

# An In-Vivo Evaluation of the Effect of Fennel Seeds Chewing on Salivary pH

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## ABSTRACT

**Background:** Saliva is one of the most important factors in regulating oral health, with flow rate and composition changing throughout development and during disease. Numerous chewing habits have been traditionally followed by various cultures and this effects salivary composition. Chewing of fennel seeds (*Foeniculum vulgare*) is one such practice. This study was done with the objective to record and compare the salivary pH at base line, immediately and five minutes after chewing the seeds.

**Materials and methods:** Total 22 subjects, aged  $\geq 18$  years were requested to chew a known quantity of fennel seeds (1.3grams) for five minutes and salivary pH was recorded using Qualigens Indikrom paper strips.

**Results:** Highly statistically significant rise in salivary pH was seen immediately after chewing seeds ( $p=0.003$ )

**Conclusion:** Chewing of seeds showed a rise in salivary pH, which can prevent demineralization and have an anti-cariogenic effect.

**Keywords:** Fennel seeds, Salivary pH, Chewing seeds

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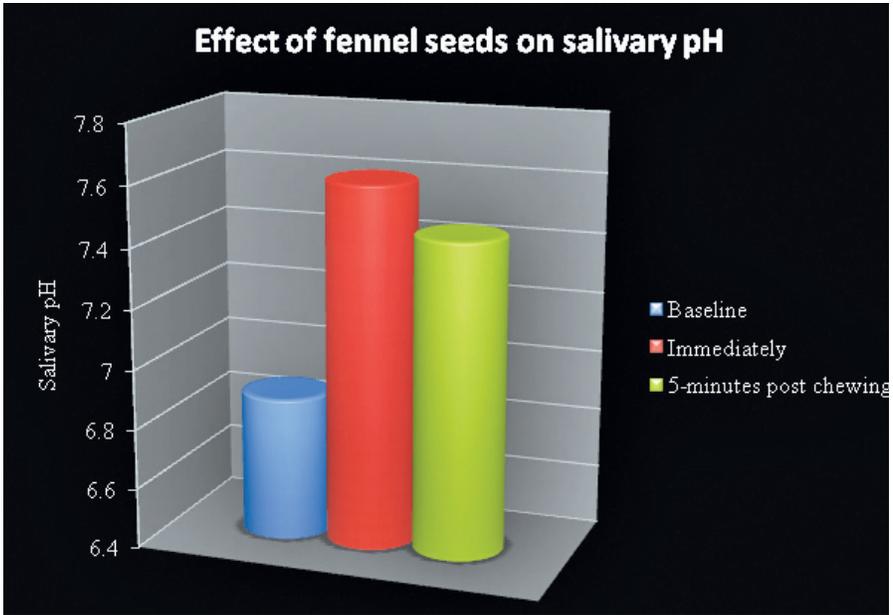
## INTRODUCTION

Fennel plant which belongs to Umbelliferae family, (1) is a stout, tall, aromatic annual herb. It is claimed to be an antidote to poisonous herbs, mushrooms and snakebites and has traditionally been used for various ailments like gastroenteritis and indigestion. Tea made from crushed fennel seeds has been used as eyewash for conjunctivitis. As a herbal medicine, fennel is reputed to increase milk secretion, promote menstruation, facilitate birth, ease the male climacteric, and increase libido(2). For the treatment of infants suffering from dyspeptic disorders, fennel tea may be a remedy of first choice (2).

Dental caries is a disease of complex etiology, and saliva plays an impor-

tant role in the disease etiology. Consumption of food or snacks changes the salivary pH, which can be either acidic or basic and can thus result in or prevent dental caries. Fennel seeds, scientifically known as *foeniculum vulgare*, are commonly chewed after food in the Indian sub-continent (1). These seeds are used for chewing either alone, sugar coated or with betel leaves. Previous studies on spices including fennel seeds showed that some of them have an anti-microbial efficacy (3) but none has reported its effect on salivary pH. Hence this study was conducted with the aim of assessing the effect of fennel seeds on salivary pH.

The objective of the study was to record and compare the salivary pH at base line, immediately and five minutes after chewing the seeds



**MATERIALS AND METHODS**

Ethical approval was obtained from Human Research Review Board and Ethics Committee of Sumandeep Vidyapeeth, Piparia, Vadodara. Study was conducted by the principal investigator.

An In-vivo experimental study was conducted to assess the effect of fennel seeds on the salivary pH at different intervals on 22 Undergraduate students of KM Shah Dental College & Hospital. A written and informed consent was obtained from the individuals prior to study.

**Sampling Methodology**

- Voluntary enrollment of individuals was done. (Non-random sampling method).

*Inclusion criteria*

- Completely dentate individuals
- Males and Females ≥ 18 years studying in KM Shah Dental college & Hospital

*Exclusion Criteria*

- Subjects undergoing topical fluoride therapy, other chemotherapeutic procedures, antibiotics and drugs having effect upon salivary function or salivary pH were excluded from the study.
- Subjects suffering from any systemic diseases/ taking any medication that affects salivary secretion.
- Participants suffering from any condition, which is contraindicated for clinical examination.
- Individuals who refrain from Fen-

nel seeds due to allergic or personal reasons.

- Individuals who are not willing to participate

**Saliva sample and pH recording**

All subjects were requested to follow their normal diet and to avoid major deviations in diet prior to the study. The subjects were asked to refrain from eating or drinking 2 hours prior to the test and baseline salivary pH (S1) was collected prior to chewing of seeds. Salivary pH, was recorded by placing the strip in the oral cavity below the tongue. Qualigens Indikrom paper strips (Thermo Fisher scientific India Pvt. Ltd) (4) was taken for recording of salivary pH and was matched with the pH scaled colored chart. The test strip color changes were matched with the pH scale color chart within about 15 seconds.

The subjects were requested to chew a known quantity of fennel seeds (1.3 grams) for about 5 minutes. The salivary pH was measured again (S2) using the same methodology. A third saliva sample (S3) was taken after five minutes of chewing the seeds.

**Statistical method used**

The data was compiled and was entered into microsoft excel sheet and then was analyzed using SPSS 11.5 for windows. Means and Standard Deviations were calculated using descriptive statistics and comparison among the intervention group were done using

**TABLE 1: Salivary pH scores before and after chewing the fennel seeds analyzed using Paired –t-test Salivary pH score**

Statistical Procedure	Salivary pH score before chewing Fennel seeds (S1)	Salivary pH score immediately after chewing Fennel seeds (S2)	Salivary pH score 5 minutes after chewing Fennel seeds (S3)
Comparison	S1 compared to S2	S2 compared to S3	S1 compared to S3
Mean (±) standard deviation	6.88±0.55	7.61±0.43	7.45±0.34
t-value	-7.48	3.13	-5.38
p-value	0.003	0.000	0.026
Statistical significance	Significant	Highly Significant	Significant

Paired t-test.

## OBSERVATIONS & RESULTS

Figure 1 represents the Mean salivary pH at baseline, immediately after chewing the seeds and five minutes post chewing the seeds.

The mean salivary pH of the subjects at baseline was  $6.88 \pm 0.55$  which increased to  $7.61 \pm 0.43$  immediately after chewing of the seeds. This increase in pH from baseline (S1) to immediately after giving the intervention (S2) was found to be significant ( $p=0.003$ ). The Mean salivary pH reduced to  $7.45 \pm 0.34$  after 5 minutes of chewing (S3) and the drop in salivary pH from immediately chewing the seeds (S2) to 5 minutes post chewing (S3) was found to be Highly Significant ( $p=0.000$ ). The drop in pH from baseline (S1) to 5 minutes after chewing (S3) was also statistically significant ( $p=0.026$ ). Table 1 shows the pH changes from baseline to immediately after intervention and five minutes after intervention and its statistical significance.

## DISCUSSION

Fennel seeds are very rich in minerals including magnesium. These seeds can be chewed upon or can be had as a tea decoction for beneficial effects upon the stomach. In India, these are routinely chewed upon after meals to aid in digestion after a rich meal while acting as an herbal mouth freshener (5). This natural product has a potential for use as alternative remedies to heal many infectious diseases as they contain essential oils.

Two of its main constituents are Anethol and Fenchone. Anethol and other terpenoids may inhibit spasms in smooth muscles such as those in the intestinal tract. Fenchone may be responsible for the medicinal properties associated with Fennel. Anethole

trithione is a bile secretion-stimulating drug, or cholagogue. It stimulates the parasympathetic nervous system and increases the secretion of acetylcholine, resulting in the stimulation of salivation from serous acinic cells. Anethole has been used for many years in the treatment of chronic xerostomia, but reports differ regarding its efficacy. While some studies report improvements in salivary flow rates in drug-induced xerostomia, trials in patients with Sjogren's syndrome show conflicting results (6). Anethole also has potent antimicrobial properties, against bacteria, yeast and fungi (5).

Only very few studies have been published which evaluated the effect of chewing fennel seeds on salivary pH. Shirahatti R et.al demonstrated a drop in salivary pH from  $7.15 \pm 0.2$  to  $6.58 \pm 0.5$  immediately after consumption of fennel seeds and increased to  $7.18 \pm 0.2$  after five minutes which are contradictory to our study results (1). However the drop in pH was only for a short period of five minutes.

Azrak B et.al carried out a research to determine possible difference in decrease of pH values of whole saliva among 12 boys and 13 girls found that there was a mean salivary pH reduction of 0.35 and 0.33 after 5 minutes and 10 minutes following intake of sweetened fennel tea (7).

Our study results reported that mean salivary pH increased from  $6.88 \pm 0.5$  to  $7.61 \pm 0.4$  immediately after the consumption of the fennel seeds, which later dropped to  $7.45 \pm 0.3$  after five minutes post-chewing the seeds but still remained significantly higher than at baseline. This indicates that the chances of salivary pH dropping below the critical pH post consumption of a cariogenic diet are reduced by chewing of fennel seeds. Along with the capability

of bringing about 50 percent reductions in the microbial population of oral cavity (8) fennel seeds might be beneficial in the fight against dental caries.

## Conclusions derived from the study are

- Fennel seeds caused significant rise in the salivary pH after their consumption.
- Rise in the salivary pH, prevents demineralization and can have anti-cariogenic effect.
- Fennel seeds can be amalgamated with other materials for improvement in their efficacy and can be used as a dentifrice, which will be cost-effective and can be used as a preventive measure for the control of oral diseases.
- Chewing of these seeds is beneficial for the oral health.

## REFERENCES

1. Shirahatti RV, Ankola AV, Nagesh L. Effect of Fennel Seeds On Dental Plaque and Salivary pH-A Clinical Study. *J Oral Health Comm Dent* 2010;**4**(2):38-41.
2. Fennel seeds, [Screen 1] available at <http://www.diagnoseme.com> accessed on 13th February 2013.
3. Singh G, Kapoor IP, Panday SK. Studies on essential oils part 10: antibacterial activity of volatile oils of some spices. *Phytother Res* 2002;**16**(7):680-82.
4. Asha V, Latha S, Pai A et.al. Oral manifestations in Diabetic and Non-diabetic chronic renal failure patients on Hemodialysis. *Journal of Indian Academy of Oral medicine and Radiology* 2012;**24**(4):274-79.
5. Fennel Seeds , [Screen1] Available at <http://www.healthandyoga.com/html/product/fennel.aspx> accessed on 13th February 2013.
6. Xerostomia, [Screen1] Available at <http://www.oralcancerfoundation.org/dental/xerostomia.htm> accessed on 13/2/2013
7. Azrak B, Willershausen B, Meyer N, et.al. Course of changes in salivary pH-values after intake of different beverages in young children. *Oral Health Prev Dent* 2008;**6**(2):159-64.
8. Ghanwate N, Thakre P. Antimicrobial and synergistic activity of ingredients of betel quid on oral and enteric pathogens. *Bioscience Discovery* 2012;**3**(1):47-51.