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ORIGINAL RESEARCH

Attrition As A Risk Factor In Interdental Papillary Health – A Prospective Observational Study

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Abstract

Background: The interdental papilla that occupies the gingival embrasure plays a crucial role in maintaining the gingival health as it acts as a biological barrier and protects the underlying periodontal structures from microbial invasion and also has an important role in phonetics and aesthetics. The health of interdental papilla is influenced by various factors and dental attrition which is seen to have a high prevalence rate also influences the papillary health. Objective: To assess the relation and correlation between attrition and interdental papillary health. Methods: A prospective observational study was conducted and data was collected from 55 samples. The participants were assessed clinically for Plaque Index, Sulcus Bleeding Index, Papilla Presence Index and Hooper et al.'s classification for tooth wear. The data was then subjected to statistical analysis and results were obtained. Results: The Plaque Index (P = 0.0041), Sulcus Bleeding Index (P < 0.0001) and Papillary Presence Index (P < 0.0001) was found to be positively correlated with the tooth wear index. Conclusion: As observed from this study, a positive correlation was found between tooth wear, Plaque Index, Sulcus Bleeding Index and Papilla Presence Index, hence is suggestive of a risk factor for periodontal health.

KEYWORDS

Attrition, Interdental papilla, Plaque index, Sulcus bleeding index, Papilla presence index

1 | INTRODUCTION

The interdental papilla occupies the gingival embrasure, which is the interproximal space apical to the area of tooth contact.[1] The shape of interdental papilla can be pyramidal in the anterior or "col" shaped in the posterior.[2] It acts as a biological barrier and protects the underlying periodontal structures from microbial invasion while playing a crucial role in phonetics and aesthetics.[3] An array of problems arises ranging from phonetics to food impaction and aesthetic disharmony in case of papillary pathology.[4] Hence integrity and preservation of the interdental papilla is an essential part of the functional and aesthetic rehabilitation of dental treatment. The health of interdental papilla is influenced by age, gender, brushing techniques, oral hygiene and clinical crown height.[5, 6] Attrition is the loss of tooth structure due to mechanical grinding or interaction with other teeth. It is caused by tooth-to-tooth contact, usually where the teeth meet on the incisal or occlusal edges. Well-defined, sharp, flat and shiny wear marks, known as 'facets' appear on molar and premolar tooth cusps or ridges. Attrition on anterior teeth results in matching wear patterns between maxillary and mandibular teeth. Tooth grinding (bruxism) is a main cause of this type of tooth wear.[7] Dental attrition is seen to have a prevalence rate of 29% in the South Indian population[8] and might lead to plaque accumulation and also aggravate the periodontal disease already present. Hence an attempt was made to evaluate the effect of attrition on interdental papillary health.

2 | MATERIALS AND METHODS

SOURCE OF DATA

Study was conducted on out patients reporting to the Department of Periodontology, Dayananda Sagar College of Dental Sciences, Bengaluru. Male: Female ratio – 1:2

STUDY DESIGN Experimental method – Prospective observational study

SAMPLE SIZE DETERMINATION Sample size estimation was done using R-Software 3.4.2 with effect size at 0.2, α error – 0.05 and power – 0.95. The output generated suggested a total sample size of 55.

PARTICIPANTS

Inclusion criteria

- Patients with attrition of either anterior or posterior teeth.
- Patients in the age group of 25-60 years.
- Patients with a minimum of a total of 24 natural teeth.

Pearson's Correlation Coefficient	Tooth wear index vs Plaque index	Tooth wear index vs Bleeding index	Tooth wear index vs Papilla presence index
r	0.314	0.6549	0.6696
95% confidence interval	0.1041 to 0.4971	0.5104 to 0.7634	0.5295 to 0.7741
R squared	0.09859	0.4288	0.4484
P (two-tailed)	0.0041	<0.0001	<0.0001
P value summary	**	****	****
Significant (alpha = 0.05)	Yes	Yes	Yes
Number of XY Pairs	82	82	82

Table 1. Correlation between Tooth wear index and Plaque Index, Bleeding Index and Papilla presence index using Pearson's Correlation Coefficient

Exclusion criteria

- Patients diagnosed with Stage I, Stage II, Stage III and Stage IV periodontitis.
- Patients suffering from any form of systemic diseases.
- Patients currently on antibiotic/anti-inflammatory therapy, steroids or hormonal therapy within the past 6 months.
- Patients with history of any dental therapy in the past 14 days.
- Patients with oral abusive habits such as smoking, consumption of alcohol or tobacco.
- Patients diagnosed with any form of psychosomatic disorders.
- Patients with parafunctional habit of bruxism.

CLINICAL PARAMETERS

The study data were entered into a standard proforma.

All the participants were assessed clinically for Plaque Index [Sillness J and Loe H, 1967][9], Sulcus Bleeding Index [Muhlemann HR, 1971] [10], Papilla Presence Index [Cardaropoli, 2004][11] and Hooper et al.'s classification for tooth wear [2004] [12]

STATISTICAL ANALYSIS

The data collected from each subject were entered into Excel sheet and a master chart was prepared. The data was analysed using R-Software 3.4.2. The data was tested for normality and Pearson's correlation coefficient was computed between tooth wear index, Plaque Index, Sulcus Bleeding Index and Papilla Presence Index. The result was considered statistically significant whenever $P<0.05$.

3 | RESULTS

A. Correlation between Tooth wear index and Plaque Index

The Pearson's Correlation of Tooth wear v/s Plaque Index was found to be positively correlated ($r = 0.314$), $P = 0.0041$ with 95% confidence interval (0.1041, 0.4971) which was seen to be statistically significant. Although there was a positive relation between Tooth wear index and Plaque Index, the contribution to the relation between Tooth wear index and Plaque Index was only 9.86%.

B. Correlation between Tooth wear index and Sulcus Bleeding Index

The Pearson's Correlation of Tooth wear v/s Sulcus Bleeding Index was found to be positively correlated ($r = 0.6549$), $P < 0.0001$ with 95% confidence interval (0.5104, 0.7634) which was seen to be statistically highly significant. Further the R-squared was 0.4288, i.e., change in tooth wear index contributed by Bleeding Index was 42.88%.

C. Correlation between Tooth wear index and Papilla Presence Index

The Pearson's Correlation of Tooth wear v/s Papilla Presence Index was found to be positively correlated ($r = 0.6696$), $P < 0.0001$ with 95% confidence interval (0.5295, 0.7741) which was seen to be statistically highly significant. Further the R-squared was 0.4484, i.e., change in tooth wear index contributed by Bleeding Index was 44.84%.

4 | DISCUSSION

The interdental papillae which fill the area between the teeth apical to their contact points play a major role by acting as a biological barrier and preventing bacterial invasion, and prevention of food impaction. A missing papilla is visible as a small triangular gap between adjacent teeth which often compromises the aesthetics.

Age and sex seem to modify the presence of the interdental papilla. Dental attrition that is caused by tooth to tooth contact is seen to have detrimental effects on the interdental papilla. It causes more plaque accumulation as it leads to reduced crown height which makes it difficult for the patient to maintain oral hygiene.

This study has been done to assess the effect of attrition on interdental papillary health in terms of Plaque index, Sulcus bleeding index and the level of interdental papillary height. It was observed that the mean Plaque index scores, Sulcus bleeding index scores and Papilla Presence index scores were significantly related to Tooth Wear.

According to a study done by Ioannou AL et al.[13] it was concluded that risk indicators for visible papillary absence, sex and age, need to be taken into consideration for careful assessment and meticulous treatment planning with respect to preservation of the interdental tissues.

A study done by Joshi K et al.[14] observed that complete papilla fill was associated with crown width: length ≥ 0.88. The observations of this study are similar to the results of our study. However Handelman CS et al.[6] concluded that tooth wear shortens the clinical crown, and therefore, the measure of clinical crown height can give a false negative result when gingival recession is present. The gingival margin-papillae measurement was not affected by tooth wear and gave a true positive result for gingival recession. It was seen that tooth wear (attrition) was not associated with an increase in gingival recession. The results of our study are in contrary to the observations of this study.

However various confounding factors like age, sex and parafunctional habits like bruxism could have influenced the results of the study which have not been taken into consideration and the sample size is not large enough to generalize the results.

3 | CONCLUSION

According to this study it can be concluded that Plaque index and Sulcus bleeding index measures and level of interdental papillary height is influenced by attrition. However larger sample size is required to generalise the results and several confounding factors could have influenced the results of this study which have not been taken into consideration. Considering larger samples and addressing the confounding factors mentioned, a further study is required to generalize the results.

CONFLICT OF INTEREST

There are no conflicts of Interest

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