

# ASSOCIATION BETWEEN GENDER AND DENTAL EROSION IN SOUTH INDIAN POPULATION

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## ABSTRACT

Dental erosion is a public health problem as it may affect various age groups and gender. It may lead to dentin hypersensitivity and eventually pulpal exposure if the erosion is severe and not treated which causes pain. Therefore, the study was done to find the association of gender with dental erosion. A retrospective study was conducted using University hospital patient records from July 2019 - March 2020. A total of 149 case sheets were reviewed. The data variables such as socio-demographic data, presence of dental erosion and number of teeth involved with dental erosion were retrieved and analyzed. Results were present with frequency distribution and chi-square test for association. Dental erosion was prevalent in males (64.4%) than females (35.6%). The age range of the patients included in the study was 21-80 years old out of which 21-40 years (14.8%), 41-60 years (57%) and 61-80 years (28.2%). Erosion in maxillary teeth involving 0-5 (85.8%) was the highest followed by 6-10 (14.1%) and erosion in mandibular teeth involving 0-5 (87.9%) was the highest followed by 6-10 (11.4%) and 11-15 (0.7%). There was no statistically significant association between gender, age with dental erosion in maxillary and mandibular teeth ( $p > 0.05$ ). Within the limitations of the study, it can be concluded that dental erosion was prevalent in males of early 60's and there was no association between gender, age with dental erosion in maxillary and mandibular teeth.

**Keywords:** Association; Dental erosion; Gender; Prevalence.

## INTRODUCTION

Tooth wear can be defined as a destructive, non-carious and irreversible process, which causes functional losses of dental hard tissue surface caused by a multifactorial condition (Shellis and Addy, 2014). The chemical or mechanical process without bacterial plaque involvement will lead to tooth wear which is considered as an age-dependent and physiological process (Lussi, 2006). Tooth wear is frequently described as erosion, abrasion, attrition and abfraction (Imfeld, 1996). Erosion is chemical wear due to the dissolution of dentin hard tissue by extrinsic or intrinsic acids (Lussi, 2006). Extrinsic causes include the environment, medication, lifestyle factors and diet. Intrinsic causes include vomiting, regurgitation or gastroesophageal reflux disease (GERD) in which the gastric acid from the stomach which reaches the oral cavity can cause dissolution to the dental hard tissue (Lussi, Jaeggi and Zero, 2004). Dental erosion may be an early predictor for GERD and the dentist may be the first to diagnose the possibility of GERD particularly in "silent refluxers" (Ranjitkar, Kaidonis and Smales, 2012). A systematic review reported that

the prevalence of tooth erosion was 24% in patients with GERD and 32.5% of adults with GERD had dental erosions (Pace *et al.*, 2008).

Dental erosion is considered a significant health problem. If it is not controlled or treated, it can cause excessive tooth wear. This will lead to severe tooth surface loss, tooth hypersensitivity and exposed dentin or even worse, pulp exposure, pulpitis, pulp necrosis and abscess (Wang *et al.*, 2010; Al-hammadi and Dubais, 2020). It may also lead to serious damage to the oral health of an individual (Donachie and Walls, 1996). Apart from that, dental caries, early childhood caries and fluorosis also are public health concerns (Prabakar, John and Srisakthi, 2016; Kumar and Preethi, 2017; Kumar and Vijayalakshmi, 2017; Prabakar, John, Arumugham, Kumar and Sakthi, 2018b; Pavithra and Jayashri, 2019; Mathew *et al.*, 2020; Samuel, Acharya and Rao, 2020). Moreover, cancer is the major cause of death and tobacco is the risk factor for cancer (Leelavathi and Others, 2019; Neralla *et al.*, 2019). Initially, before progressing to dental caries, it is called incipient lesion (Mohapatra *et al.*, 2019). Pit and fissure sealant is found effective as a preventive measure from caries development (Prabakar, John, Arumugham, Kumar and Sakthi, 2018a; Prabakar, John, Arumugham, Kumar and Srisakthi, 2018; Khatri *et al.*, 2019).

Previous literature found that there was an association between dental erosion and acidic drinks such as carbonated drinks, sports drinks and fruit juices (Lussi, Jaeggi and Zero, 2004; Manaf *et al.*, 2012; Baber, Abbas and Maqsood, 2016). Drinks with pH less than 5.5 have a higher tendency to cause erosion and soften the enamel surface (Manaf *et al.*, 2012). A study revealed that after consuming carbonated drinks, the pH became acidic and in energy drinks, there was an increase in pH after 10 and 15 minutes (Pratha and Prabakar, 2019). Besides that, a study also revealed that even though yogurt is acidic, it does not have erosive potential similar to milk and tea (Milosevic, Bardsley and Taylor, 2004; Kargul, Caglar and Lussi, 2007). There were various epidemiological studies conducted with regard to tooth wear. They showed that there was a significant association in relation to age, gender, dietary intake and pattern of tooth wear in different cultures (Al-hammadi and Dubais, 2020). Tooth wear is a clinical problem that is becoming important in the aging population.

Thus the aim of the study was to evaluate the association of dental erosion with age and gender among the South Indian population.

## **MATERIALS AND METHOD**

### **Study setting and designs**

This retrospective study was conducted by reviewing 86,000 patient records of the author's University hospital for a period of nine months from June 2019 to March 2020.

### **Selection Criteria**

A total of 149 consecutive case records with signed informed consent and information on dental erosion was sorted. Case records of patients age ranging from 21-80 years irrespective of gender were retrieved and analyzed.

### **Ethical approval**

Prior permission to utilize and to analyze the data from the case records of patients were obtained from the University authorities with ethical approval number SDC/SIHEC/2020/DIASDATA/0619-0320.

### **Data Collection**

Information on age, gender and number of teeth involved with dental erosion were collected from the patient's records. The number of teeth involved with dental erosion was divided according to maxillary

and mandibular teeth. In maxillary teeth, it was divided into 0-5 teeth and 6-10 teeth. In mandibular teeth, it was divided into 0-5 teeth, 6-10 teeth and 11-15 teeth. The age of the patients were categorized for statistical convenience as 21-40 years, 41-60 years and 61-80 years.

### Statistical Analysis

Data were entered in Excel and analyzed using the Statistical Package for Social Sciences SPSS Version 20. Descriptive analysis was done to assess the frequency distribution of age and gender with the presence of dental erosion. Chi-square test was used to evaluate the association of gender and age with dental erosion. A significant level test was set at  $p=0.05$ .

### RESULTS AND DISCUSSION

The overall objective of the present study was to evaluate the association of age and gender with dental erosion. Dental erosion may occur in various age groups and the severity may depend on lifestyle habits or other factors.

A total of 148 subjects present with dental erosion were included in the study. Based on Figure 1, the age of the patients were categorized into 21-40 years (14.8%), 41-60 years (57%) and 61-80 years (28.2%). 64.4% were males and 35.6% were females as shown in Figure 2. Dental erosion in maxillary teeth was higher involving 0-5 teeth (85.9%) followed by 6-10 teeth (14.1%) as shown in Figure 3 and in mandibular teeth, dental erosion was higher involving 0-5 teeth (87.9%), followed by 6-10 teeth (11.4%) and 11-15 teeth (0.7%) as shown in Figure 4.

There was no statistically significant association between age and maxillary teeth erosion ( $p>0.05$ ). Figure 5 shows the association of age with maxillary teeth erosion. Dental erosion in maxillary teeth involving 0-5 teeth (57%) and 6-10 teeth (57.1%) were higher in 41-60 years followed by 61-80 years (27.3%) and (33.3%) respectively and 21-40 years (15.6%) and (9.5%) respectively. Figure 6 shows the association of age with mandibular teeth erosion. Mandibular teeth erosion involving 0-5 teeth (54.2%), 6-10 teeth (76.5%) and 11-15 (100%) were the highest in 41-60 years compared to other age groups. In the 61-80 years, 29.8% involved 0-5 teeth and 17.6% involving 6-10 teeth. Meanwhile, in the 21-40 years, 16% involved 0-5 teeth and 5.9% involving 6-10 teeth. There was no statistically significant association between age and erosion in mandibular teeth ( $p>0.05$ ).

Dental erosion was prevalent in the 41-60 years age group (56.8%) in the present study. A study in consistency with the present study, the tendency of tooth wear increases as age increases and the oldest age group 65-74 had the highest mean tooth wear score (Wetselaar et al., 2016). Similarly in the study done by Wei, Zhao et al, the prevalence of tooth wear was 67.5% and 100% in the 35-49 and 50-74 age groups respectively (Wei et al., 2016). In the fifth German Oral Health Survey (DMS V) it was observed that there was a clear relationship between increasing age and increasing erosion prevalence in which 12 years (4%), 35-44 years (24%) and 65-74 years (40%) (Jordan et al., 2014). In contrast, the present study reported that there was no clear relationship between increasing age and increasing dental erosion in which, 21-40 years (14.9%), 41-60 years (56.8%), 61-80 years and (28.4%).

This present study reported that there was no statistically significant association between gender and erosion in maxillary teeth. Dental erosion involving 0-5 teeth (61.7%) and 6-10 teeth (81%) were higher in males compared to females with 38.3% and 19% respectively. In mandibular teeth erosion, dental erosion involving 0-5 teeth (64.1%) and 6-10 teeth (70.6%) were higher in males than females with 35.9% and 29.4% respectively. Dental erosion involving 10-15 teeth was higher in females (100%) than males (0%). There was also no statistically significant association found between gender and mandibular teeth erosion.

Previous studies reported that there was no association between gender and dental erosion (Correr et al., 2009; Manaf et al., 2012; Moimaz et al., 2013; Aguiar et al., 2014). Dental erosion was prevalent in males

compared to females in the present study. Several studies reported a higher prevalence in males which were in line with the present study (Tao et al., 2015; Tschammler et al., 2016; Al-hammadi and Dubais, 2020). However, several studies also reported a higher prevalence in females (Nayak, Ashokkumar and Ankola, 2010; Manaf et al., 2012; Al-Ashtal et al., 2017). Studies observed that the prevalence of dental erosion was higher in females due to a higher number of females consuming carbonated drinks (Kannan et al., 2014; Baber, Abbas and Maqsood, 2016) and having GERD (Baber, Abbas and Maqsood, 2016). However, there are no specific reasons why males are more affected by erosion than females (Schlueter and Luka, 2018). There was no study reported a statistically significant association between gender and dental erosion.

Dental erosion is considered a significant health problem as it may be an early predictor for GERD. Therefore, preventive measures should be implemented and necessary treatment should be done at the earliest by the dentist. Dental professionals play a major role in any emergency (Indiran, 2017). However, the patients should be aware and have knowledge regarding dental erosion in order for them to seek treatment. Patients can barely detect early enamel erosion due to its smooth and shiny surface. But even when detected, they rarely seek treatment until it becomes symptomatic or affects their aesthetic (Amaechi and Higham, 2005).

The limitations of this study is that extrapolation of the result is not possible since genetic, environment and food habits play a role. Thus, further longitudinal prospective study with associated factors of dental erosion can be conducted.

## CONCLUSION

Within the limitations of the study, it can be concluded that prevalence of dental erosion increases with increase in age. No significant association between age and dental erosion. Males have more teeth with erosion than females with no significant association. Between gender and dental erosion. Age and gender has no role in the prevalence of dental erosion, however life style and food habits may play a significant role.

## AUTHOR CONTRIBUTIONS

All authors have equal contribution in bringing out the research work.

## CONFLICT OF INTEREST

There was no conflict of interest declared by the authors

## REFERENCES

- [1] Aguiar, Y. P. C. et al. (2014) 'Association between dental erosion and diet in Brazilian adolescents aged from 15 to 19: a population-based study', *The Scientific World Journal*. 2014, p. 818167.
- [2] Al-Ashtal, A. et al. (2017) 'Dental erosion in groups of Yemeni children and adolescents and the modification of an erosion partial recording system', *International journal of paediatric dentistry / the British Paedodontic Society [and] the International Association of Dentistry for Children*, 27(4), pp. 283–292.
- [3] Al-hammadi, S. and Dubais, M. (2020) 'The Prevalence of Tooth Wear among a Group of Yemeni Adults', *Journal of Oral Research*. 8(6), 478-487.
- [4] Amaechi, B. T. and Higham, S. M. (2005) 'Dental erosion: possible approaches to prevention and control', *Journal of dentistry*, 33(3), pp. 243–252.
- [5] Baber, H., Abbas, Z. and Maqsood, S. (2016) 'Knowledge and Association of Dental Erosion with Age and Gender in Local OPD of Pakistan', *JPDA*, 25(01), p. 32.

- [6] Correr, G. M. et al. (2009) 'Influence of diet and salivary characteristics on the prevalence of dental erosion among 12-year-old schoolchildren', *Journal of dentistry for children*, 76(3), pp. 181–187.
- [7] Donachie, M. A. and Walls, A. W. (1996) 'The tooth wear index: a flawed epidemiological tool in an ageing population group', *Community dentistry and oral epidemiology*, 24(2), pp. 152–158.
- [8] Imfeld, T. (1996) 'Dental erosion. Definition, classification and links', *European journal of oral sciences*, 104(2), pp. 151–155.
- [9] Indiran, M. A. (2017) 'Awareness And Attitude Towards Mass Disaster And Its Management Among House Surgeons In A Dental College And Hospital In Chennai, India', *Disaster Management and Human Health Risk V: Reducing Risk, Improving Outcomes*, 173, p. 121.
- [10] Jordan, R. A. et al. (2014) 'The Fifth German Oral Health Study (Fünfte Deutsche Mundgesundheitsstudie, DMS V) - rationale, design, and methods', *BMC oral health*, 14, p. 161.
- [11] Kannan, A. et al. (2014) 'Dental hard tissue erosion rates and soft drinks--A gender based analysis in Chennai city, India', *The Saudi journal for dental research*, 5(1), pp. 21–27.
- [12] Kargul, B., Caglar, E. and Lussi, A. (2007) 'Erosive and buffering capacities of yogurt', *Quintessence international*, 38(5), pp. 381–385.
- [13] Khatri, S. G. et al. (2019) 'Retention of moisture-tolerant fluoride-releasing sealant and amorphous calcium phosphate-containing sealant in 6--9-year-old children: A randomized controlled trial', *Journal of the Indian Society of Pedodontics and Preventive Dentistry*, 37(1), p. 92.
- [14] Kumar, R. P. and Preethi, R. (2017) 'Assessment of Water Quality and Pollution of Porur, Chembarambakkam and Puzhal Lake', *Research Journal of Pharmacy and Technology*, 10(7), pp. 2157–2159.
- [15] Kumar, R. P. and Vijayalakshmi, B. (2017) 'Assessment of fluoride concentration in ground water in Madurai district, Tamil Nadu, India', *Research Journal of Pharmacy and Technology*, 10(1), pp. 309–310.
- [16] Leelavathi, L. and Others (2019) 'Nicotine Replacement Therapy for Smoking Cessation-An Overview', *Indian Journal of Public Health Research & Development*, 10(11).
- [17] Lussi, A. (2006) 'Erosive tooth wear--a multifactorial condition of growing concern and increasing knowledge', in *Dental erosion*, pp. 1–8.
- [18] Lussi, A., Jaeggi, T. and Zero, D. (2004) 'The role of diet in the aetiology of dental erosion', *Caries research*, 38 Suppl 1, pp. 34–44.
- [19] Manaf, Z. A. et al. (2012) 'Relationship between food habits and tooth erosion occurrence in Malaysian University students', *The Malaysian journal of medical sciences: MJMS*, 19(2), pp. 56–66.
- [20] Mathew, M. G. et al. (2020) 'Evaluation of adhesion of Streptococcus mutans, plaque accumulation on zirconia and stainless steel crowns, and surrounding gingival inflammation in primary molars: Randomized controlled trial', *Clinical oral investigations*, pp. 1–6.
- [21] Milosevic, A., Bardsley, P. F. and Taylor, S. (2004) 'Epidemiological studies of tooth wear and dental erosion in 14-year old children in North West England. Part 2: The association of diet and habits', *British dental journal*, 197(8), pp. 479–83; discussion 473; quiz 505.
- [22] Mohapatra, S. et al. (2019) 'Assessment of Microhardness of Enamel Carious Like Lesions After Treatment with Nova Min, Bio Min and Remin Pro Containing Toothpastes: An in Vitro Study', *Indian Journal of Public Health Research & Development*, 10(10), pp. 375–380.
- [23] Moimaz, S. A. S. et al. (2013) 'Prevalence of deciduous tooth erosion in childhood', *International journal of dental hygiene*, 11(3), pp. 226–230.
- [24] Nayak, S. S., Ashokkumar, B. R. and Ankola, A. V. (2010) 'Distribution and severity of erosion among 5-year-old children in a city in India', *Journal of dentistry*. 77(3), 152-157.
- [25] Neralla, M. et al. (2019) 'Role of nutrition in rehabilitation of patients following surgery for oral squamous cell carcinoma', *International Journal of Research in Pharmaceutical Sciences*, 10(4), pp. 3197–3203.
- [26] Pace, F. et al. (2008) 'Systematic review: gastro-oesophageal reflux disease and dental lesions', *Alimentary pharmacology & therapeutics*, 27(12), pp. 1179–1186.

- [27] Pavithra, R. P. and Jayashri, P. (2019) 'Influence of Naturally Occurring Phytochemicals on Oral Health', *Journal of pharmacy research*, 12(8), 3979-3983.
- [28] Prabakar, J., John, J., Arumugham, I. M., Kumar, R. P. and Srisakthi, D. (2018) 'Comparative Evaluation of Retention, Cariostatic Effect and Discoloration of Conventional and Hydrophilic Sealants - A Single Blinded Randomized Split Mouth Clinical Trial', *Contemporary clinical dentistry*, 9(Suppl 2), pp. S233–S239.
- [29] Prabakar, J., John, J., Arumugham, I. M., Kumar, R. P. and Sakthi, D. S. (2018a) 'Comparative Evaluation of the Viscosity and Length of Resin Tags of Conventional and Hydrophilic Pit and Fissure Sealants on Permanent Molars: An In vitro Study', *Contemporary clinical dentistry*, 9(3), pp. 388–394.
- [30] Prabakar, J., John, J., Arumugham, I. M., Kumar, R. P. and Sakthi, D. S. (2018b) 'Comparing the Effectiveness of Probiotic, Green Tea, and Chlorhexidine- and Fluoride-containing Dentifrices on Oral Microbial Flora: A Double-blind, Randomized Clinical Trial', *Contemporary clinical dentistry*, 9(4), pp. 560–569.
- [31] Prabakar, J., John, J. and Srisakthi, D. (2016) 'Prevalence of dental caries and treatment needs among school going children of Chandigarh', *Indian journal of dental research: official publication of Indian Society for Dental Research*, 27(5), pp. 547–552.
- [32] Pratha, A. A. and Prabakar, J. (2019) 'Comparing the effect of Carbonated and energy drinks on salivary pH-In Vivo Randomized Controlled Trial', *Research Journal of Pharmacy and Technology*, 12(10), pp. 4699–4702.
- [33] Ranjitkar, S., Kaidonis, J. A. and Smales, R. J. (2012) 'Gastroesophageal reflux disease and tooth erosion', *International journal of dentistry*, 2012, p. 479850.
- [34] Samuel, S. R., Acharya, S. and Rao, J. C. (2020) 'School Interventions–based Prevention of Early-Childhood Caries among 3–5-year-old children from very low socioeconomic status: Two-year randomized trial', *Journal of public health dentistry*, 80(1), pp. 51–60.
- [35] Schlueter, N. and Luka, B. (2018) 'Erosive tooth wear--a review on global prevalence and on its prevalence in risk groups', *British dental journal*, 224(5), pp. 364–370.
- [36] Shellis, R. P. and Addy, M. (2014) 'The interactions between attrition, abrasion and erosion in tooth wear', *Monographs in oral science*, 25, pp. 32–45.
- [37] Tao, D.-Y. et al. (2015) 'Dental erosion among children aged 3-6 years and its associated indicators', *Journal of public health dentistry*, 75(4), pp. 291–297.
- [38] Tschammler, C. et al. (2016) 'Prevalence and risk factors of erosive tooth wear in 3–6 year old German kindergarten children—A comparison between 2004/05 and 2014/15', *Journal of dentistry*, 52, pp. 45–49.
- [39] Wang, P. et al. (2010) 'The prevalence of dental erosion and associated risk factors in 12-13-year-old school children in Southern China', *BMC public health*, 10, p. 478.
- [40] Wei, Z. et al. (2016) 'Prevalence and Indicators of Tooth Wear among Chinese Adults', *PloS one*, 11(9), p. e0162181.
- [41] Wetselaar, P. et al. (2016) 'The Prevalence of Tooth Wear in the Dutch Adult Population', *Caries research*, 50(6), pp. 543–550.

## FIGURE AND LEGENDS

Figure 1: Bar chart represents the frequency distribution of age. X-axis represents the age group and Y-axis represents the number of patients in each age group. Most of the patients were in the age group 41-60 years

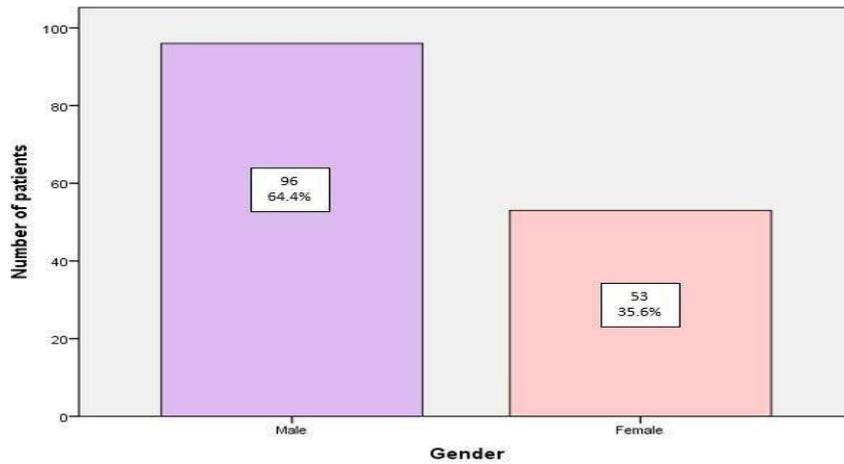
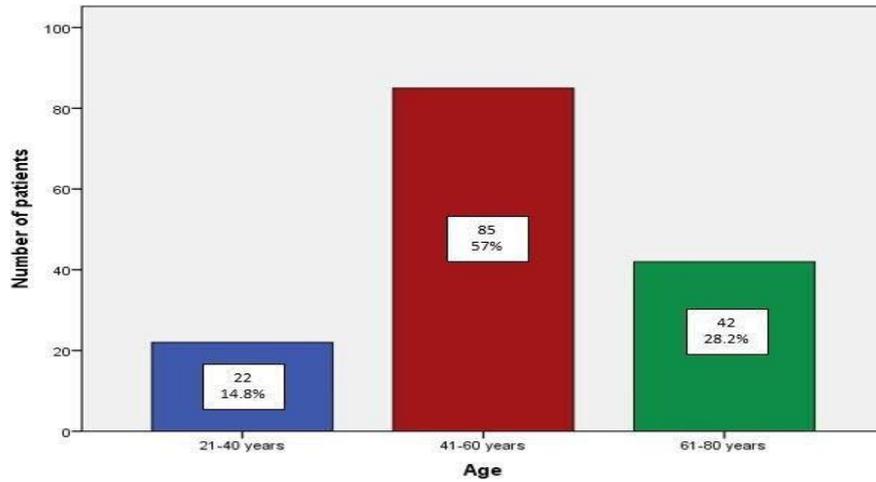


Figure 2: Bar chart represents the frequency distribution of gender. X-axis represents the gender and Y-axis represents the number of patients. Males predominated in the study population.

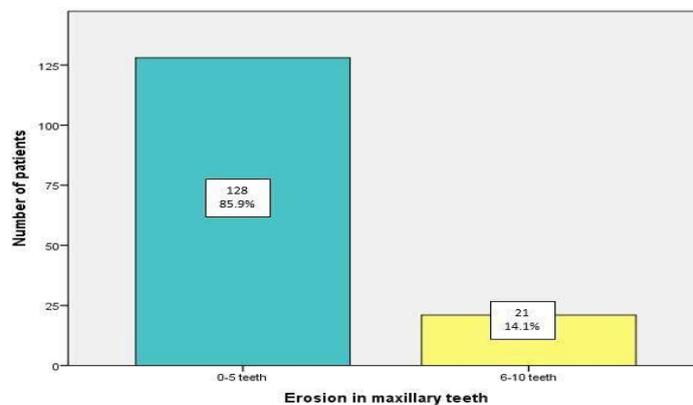


Figure 3: Bar chart represents the frequency distribution of maxillary teeth dental erosion among the patients. X-axis represents erosion in maxillary teeth and Y-axis represents the number of patients. Most of the patients had 0-5 teeth erosion.

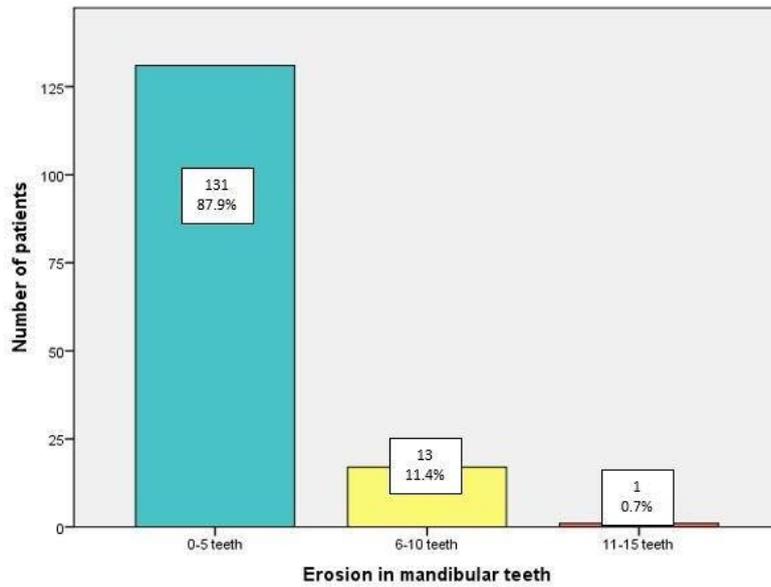


Figure 4: Bar chart represents the frequency distribution of mandibular teeth erosion among the patients. X-axis represents erosion in mandibular teeth and Y-axis represents the number of patients. Most of them had 0-5 mandibular teeth erosion.

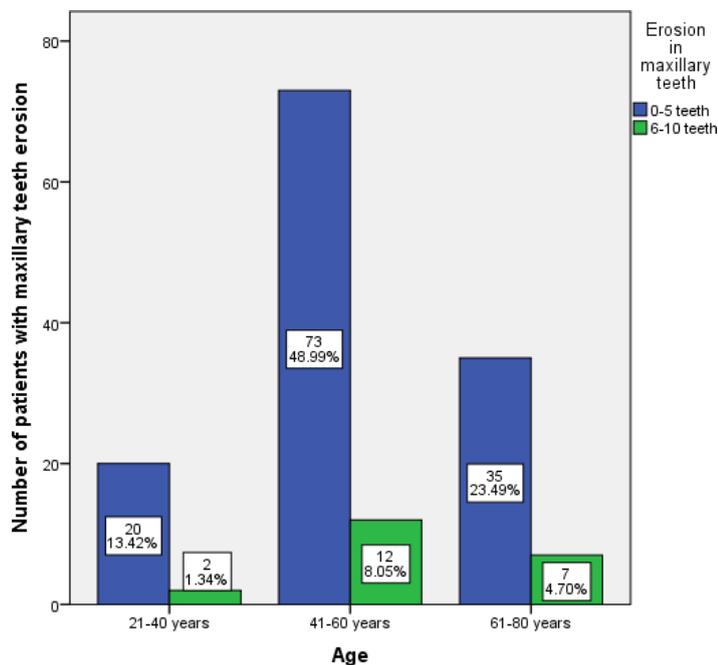


Figure 5: Cluster bar chart represents the association of age with maxillary teeth erosion. X-axis represents the age group and Y-axis represents the number of patients with maxillary teeth erosion. Chi-square test was done and found to be not significant (Chi-Square value: 0.622, df: 1; p-value: 0.430 ( $p > 0.05$ )). Elderly patients have more maxillary teeth erosion than adults.

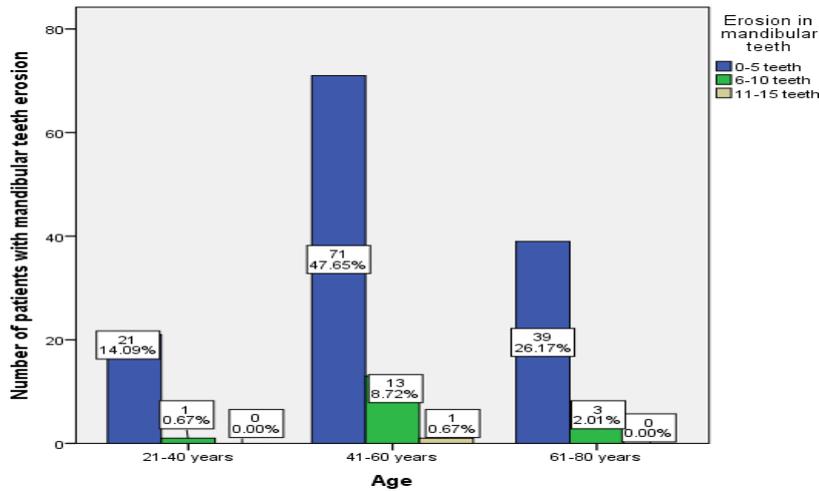


Figure 6: Cluster bar chart represents the association of age with mandibular teeth erosion. X-axis represents the age group and Y-axis represents the number of patients with mandibular teeth erosion. Chi-square test was done and found to be not significant (Chi-Square value: 0.042, df: 1; p-value: 0.838 (p>0.05)). Elderly patients have more mandibular teeth erosion.

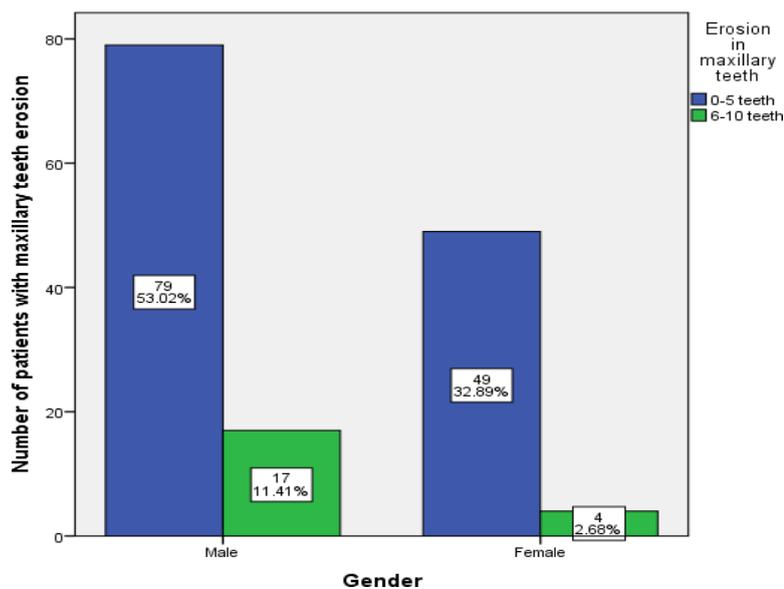


Figure 7: Cluster bar chart represents the association of gender with maxillary teeth erosion. X-axis represents the gender and Y-axis represents the number of patients with maxillary teeth erosion. Chi-square test was done and found to be not significant (Chi-Square value: 2.971, df: 1; p-value: 0.085 (p>0.05)). Males have more number of maxillary teeth erosion than females.

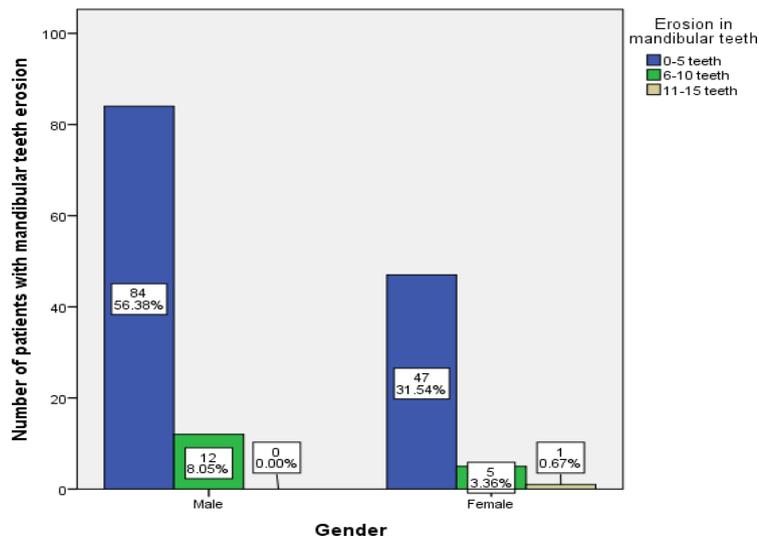


Figure 8: Cluster bar chart represents the association of gender with mandibular teeth erosion. X-axis represents the gender and Y-axis represents the number of patients with mandibular teeth erosion. Chi-square test was done and found to be not significant (Chi-Square value: 0.009, df: 1; p-value: 0.925 ( $p > 0.05$ )). Males have more number of mandibular teeth erosion than females.