

Effect of Fennel Seeds On Dental Plaque and Salivary pH-A Clinical Study

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ABSTRACT

Aim: Numerous types of practices have been developed over a period of time and have been traditionally followed by various cultures. Chewing of fennel seeds is one of such practices. Scientifically known as *foeniculum vulgare*, seeds of this plant are commonly chewed after food in Indian sub-continent. Aim of this study was to know the effect of chewing fennel seeds on plaque pH and salivary pH.

Materials and Method: Twenty subjects were recruited based on eligibility criteria and were informed not to use any oral hygiene measures 24 hours prior to appointment. Plaque was collected to represent buccal surfaces of posterior teeth. For measurement of salivary pH, 2 ml of stimulated saliva was collected. Baseline pH was determined for both plaque and saliva using a calibrated glass combination electrode. After the subjects chewed seeds for five minutes resultant plaque and salivary pH were measured again. A third saliva sample was taken and pH measured five minutes later.

Results: A highly significant but a very transient drop in salivary pH on chewing the seeds was observed. However plaque pH did not show any significant change.

Conclusion: The drop in pH is not sustained and is returning to normal limits within five minutes after chewing the seeds suggesting that the seeds have very little Cariogenic potential.

KEY WORDS

Plaque pH, Salivary pH, *Foeniculum vulgare*.

INTRODUCTION

In the field of preventive dentistry, investigations done on some indigenous and traditional practices have yielded positive results. Use of “miswak” sticks as oral hygiene aid can be the relevant example (1). This stick was traditionally used for cleaning teeth since many generations. Investigations done on it proved that it has some antibacterial properties. This stick has been recommended by World Health Organization as an adjunctive oral hygiene aid (2).

In our search of such traditionally practiced, culturally acceptable and yet effective preventive agents we found it interesting to assess the effect of chewing fennel seeds, chewing of which is widely in vogue in Indian society and many parts of the world. Fennel seeds are derived from plant scientifically known as *foeniculum vulgare* cultivated for its condiment value. This plant is a stout, tall, aromatic annual herb. In plant taxonomy it belongs to *umbelliferae* family (3). This plant is traditionally used and is being investigated for therapeutic purposes (4-8).

The seeds of this plant are oblong or ellipsoid; somewhat dorsally compressed inner face slightly concave. In India the seeds are used for chewing alone or with betel leaves or mixed with sugar or commercially available sugar coated sachets. A review of previous studies on spices including fennel seeds shows that some of them have anti-microbial efficacy(9). But there was no data available regarding the effect of these seeds on the pH changes in oral cavity.

Aim of the present study was to know the effects of chewing the fennel seeds on the plaque pH and salivary pH. This study had two objectives. Firstly, to record the baseline pH of plaque and saliva and secondly, to record the changes in plaque and salivary pH after chewing fennel seeds.

MATERIALS AND METHODS

Study was carried out in the city dental clinic and college of pharmacy, Belgaum, during the period of first to third week of September 2004. All the experiments were carried out at morning to minimize variations in salivary flow and composition.

A table of subject characteristics including age, sex, DMFT scores, periodontal status and sites were used when pH

determination was documented. 20 adult volunteers were included for the study. They were informed about the study procedures and informed consent was taken. Subjects under going topical fluoride therapy, other chemotherapeutic procedures, antibiotics and drugs having effect upon salivary function/ salivary pH/ plaque formation or plaque pH were excluded from the study. The subjects were requested to refrain from brushing and using any other oral hygiene procedures for 24 hours in order to allow for plaque accumulation as mentioned in previous studies as the plaque harvesting technique (10).

The subjects were requested to consume their normal diet and to avoid major deviations in diet prior to the study. Patients were also requested to refrain from eating or drinking anything (except plain water) 2 ½ hours prior to the appointment on the test day. The resting plaque and salivary pH was measured to record the baseline data. For measurement of salivary pH 2 ml. of stimulated saliva was taken. The measurement of the plaque pH was done as follows. The plaque was collected from buccal surfaces of the designated posterior teeth and pH measured by pooling the plaque. For the baseline data the plaque was collected from mesial half of buccal surface eight posterior teeth and distal half of buccal surface eight more posterior teeth. Collection of plaque was done using a sterilized explorer and collection was standardized as using three occlusally directed strokes per surface for each collection. The collected pooled plaque was thoroughly mixed with 10 milliliters of distilled water and pH determined using a previously calibrated glass combination electrode. After the baseline (S1 and P1) pH was determined, the subjects were requested to chew a known quantity (1.3 grams) of fennel (*foeniculum vulgare*) seeds for about five minutes. The plaque and salivary pH was measured again (S2 and P2) using the same methodology but taking the other half of the tooth for plaque collection immediately after chewing the seeds. A third saliva sample (S3) was taken five minutes after chewing the seeds. The changes in pH before and were compared using paired -t-test. A significance level of 5% was considered as statistically significant.

RESULTS

The plaque showed an average drop of 0.2 ± 0.6 but this

drop was not statistically significant ($p = 0.19161$) as shown in Table 1. But salivary pH was shown to drop to a statistically significant level ($p = 0.00003$) with a mean drop of 0.56 ± 0.46 (Table 2). The duration of drop in salivary pH is however for a short period of five minutes.

DISCUSSION

The above results indicate a drop in the pH (both plaque and saliva) on consumption of the seeds. The drop in plaque pH was not statistically significant. This indicates that chewing of these seeds don't seem to induce any change in plaque pH below "critical pH" (11). Though the drop of salivary pH was statistically significant, the drop of 0.56 ± 0.46 is a very small drop. Also the drop is not sustained and pH is coming back to normal within five minutes. Since extensive search of literature did not reveal information on effect of these seeds on pH changes in oral cavity we are unable to compare the present data to any other study. Further prospective studies in the following direction may throw light upon the effect of fennel seeds on oral cavity like its "antibacterial efficacy" against – oral bacteria, Its ability of mechanical plaque removal, effects on salivary parameters like flow rate, buffering capacity and viscosity.

CONCLUSION

Since the drop in pH is not sustained and is returning to

normal limits within five minutes after chewing the seeds suggesting that the seeds have very little Cariogenic potential. Meticulous studies in due course of time may help us in deciding whether this widely used spice is indeed beneficial.

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Table 1: Difference in Plaque pH scores before and after chewing the fennel seeds

Statistical procedure	pH before chewing	pH recorded immediately after chewing
Mean (Standard deviation)	6.81(0.65)	6.61(0.24)
Paired –t-test	t-value 1.354, p-value 0.19, Not significant.	

Table 2: Salivary pH scores before and after chewing the fennel seeds analyzed using Paired –t-test.

Statistical procedure	Salivary pH score before chewing (S1)	Salivary pH score immediately after chewing (S 2)	Salivary pH score five minutes after chewing (S 3)
Mean(Standard deviation)	7.15 (0.26)	6.58(0.50)	7.18(0.26)
Comparison	S1 compared to S2	S2 compared to S3	S1 compared to S3
t-value	5.37	5.76	0.76
p-value	0.000034	0.000014	0.45
Statistical significance	Highly significant	Highly significant	Not significant

S1 - Salivary pH score before chewing.

S2 - Salivary pH score immediately after chewing.

S3- Salivary pH score five minutes after chewing.

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