed consent, a thorough history was taken followed by clinical examination of 532 patients. Modified Smith and Knight Index was used to assess the levels of erosion.

Results: Among the total 532 patients, 132 (24.8%) patients presented with palatal erosion, 72 (26%) males and 60 (23.4%) females. The most notable cause was GERD (47%) due to intrinsic reason, followed by extrinsic reason of acidic drinks/diet (12%), 6% history of medications and 34% were without history of any obvious causative factors.

Conclusion: GERD is the main cause of palatal erosion. Therefore, clinicians must have a thorough knowledge and understanding of GERD so that it can be timely treated or prevented.

Keywords: Palatal erosion, Dental erosion, GERD, Carbonated drinks

Dental erosion is a multi-factorial condition (non carious) resulting from both extrinsic and intrinsic causes (erosive acids). The most common extrinsic acids cause erosion are dietary acids, such as fruit, fruit juices, sports and carbonated drinks.¹ Behavior and attitude also influence the impact of these dietary acids on the dentition e.g. excessive consumption of acidic food/beverages, or drinking habits such as sipping a carbonated drink over a long period of time for a fresh and fizzy mouth feel. Unusual eating habits and intentional vomiting can also lead to erosion of the teeth.⁵

The erosive effects of acids can be exacerbated in people with decreased salivary flow due to any reason e.g. diabetes, Sjogren's syndrome and xerostomic medications. Saliva plays important role in the prevention of caries as well as dental erosion. It directly clears and neutralizes the acids from the oral cavity (thus normalize the oral pH), and at the same time form a protective layer over the teeth and promote remineralization.⁶ Other extrinsic causes include environmental acids, oral hygiene products, medications (low pH) such as toothpastes, fluoride rinses, and vitamin C tablets etc.⁵ The people, who work in lead battery factories (exposed to environmental acids) and professional wine tasters as they sip beverages (low pH) for long period of time, are more prone to develop dental erosion.⁷ Intrinsic cause of dental erosion is gastric acid that is regurgitated into the mouth and mostly observed in patients with gastro esophageal reflux disease (GERD) or with chronic excessive vomiting such as patients with anorexia, bulimia, alcoholism and gastrointestinal disorders.¹ The medical history is very important to identify the intrinsic sources of acid causing dissolution or demineralization of tooth structure. While the drug history may help in identifying extrinsic sources of acid directly causing erosion or indirectly by decreasing the salivary flow. But the most common source of extrinsic acid is the patient's diet with low PH.²

Site specific distribution of tooth wear is very important as it may help in identifying the underlying cause. For example, palatal erosion of maxillary incisors suggests an intrinsic

INTRODUCTION

Dental erosion is one of frequently encountered condition in dentistry that is characterized by irreversible and progressive loss of hard dental tissues without any involvement of any cariogenic bacteria.¹ It affects the people of all age groups and is a common finding in the developed countries.² The hard dental tissues are essential for the integrity of the dentition. Therefore, loss of these tissues due to any reason can be resulted into deleterious consequences for the patient. The clinical picture of dental erosion includes smooth glossy appearance, broad concavities on smooth surfaces of enamel and increased incisal translucency, which can lead to esthetic problems.¹

At the same time, loss of enamel can result in dentin exposure leading to hypersensitivity, if not treated even lead to pulpal involvement in some cases.¹ The clinical diagnosis of dental erosion must be differentiated from other forms of non carious lesions i.e. attrition, abrasion or abfraction lesions. The diagnostic procedure aims to classify tooth wear based on clinically observed morphological features, to categorize it according to the severity and hence treatment needs.⁴

A number of indices have been devised to diagnose and quantify dental erosion but there is a lack of standardization of indices. Therefore, it is needed to develop practical diagnostic tools to standardize the indices for comparison of the studies.⁴

¹Assistant Professor, ⁴Demonstrator, Department of Operative Dentistry, de'Montmorency College of Dentistry, ²Assistant Professor Department of Operative Dentistry, University College of Dentistry, ³Assistant Professor Department of Operative Dentistry, Akhtar Saeed Medical and Dental college Lahore, Pakistan

Corresponding author: Babra Marium Anwari, Department of Operative Dentistry, de'Montmorency College of Dentistry Lahore, Pakistan

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etiology while occlusal wear of molars and labial surfaces of anterior teeth related with extrinsic etiology (mostly) based on acidic diet.⁸⁻¹³

The objective of this study was to determine the prevalence, etiology/risk factors and gender distribution of palatal erosion, among the patients visiting University College of Dentistry, The University of Lahore, Pakistan and to highlight the importance of dental erosion among the clinicians.

MATERIAL AND METHODS

This was a descriptive cross sectional study. The patients within the age range of 13-50 years were included in the study. Patients, with age below 13 years, were excluded from the study. Teeth with caries, defective restorations, fracture and congenital anomalies were also excluded from the study. Ethical clearance was obtained from the institutional review board and informed consent was taken from the patients before the start of the study. Although different erosion indices have been suggested by researchers including Smith and Knight, Eccles, and Lussi¹⁴ but we followed the modified Smith and Knight index, which defines wear on three levels/ types (type- I mild, type- II moderate and type –III-severe) according to severity.⁵

Type I: Mild tooth wear would involve dentine exposure on less than 1/3rd of the tooth surface and may not require treatment.

Type II: Moderate tooth wear with dentine exposed for greater than 2/3rd, might require treatment but would depend upon what the patient required.

Type III: Severe tooth wear would normally involve secondary dentine exposure.

The assessment was subjective and could be varied for different age groups. This criterion was applied on all age groups.

Total n=532 patients were examined randomly who visited the Operative Dentistry Department of University College of Dentistry, The University of Lahore, during the period of 6 months (November 2010 to April 2011). Majority of the patients were from lower to middle socio-economic class. A thorough history was taken regarding heart burn and other symptoms of reflux (epigastric pain, acid taste in mouth, belching, heartburn, stomach-ache and chronic cough etc), regurgitation, medical history, use of any drugs, eating habits (acidic drinks like carbonated drinks and lemonade or diet like pickle, spicy food etc) and occupation. After written informed consent, history and intraoral examination was performed to assess the levels of erosion on the palatal surfaces of the maxillary anterior teeth. For dental examination, routine diagnostic instruments were used under dental unit light. The data was collected and analyzed for frequency of palatal erosion. The patients were educated about the etiology/risk factors and preventive measures to arrest the condition, referral to physician if needed and further management required accordingly.

RESULTS

A total of 532 patients were examined, with 276 males and 256 females. The age range was 13-50 years. Distribution of dental erosion and etiological factors is given in table-1.

According to severity, 47.2% of the male patients were presented with type I, 52.7% with type II and none of the patient with type III dental erosion (Table-2).

Tables-3,4 are showing the distribution of dental erosion in female subjects according to etiology and severity of disease.

When we compared the both genders for etiology, the females suffered more from GERD (50%) and consumed more acidic diet (13.33%) as compared to males (44.44% and 11.11%)

Age group (males)	Total patients examined	Pts with palatal erosion	Percentage of patients with palatal erosion	GERD	Cold Drink / Diet	Non specific history	Other reasons
13-30yr	142	26	18.3%	8	6	12	0
31 -50yr	94	26	27.6%	12	2	6	6
50 yr and above	40	20	50%	12	0	4	4
Total	276	72	26.0%	32 (44.44%)	8 (11.11%)	22 (30%)	10 (13%)

Table-1: Frequency of palatal erosion among males according to etiology

Age group (males)	Patient examined	Patient with palatal erosion	Percentage of patients with palatal erosion	Number of patients with type-I %	Number of pts with type-II	Number of patients with type-III
13-30 years	142	26	18.3%	20	6	0
31-50 years	94	26	27.6%	10	16	0
50 years and above	40	20	50%	4	16	0
Total	276	72	26.0%	34, (47.2%)	38 (52.7%)	0%

Table-2: Frequency of palatal erosion among males according to severity

Age group(females)	Total patients examined	Patients with palatal erosion	Patients with palatal erosion %	Patients with GERD	Patients with drink/diet	Patients with non-specific history	Patients with other reasons
13-30 years	102	22	21.6%	8	6	8	0
31 -50 years	116	26	22.4%	16	0	8	2
50 years and above	38	12	31.6%	6	2	4	0
Total	256	60	23.4%	30 (50%)	8 (13.3%)	20 (33.3%)	2 (3.3%)

Table-3: Frequency distribution of palatal erosion among the females according to etiology

Age group (females)	No. of patients examined	Patient with palatal erosion	Patients with type I	Patients with type II	Patients with type III
13-30 years	102	22 (21.56%)	14 (6.36%)	8 (3.36%)	0
31-50 years	116	26 (22.41%)	6 (23.0%)	18 (69.22%)	2 (7.69%)
50 and above	38	12 (31.57%)	4 (33.3%)	4 (33.3%)	4 (33.3%)
Total	256	60 (23.4%)	24 (9.3%)	30 (11.71%)	6 (2.34%)

Table-4: Frequency distribution of palatal erosion among the females according to severity

Gender	Male	Female	Total (%)
Total patient examined	276	256	532
Palatal erosion	72 (26.0%)	60 (23.43%)	132 (24.81%)
GERD	32 (44.44%)	30 (50%)	62 (47%)
Carbonated drink/diet	8 (11.11%)	8 (13.33%)	16 (12%)
Non-specific history	28 (38.88%)	18 (30%)	46 (34%)
Other reasons	4 (11.11%)	4 (6.66%)	8 (6%)

Table-5: Comparison of frequency of palatal erosion according to etiology in both genders

Gender	Male	Female
Total patient	138/276	128/256
Patients with palatal erosion	26.0%	23.43%
Mild I	14.4%	10.15%
Moderate II	13.7%	11.71%
Severe III	0%	2.34%

Table-6: Comparison of frequency of palatal erosion according to severity in both genders

Gender	Male	Female
Total patient examined	276	256
Patients with palatal erosion	26.0%	23.43%
13-30 years	18.3%	21.6%
31 -50 years	27.6%	22.41%
50 years and above	50%	31.6%

Table-7: Comparison of frequency of palatal erosion according to age groups in both genders

Age groups	Number of patients	Frequency of palatal erosion
13-30 years	244	19.67%
31 -50 years	210	24.76%
50 years and above	78	41.0%

Table-8: Over all frequency of palatal erosion according to age groups

(Table-5). Considering the severity of dental erosion, more males suffered from palatal erosion (26%) than females (23.43%). The males had 14.4% type I and 13.7% type II dental erosion as compared to females with 10.15% and 11.71% type I and II dental erosions respectively. However 2.34% females had type III as compared to males (0%) (Table-6). Tables-7,8 shows distribution of dental erosion in different age groups.

DISCUSSION

Tooth wear is a frequently encountered clinical problem in dental practice and the prevalence values in the adult patients, reported are up to 82%.¹⁶ Dental erosion has been reported 37% in United Kingdom and 41% in United States.¹⁷ However, the prevalence of tooth erosion is not well documented

because National Dental Surveys are not commonly conducted and rarely include measures of erosive tooth wear¹⁸ which is especially true in third world countries.

In addition, different epidemiological studies on dental erosion can not be compared because of the use of different examination standards, including scoring systems, sample size and the groups examined belong to different races with different culture.¹⁹ The modified tooth wear index (TWI) had been proposed as a diagnostic tool to quantify the degree of damage to different tooth surfaces, and possible etiological factors responsible for tooth erosion.^{20,21}

In this study 132 out of 532 (24.81%), patients presented with palatal erosion. Overall an increased prevalence of palatal erosion was observed with advancing age (table 8), which is normal as all adult studied have shown that tooth wear increases with increasing age. This is not surprising as tooth wear is a normal physiological process and occurs throughout the life and must be distinguished from pathological wear.²²

Epidemiological studies of young adults reported that prevalence of tooth wear was in the range 6–45%^{23,24} which is in accordance with our study (at 13-30 years - 19.67%). A study by Smith et al. reported a frequency of 5.73% at 15-26 years, 8.19% at 26 -65 years and 8.84% at 65 years and above, but they did not mention the palatal surfaces and the gender distribution.²⁵

Another study by Lussi et al. documented that 30% of their study population at the age 26-30 years old and 43% at the age 46 -50 years were suffering from dental erosion. They noticed that old persons had severe erosion on occlusal surfaces; however they did not mention the palatal surfaces and the gender.²⁶

The distribution of dental erosion according to gender is not specific as it is different in different parts of the world. Wang et al. reported dental erosion 25.7% in males and 29.9 % in females.²⁷ A study by Nayak et al. reported 15.5% in males and 26.7% in females.²⁸ In a local study by Shah, dental erosion was 44.3% in males and 55.5% in females.²⁹ In another local study, researchers found dental erosion 47.3% in males and 53.7% in females.³⁰

In this study overall males have slightly higher prevalence (26.0%) of palatal erosion than females (23.43%). It might be due to their lifestyle/culture, profession (competition, tension and outdoor jobs), and hot weather in our country (more use of carbonated drinks/beverages).

However use of carbonated drinks, is also an increasing trend now a days throughout the world, which is also evidenced by the study that “Sales of soft drinks in the United Kingdom (UK) have increased seven-times since 1950 and Coca-Cola is the biggest selling brand, while Pepsi-Cola is the eighth biggest brand”.³¹ According to a local study, 89% males and 69% females (all age groups) consume fizzy/energy drinks.³² Carbonated drinks have inherent acidity (pH 2.7-3.5) because of the fact that acids are added to stimulate taste and counteract sweetness.³³

In our sub-continent region, summer prevails for longer period of time and people are used to take, squashes, lemonade (pH 1.8-2.4), which are economical drinks and in winter, the consumption of oranges/orange juice (pH 2.8-4) also increased due to easy access at cheap rates and the groups studied mostly consist of people belong to middle and lower classes. There is also increasing trend of carbonated drinks in our society.

Also daily life problems related to earning and competition may also contribute to anxiety which ultimately can lead to gastric problems, with which the patient may or may not be aware. However there is no use of wine (prohibited), or sports drinks (although increasing trend in youth) in our society because of religion and the group studied (belonged to middle and low socioeconomic group). However these drinks play major role in Western society.^{34,35} Carbonated drinks usually have pH in the range of 2.4–3.2, which is well below the critical pH (i.e. 5.5) for enamel demineralization.^{36,37}

A study by Bartlett et al. demonstrated a strong association between the gastro esophageal reflux and erosion of the palatal surfaces of the teeth, and found 64% of the patients had gastro esophageal reflux.³⁸ Two other studies reported around 40-50% of dental erosion due to acid regurgitation.^{39,40} However, it is possible that the patients have erosion, without being aware of the problem/reflux. These patients are also known as “silent refluxers”. This subclinical reflux may involve entry of enough acid into the mouth to cause erosion.⁴¹

Preventive management includes measures that can avoid or reduce direct contact with acids, increase the acid resistance of dental hard tissues by in office fluoride application or at home use of fluoridated tooth pastes and mouthwashes.⁴² So, there is a paradigm shift for dental practitioners to look into the risk factors/etiology while taking history, as identification of these factors before the appearance of any sign of erosion may be more important. At early stage, demineralised tooth structure, like incipient caries can be remineralised by controlling the causative factors.

Early intervention for the prevention of dental erosion is a more effective therapeutic strategy than any attempt to restore lost dental hard tissue destroyed by erosion. A thorough evaluation of dietary habits may be helpful in assessing the erosive potential of acidic foodstuffs. This study was hospital based and there is a need of well designed study on community basis to determine the true magnitude of the dental erosion.

CONCLUSION

From this study, it can be concluded that GERD is the major cause for palatal erosion. Secondly dental erosion is the issue of the day affecting all age groups in both genders and should be addressed properly. Although it does not always indicate a

clinical problem and does not need immediate dental treatment. However, It can result in hyper-sensitivity, poor esthetics, loss of occlusal Vertical dimension (OVD), resulting in functional problems. Therefore, clinicians must have a thorough knowledge and understanding of the etiology/risk factors of dental erosion, as identification of the cause is the first step in the management of any problem.

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