Prevalence of Dental Attrition and its Severity in Relation to Age and Gender: A Clinical Study

Roopa K Thippanna, Vijayalakshmi C Ramu

Aim: The present study was conducted to evaluate the prevalence and severity of dental attrition in different age groups in both the gender among the population of Davangere district.

Need for the study: Early diagnosis, treatment and preventive care of attrition has become an essential and important part of daily practice. Hence, the present study was carried out to evaluate the prevalence of dental attrition and its severity in different age groups in both the genders.

Materials and methodology: The present study was conducted randomly among the dentulous or partially edentulous individuals seeking dental treatment for various needs in College of Dental Sciences, Davangere, Karnataka. A total of 570 subjects were divided into three groups according to different age i.e., young (18–34 years), middle (35–54 years) and old (55 years and above).

Questionnaire and clinical examination was performed personally for each subject. Clinical examination involved the evaluation of individual tooth for attrition and scoring was done using attrition index modified by tooth wear index of Smith and Knight.

Results: The study was carried out on 570 subjects divided into three groups. Subjects in the middle and old age group showed 100% prevalence of attrition and subjects in younger age group showed 91.5% prevalence. Mean attrition score in subjects of young, middle and old age groups were 0.21, 0.82, 1.44 respectively. Mean attrition scores of males and females in all the age groups as 0.99, 0.67 respectively.

Conclusion: Highest prevalence of attrition was seen in both middle and old age compared to younger age. Younger age showed least attrition score involving only enamel compared to older age who showed attrition involving enamel and dentine. As the age advances severity of attrition was also increased. Males showed higher attrition than females. Severity of attrition was also more in males.

Keywords: Attrition, Prevalence of tooth wear, Severity of attrition, Tooth wear.

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INTRODUCTION

Aging is a universal process. With the growing number of seniors, the incidence of natural tooth retention is increasing, and consequently, a greater prevalence of tooth wear is observed in the aging population.

Tooth wear is an inherent part of the aging process and therefore occurs continuously but slowly throughout life. Tooth wear over time alters the appearance of the teeth and smile in a way that is perceptible to dentists and laypeople.

Tooth wear is a general term describing the loss of dental hard tissues from the surfaces of the teeth caused by factors other than dental caries, trauma, and developmental disorders. This gradual wearing away of the tooth surface occurs in all individuals and can be classified as one of four types: attrition, abrasion, erosion, or a poorly characterized phenomenon called abfraction. These surface loss modalities have distinct etiologies, characteristics and wear patterns. The wear of the teeth is irreversible and cumulative with age.

Word attrition derived from the Latin verb “atterere,” which is defined as the action of rubbing against something. Dental attrition has a multifactor etiology, with age and the geometry of canine guidance having a significant influence, in addition to commonly accepted para function.

Tooth wear can progress to exposure of dentin, resulting in dentinal hypersensitivity and consequently reduced chewing function. Severe tooth wear can result in serious consequences such as pulpal pathology, occlusal disharmony, impaired function, and esthetic disfigurement. Sometimes complicated complete-mouth dental rehabilitations are necessary to treat severe tooth wear. Hence early diagnosis, treatment and preventive care of these lesions become an essential and important part of daily practice.

Hence, the present study was carried out to evaluate the prevalence of dental attrition and its severity in different age groups in both the genders.

MATERIALS AND METHODOLOGY

The materials and method followed in this study have been discussed under the following headings for the convenience:
Armamentarium

The instruments used in the study were:

- Mouth mirrors
- Probe
- Explorer
- William’s graduated periodontal probe
- Tweezer
- Kidney tray
- Gauze sheets
- Cotton holder and cotton
- Examination gloves

Source of Collection of Data

A cross-sectional study was conducted randomly among the dentulous or partially edentulous individuals seeking dental treatment for various needs in College of Dental Sciences, Davangere, Karnataka.

A total of 570 subjects who were willing to participate in the study were selected and requested to fill in the consent form. The subjects were divided into three groups according to age, i.e., young (18–34 years), middle (35–54 years) and old (55 years and above).

Criteria for Selection of Subjects

Inclusion Criteria for Selection of Subjects

Presence of complete natural permanent dentition or dentition with a single missing tooth in the posterior and/or anterior region of the dental arch.

Exclusion Criteria for Selection of Subjects

- Two or more posterior and/or anterior teeth missing.
- Extensive restoration, cast restoration, cuspal coverage.
- Subjects who have undergone orthodontic treatment.
- Presence of fixed or removable partial denture.
- Fluorosed teeth

Study Design

Questionnaire and clinical examination were performed personally for each subject. A questionnaire was consisting of closed-ended questions; questionnaire enquired the socio-demographic data of subject that includes name, age, sex and occupation.

Every subject was asked to sit in the dental chair in an upright position. All the examinations were carried out by the single operator, standing in front of the subjects. The clinical oral examination was done under good illumination using sterile diagnostic instruments (Fig. 1). Intraoral examination proceeded in an orderly manner starting from upper right quadrant to lower right quadrant in a clockwise direction, to evaluate the attrition using attrition index which is modified from the tooth wear index given by Smith and Knight in 1984 (Figs 2 to 5).

Attrition: The degree of attrition was assessed by the following criteria:

<table>
<thead>
<tr>
<th>Score</th>
<th>Surface</th>
<th>Criterion</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>O/I</td>
<td>No loss of enamel surface characteristics</td>
</tr>
<tr>
<td>1</td>
<td>O/I</td>
<td>Loss of enamel surface characteristics</td>
</tr>
<tr>
<td>2</td>
<td>O</td>
<td>Loss of enamel exposing dentin for less than one-third of the surface</td>
</tr>
<tr>
<td></td>
<td>I</td>
<td>Loss of enamel just exposing dentin</td>
</tr>
<tr>
<td>3</td>
<td>O</td>
<td>Loss of enamel exposing dentin for more than one-third of the surface</td>
</tr>
<tr>
<td></td>
<td>I</td>
<td>Loss of enamel and substantial loss of dentin, but not exposing pulp or secondary dentin</td>
</tr>
<tr>
<td>4</td>
<td>O</td>
<td>Complete loss of enamel, or pulp exposure, or exposure of secondary dentin</td>
</tr>
<tr>
<td></td>
<td>I</td>
<td>Pulp exposure or exposure of secondary dentin</td>
</tr>
</tbody>
</table>

O–Occlusal, I–Incisal

Fig. 1: Armamentarium

Fig. 2: Maxillary arch showing no attrition of teeth
After scoring the individual teeth, the sum score of all teeth examined was divided by the number of teeth. The value obtained was considered as the attrition score.

**RESULTS**

Data were subjected to statistical analysis.

Table 1 shows the prevalence of attrition in the study group. Subjects in the middle and old age group showed 100% prevalence of attrition and subjects in younger age group showed a 91.5% prevalence.

Table 2 shows the frequency distribution of attrition score in 570 subjects. Total 41% of the subject showed that attrition score between 1.0 and 2.0 and in 41% of the subject's score of less than 0.5 was seen.

Table 3 shows mean attrition score in subjects of young, middle and old age groups as 0.21, 0.82, 1.44 respectively.

Mean attrition score was found to be statistically significant (p < 0.05) when compared between different age groups. With the post–hoc Tukey’s analysis it was found that mean attrition scores were higher in old age groups when compared with middle and young age groups.

Table 4 shows mean attrition scores of males and females in all the age groups as 0.99, 0.67 respectively. Statistically significant (p < 0.05) mean attrition scores were found between males and females in which males had higher scores when compares with females.

**DISCUSSION**

The global population is increasing at an annual rate of 1.2%, while the population of those 65 years or older is increasing at a rate of 2.3%. The proportion of the elderly to the total population of India rose from 7.5% in 2001 to 8.2% in 2011.

Tooth wear is perceived internationally as an ever-increasing problem, especially in the elderly, as it is more common in this age group. Tooth wear is physiologic, occurring as a normal aging process. Tooth surface loss is a macroscopically irreversible process that accumulates with age. Lambrechts estimated the normal vertical loss of enamel from physiological wear to be approximately 20 to 38 μm per annum. This process is accelerated by several endogenous and exogenous factors termed as pathologic.

**Table 2:** Prevalence of severity attrition in 570 subjects

<table>
<thead>
<tr>
<th>Attrition score</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;0.5</td>
<td>239</td>
<td>41.29%</td>
</tr>
<tr>
<td>0.51–1</td>
<td>91</td>
<td>15.96%</td>
</tr>
<tr>
<td>1–1.5</td>
<td>152</td>
<td>26.66%</td>
</tr>
<tr>
<td>1.51–2</td>
<td>84</td>
<td>14.73%</td>
</tr>
<tr>
<td>2.1–2.5</td>
<td>4</td>
<td>0.70%</td>
</tr>
<tr>
<td>&gt;2.5</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
Attrition is the loss of tooth substance occurring as a result of mechanical wear between the opposing surfaces of teeth during masticatory and parafunctional movements. Wear facets are characterized as flat, round or sharply angled and polished surfaces, most often seen on the occlusal surfaces of posterior teeth, the incisal edges of anterior teeth.

Factors causing excessive or pathological occlusal wear are: congenital anomalies, psychological factors, and bruxism, iatrogenic like occlusal pre maturities, coarse porcelain restorations, deleterious habits like betel nut chewing/tobacco pan chewing, nail-biting and coarse diet class III incisal relationship and lack of posterior support also lead to attrition.

When the process of tooth wear is excessive, it leads to tooth shortening, exposed dentin, tooth hypersensitivity, or, more seriously, exposure of the canal, pulpititis, pulp necrosis, loss in occlusal vertical dimension, mechanical failure of teeth or restorations and an unsightly appearance.

Dental attrition is one of the main causes of non-curious lesions which results in deterioration of natural dentition and consequent degradation of occlusion.

The challenges faced during the clinical management of patients with tooth wear has raised considerable professional interest as its impact could be severe and may also affect an individual’s quality of life. It should be emphasized that most often a combination of factors are responsible for the wear.

Hence, it is important to find the causative factors which will help in the management of attrition. So, the study was carried out to find the causative factors of dental attrition, severity, and prevalence of dental attrition.

In the present study, attrition index modified by tooth wear index of Smith and Knight was chosen as it is user-friendly, easily, comparable and widely used. Clinical examination was conducted to score the individual teeth, after that the sum score of all teeth examined was divided by the number of teeth. The value obtained was considered as the attrition score. This attrition score showed the severity of attrition in the subject.

In the present study prevalence rate of the attrition among the population studied was 97.2%, where younger age group subjects showed the prevalence rate of 91.5% and middle, old age group subjects showed the prevalence of 100% (Graph 1). Similar results were seen in a study by Seligman et al. where 91.5% of the young adult population showed similar tooth wear.

This showed that minimal amount of tooth wear in enamel is universal. This could be due to age, habits and functional activity.

Tooth wear is seen in the subjects of all the age groups, but the severity of attrition was varied. Least attrition score of less than 0.5 was seen in 41.2% of the study population (Graph 2). This is incongruent with the study conducted by Sangeeta Yadav where 88% of the study population had one or more tooth with significant attri-
tion with grades of 2 or more on a 0–4 scale of a standard attrition index.\textsuperscript{15}

In the present study, it was observed that the attrition rate was increased with the increase in age (Graph 3). As the age increased mean attrition score was also increased in the study population. This was incongruent with the earlier studies conducted by Hugosan et al., Pergamalian et al., which showed that attrition increases with the increase in age.\textsuperscript{16,17} This showed that as the age advances, attrition becomes more severe. It has been reported that tooth wear is an age-dependent process. This increase in attrition with the increased age was due to increased functional activities, the accumulative effect of duration of etiological factors.

Least attrition score of 0.5 was seen in 94.2\% of younger subjects and 91.05\% older age subjects showed the attrition score of 1 to 2. None of the subjects showed attrition score of more than 2.5. A study conducted by Hugosan et al. showed the attrition score of 2 in 6\%, 10\% and 31\% of subjects aged 20, 30 and 70 years respectively.\textsuperscript{16} This showed that younger subjects had minimal wear involving only enamel and older subjects showed wear involving both enamel and dentine. This was attributed to functional wear and increase in duration of habits. Older people are exposed to the risk factors of tooth wear over a longer, and they also tend to indulge in deleterious oral health practices that result into tooth wear.

It was found that male subjects in the present study showed more attrition than female subjects. Male subjects of all the age groups showed higher attrition than female subjects of all the age groups (Graph 4). Similar results were seen in earlier studies of Hugosan et al., Seligman et al. and Donachie et al.\textsuperscript{14,16,18} The higher attrition score in men may be probably due to strong masseter function, greater muscle fiber mass, stronger ligaments resulting in higher biting force. Males showed more adverse habits than females which might have resulted in attrition.\textsuperscript{15}

Initial management of tooth surface loss depends on accurate diagnosis of the condition, the identification of the etiology and frequent monitoring of the successive changes; hence to prevent further damage. Treatment planning is sometimes very challenging, and it is very necessary that accurate analysis of the tooth surface loss is made at an early stage and that satisfactory preventive measures are carried out. In patients who exhibit only physiological wear with no esthetic or functional complaints and associated symptoms of discomfort, the management strategies should be primarily limited to preventive measures and monitoring. In those patients exhibiting pathological tooth wear, there is a need for active restorative involvement along with the preventive strategies and regimes.\textsuperscript{5}

Some limitations of the present study were it is a cross-sectional study, and the methodology included only clinical examination using the index. For evaluation and management of attrition follow up studies will be more helpful. The methodology could have included one more method of verifying the scoring like intraoral photographs and high-density casts.

**CONCLUSION**

Within the limitations of this study, the following conclusions can be drawn:

- The highest prevalence of attrition was seen in both middle and old age compared to younger age.
- Younger age showed the least attrition score involving only enamel compared to older age who showed attrition involving enamel and dentine.
- As the age advances severity of attrition was also increased.
Males showed higher attrition than females. The severity of attrition was also more in males.

REFERENCES