Abrasiveness of a toothpaste depends on the amount of abrasive, particle size, and the configuration of the abrasive particle. The use of a toothbrush with dentifrice improves the mechanical control of plaque. Besides cleaning of teeth, the injudicious use of toothbrushes has been considered an etiological factor in gingival recession and tooth wear as reported by various studies. The bucco-cervical regions of the teeth are the most vulnerable and the hard tissues mainly affected are cementum and dentin. The consequent lesions are called dental or cervical abrasion. The mechanism

**ABSTRACT**

**Introduction** Toothpaste is a dentrifice used with a toothbrush as an accessory to clean and maintain the aesthetics and health of teeth. It serves as an abrasive that aids in removing the dental plaque and food from the teeth, assists in suppressing halitosis and delivers active ingredients to help prevent tooth decay and gum disease, thereby promoting oral health. Current trends are shifting towards alternate medicinal systems especially herbal medicines. Herbal toothpastes have received attention from the public and professionals following a number of studies which have reported beneficial effects on teeth. However, no study has been conducted on the detrimental effect of herbal toothpaste on the surface enamel owing to its abrasiveness. So, in this study, we evaluated and compared the effect of herbal-based products with conventionally formulated toothpaste on the roughness of tooth enamel.

**Materials and Methods** Enamel specimens were obtained from 20 freshly extracted human molars after cleaning. The enamel specimens were divided into four groups. Group A: Colgate toothpaste (which will be served as control group); Group B: Patanjali Dant Kanti toothpaste; Group C: Himalaya Hiora toothpaste; and Group D: Dabur Red toothpaste. The samples were brushed for 2 min twice daily with soft toothbrush for 15 days and were kept in distilled water. They were rinsed under running water to remove the toothpaste and stored in distilled water until readout was taken on the surface profilometric analysis for surface roughness.

**Conclusion** Himalaya Hiora and Patanjali Dant Kanti toothpaste were less abrasive on tooth surface compared to Colgate and Dabur red. However, Himalaya Hiora had even lesser abrasive compared to Patanjali Dant Kanti.

**KEYWORDS** herbal patanjali tooth paste, dabur red paste, himalaya hiora

**INTRODUCTION**

Effective plaque control is critical for the maintenance of oral health, because dental plaque is the primary etiological factor in the introduction and development of both caries and periodontal diseases. The toothbrush is the principal instrument in general use for accomplishing plaque removal as a necessary part of disease control. Toothpaste serves as an abrasive that aids in removing the dental plaque and food from the teeth, assists in suppressing halitosis and delivers active ingredients to help prevent tooth decay and gum disease, thereby promoting oral health. Many different designs of toothbrushes and supplementary devices have been manufactured and promoted. Depending on the diameter of the bristles, toothbrushes have been categorized as soft (0.2 mm), medium (0.3 mm) and hard (0.4 mm).

The use of toothbrush with dentifrice improves the mechanical control of dental plaque. Besides cleaning of teeth, the injudicious use of toothbrush has been associated with harmful effects on dentition. The wear produced by toothpastes, toothbrushes and polishing pastes is defined as abrasion. The abrasivity of a toothpaste depends on the amount of abrasive, particle size, surface structure of the particle and on the chemical influence of other types of ingredients in the product.

Besides, regular tooth brushing with dentifrices has been considered an etiological factor in gingival recession and tooth wear as reported by various studies. The bucco-cervical regions of the teeth are the most vulnerable and the hard tissues mainly affected are cementum and dentin. The consequent lesions are called dental or cervical abrasion. The mechanism...
is unclear as to how abrasion varies with the use of different types of toothbrushes and the role of toothpaste in abrasion process. Different in vitro studies have used profilometer to measure surface abrasivity. Profilometer is a device which can measure changes in surface roughness. It provides roughness average (Ra) values for each profile. The profilometer produces a tracing using digital and analogue hardware and software, and calculates the average surface roughness (Ra) value for the resultant tracing.8,9

Current trend is shifting towards alternate medical systems especially herbal medicines. Herbal toothpastes have received attention from the public and professions following a number of studies, which have reported beneficial effects on teeth. However, no study has been conducted on the detrimental effect of herbal toothpaste on the surface enamel owing to its abrasiveness.

So, in this study, we will evaluate and compare the effect of herbal-based products with conventionally formulated toothpaste on the roughness of tooth enamel.

### MATERIALS AND METHODS

A total of 20 freshly extracted human molars were obtained and visually inspected to exclude those with stains, cracks, or fractures in the labial surfaces of the enamel. After careful cleaning, the specimens were stored at 37°C in distilled water until use.

### Experimental groups

The specimens were randomly divided into four groups (n = 5 samples per group) according to toothpaste being used (Fig. 1).

### Brushing duration and frequency

Brushing of each specimen was carried out for 2 minutes, twice daily for 15 days. (Fig. 2).

### Profilometeric analysis

The mean surface loss was evaluated using a profilometer (Fig 3). It provides Ra value (average surface roughness) and difference in Ra value before and after tooth brushing provides proxy measure for assessing surface abrasion. The Ra value for all the 20 specimens was calculated prior and post to tooth brushing and the difference in Ra value (Post-Pre) was used to assess change in surface roughness/abrasion.

### Statistical analysis

The statistical analysis was done using the ANOVA:

**ANOVA: Design 1 between Subject Factor**

Surface hardness F(3, 16) = 24.9 P < 0.000003 SS = 9.45 MSE = 0.13

Pairwise Comparisons (Q = TukeyHSD: *P < 0.05 **P < 0.01)

(Colgate toothpaste) vs (Patanjali Dant Kanti toothpaste) t(8) = 6.80 P < 0.0001 Q = 8.2933**

(Colgate toothpaste) vs (Himalaya Hiora toothpaste) t(8) = 15.14 P < 0.0001 Q = 11.8745**

(Colgate toothpaste) vs (Dabur Red toothpaste) t(8) = 4.20 P < 0.0030 Q = 7.4263**

(Patanjali Dant Kanti toothpaste) vs (Himalaya Hiora toothpaste) t(8) = 3.83 P < 0.0050 Q = 3.5812

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**Fig. 1** Types of toothpaste used.

**Fig. 2** Method of brushing of each specimen.

**Fig. 3** Profilometer used to evaluate surface roughness.
surface abrasiveness, no significant findings were observed for the Himalaya Hiora and Patanjali toothpaste.

**DISCUSSION**

Various types of toothbrushes available in the market keep the buyer in a state of dilemma as to which one to choose, due to lack of information about the quality of it.\(^{10,11}\) Brushing associated with dentifrices continues being the most used and efficient procedure of self-care in the practice of oral hygiene.\(^{12}\) Besides having potential benefits of dental plaque and biofilm removal and improving oral health, the injudicious use of toothpaste and toothbrush results in injuries to dental hard and soft tissues e.g. abrasion.\(^{13,14}\) Abrasion has multifactorial etiology and numerous factors affect the abrasion process.\(^{15}\)

Since the role of different types of toothbrushes and dentifrice is still not clear in abrasion process, this in vitro study was undertaken to assess the role of different types of toothpastes in causing abrasion.

In the present study, it was found that when the specimens were brushed for 15 days, the mean surface loss produced was significantly higher in Group A (Colgate toothpaste). Also, it was observed that brushing with Himalaya Hiora toothpaste caused very little abrasion on mounted enamel specimens when compared to other groups.

This in vitro study was performed for a short duration; hence, the role of toothpastes for long-term use cannot be documented. Moreover, the study did not take into consideration the abrasive nature of toothbrush.

**CONCLUSION**

Himalaya Hiora and Patanjali Dant Kanti toothpaste are less abrasive on tooth surface compared to Colgate and Dabur Red. However, Himalaya Hiora is even less abrasive as compared to Patanjali Dant Kanti.

**REFERENCES**