Original Article

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CLINICAL EFFECT OF VIRGIN OLIVE OIL ON DENTAL PLAQUE

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ABSTRACT:

Introduction: Oral cavity has a complex and changing environment. Dental diseases are affecting a large number of people in both the developed and developing countries. Salivary secretion is reduced at night and salivary osmolality is highest at 7 am in the morning. Mild dehydration is a risk factor for dental disease. Virgin olive oil has low surface tension and is rich in monounsaturated fatty acids, phenolics and antioxidants.

Aim and Objectives: This study was done to determine the plaque inhibitory action of virgin olive oil using a plaque re-growth model and compare the effect of virgin olive oil with distilled water on plaque index

Materials and Methods: 17 healthy young volunteers participated in this study. A randomized, controlled, cross-over design was used. The subjects were asked to swish thoroughly for 5 minutes with 3 ml of virgin olive oil or distilled water in the morning and at night before going to sleep and then swallow. They were told to use water or olive oil from Monday to Friday twice daily (10 swishing in total), and were instructed not to use any other oral hygiene product during this period. Dental plaque was assessed with Plaque disclosing agent (Alphaplac),at the beginning and end of the study.

Results: The mean plaque index with virgin olive oil use was (mean ± SD) 1.476 ± 0.36 and with use of distilled water 2.3±0.386 ($p<0.001$)

Conclusion: Use of Virgin olive oil twice a day (in the morning and at night) is effective in decreasing dental plaque compared to that observed with distilled water.

Key words: Dental diseases, Virgin olive oil, Dental plaque, oral hygiene, swishing

INTRODUCTION

Olive oil is a vegetable oil having 73% monounsaturated fatty acids and 55-83% oleic acid. It also contains antioxidants, carotenoids, oleuropein and a phenolic compound oleocanthal, which contribute for its antibacterial and anti-inflammatory effects. Olive oil has high concentration of oleic acid and this may help in the growth of lactic acid bacteria and inhibit the streptococcal organisms. Oleic acid is also structural component of teeth. Olive oil can be of help to form a film on the food particle, reduce food retention in oral cavity, lubrication and formation of oil film on teeth and gums to prevent penetration of acid to the enamel.(1)

Olive oil formulation dentifice (tooth paste) has been used and a decrease in bacterial growth and adhesion has been observed in the presence of olive oil.(2)

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The incorporation of oils into dentifices and mouthwashes is believed to offer enhanced plaque inhibition by reducing the bacterial adherence to the acquired pellicle [3]. A number of oils have been employed, including various essential oils [4-7] vegetable oils, [8] tea-tree oil, [9] fish oils [10] trclosan [11] and olive oil formulation [2].

To the best of our knowledge, there have been no studies in literature, to check clinical effect of Virgin olive oil on oral cavity. The purpose of this study is to determine the plaque inhibitory action of Virgin olive oil using a plaque re-growth model.

Aim of the study: To determine the plaque inhibitory action of virgin olive oil using a plaque re-growth model.

Objective of the study: To determine the amount of plaque reduction of after use of virgin olive oil as compared to distilled water.

MATERIALS AND METHODS

This study was done at dental outpatient department of MGM dental college & hospital, Navi Mumbai. A double-blind, single treatment, randomized, controlled; cross-over design was employed for this investigation. Extra virgin olive oil (Figaro) was used as a test product in this study and distilled water was used as placebo control.

The sequence of virgin olive oil and distilled water allocation was according to a predetermined randomization. This involves two experimental phases. A washout period of one week was proceeding each experimental phase. During washout, subjects were provided with standard toothpaste (Colgate Dental Cream) and a toothbrush to use in place of their regular oral hygiene products.

At the start of each experimental period (day 1, Monday), Plaque disclosing agent (Alphaplac) was applied to the dentition of the subject followed by oral prophylaxis. Re-disclosing, and repeating the prophylaxis as required, confirms their plaque free status.

Following this, the subjects were provided with virgin olive oil (3 ml), and were instructed to swish thoroughly for 5 minutes and then swallow. They were to repeat this on Monday evening and twice daily until Friday (10 swishing in total), and were instructed to refrain from using any other oral hygiene product during this period.

On day 5 (Friday) the subjects returned to the dental OPD. Plaque was again disclosed and assessed on both buccal and lingual surfaces using the Turesky et al.[12] modification of the Quigley and Hein plaque index. [13]

Subjects were provided with a further prophylaxis. Each subject then again was given a 9-day washout and came on Monday for the second phase of the trial. In the second phase the subject was asked to swish with distilled water which acts as a control.

Whole mouth, mean plaque scores was used for statistical analysis. t-test comparison was done for case and control. Paired t tests were conducted using SPSS.

Evaluation Parameters: Whole mouth mean plaque scores (Turesky) were used as evaluation parameter.

RESULTS

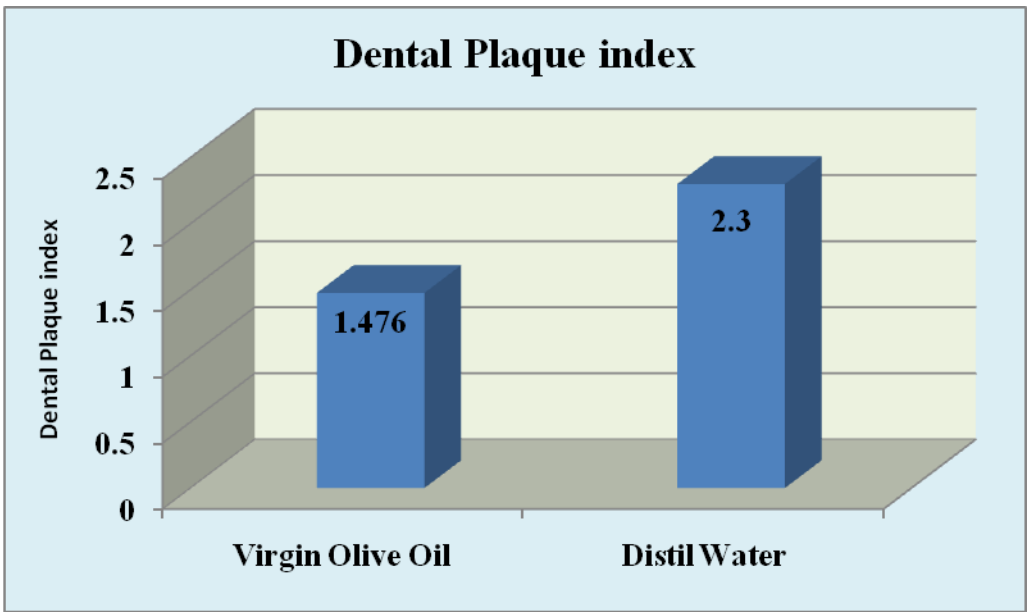
Seventeen volunteers completed the study. The results are shown in Table 1 and Figure 1. The use of virgin olive oil decreases the dental plaque index significantly compared to the use of distilled water. This study shows that use of virgin olive oil causes dental plaque inhibition.

Table 1. Dental Plaque Index

Group	Mean	SD	Difference	t-stat	df	p-value
Virgin Olive Oil	1.476	0.361	-0.824	-8.108	16	< 0.001**
Distil Water	2.3	0.386				

**: Significant at 1% level of significance

Figure1: Dental plaque index with use of use of virgin olive oil and distilled water



DISCUSSION

Adequate salivary flow with its unique composition is essential for maintenance of good oral health. Saliva protects against dental caries, erosion, attrition, abrasion, candidiasis and the abrasive mucosal lesions. Salivary secretion is influenced by the degree of hydration,

circadian rhythm, exposure to light and body position. The average salivary secretion at rest is 0.3 to 0.4 ml per minute. The mean surface area of the mouth is 215 square centimeters. Saliva spreads throughout the mouth, as a thin film.

During sleep the salivary secretion decreases and is very negligible hence the protective effect of saliva is lost.

An individual should keep food and liquids in the mouth as briefly as possible. [14-15]

Virgin Olive oil is rich in monounsaturated fatty acids, anti oxidants, vitamin E and chlorophyll. Olive oil has specific gravity 0.9150 to 0.9180, absolute viscosity of 100 cP, surface tension 35.8 dynes/cm and interfacial tension against water is 22.9 dynes/cm [16-18]. In the oral cavity olive oil forms an oil film on teeth, gums and on the mucus membrane. This helps to prevent penetration of acid to the enamel [19]. Vegetable oils like sesame oil. Sunflower oil, coconut oil and olive oil are used for oral health care [20]. In oil pulling studies 10 to 15 ml of oil has been used. [21-29] In one of the study using olive oil, there was a decrease of 80% of volatile sulfides in the breath [2]. Irving Langmuir has shown that Olive oil spreads on water as a film rapidly [30] and it decreases the evaporation of water[1].The small quantity (1-3ml)of olive oil will be enough to form a oil film layer in oral cavity .

Since last few years, the prevention of oral diseases has gained more attention in clinical dentistry and dental research [31].The study on global economic impact of dental diseases shows that it amount to US$442 billion in 2010 [32].Thus oral diseases are expensive to treat so prevention is better. The regular removal of dental plaque, prevention of formation of plaque as well as the retardation of biofilm formation are the targets of dental prevention methods [31].The use of 1-3 ml olive oil to swish two times a day, once in morning and before sleeping helps to prevent formation of dental plaque.

CONCLUSION

The study was done to determine the plaque inhibitory action of virgin olive oil using a plaque re-growth model. Seventeen volunteers participated in the study. By this study we conclude that use of Virgin olive oil twice a day (in the morning and at night) is effective in decreasing dental plaque compared to that observed with distilled water.

REFERENCES:

1. Math M.V. (2013) Olive Oil and Water - Role in Oral Care. International Journal of Medical and Clinical Research, ISSN: 0976-5530 & E-ISSN: 0976-5549, Volume 4, Issue 1, pp.-258-260
2. Pretty I.A., Gallagher M.J., Martin M.V., Edgar W.M., Higham S.M. A study to assess the effects of a new

detergent-free, olive oil formulation dentifrice in vitro and in vivo. J. Dent.2003; 31(5), 327-32.
3. Moran J, Addy M, Corry D, Newcombe RG, Haywood J. A study to assess the plaque inhibitory action of a new zinc citrate toothpaste formulation. Journal of Clinical Periodontology 2001;28:157—61.
4. Charles CH, Vincent JW, Borycheski L, Amatnieks Y, Sarina M, Qaqish J, et al. Effect of an essential oil-containing dentifrice on dental plaque microbial composition. American Journal of Dentistry 2000;13:26C—30C.
5. Moran J, Addy M, Newcombe R. A 4-day plaque regrowth study comparing an essential oil mouthrinse with a triclosan mouthrinse. Journal of Clinical Periodontology 1997;24:636—9.
6. McKenzie WT, Forgas L, Vernino AR, Parker D, Limestall JD. Comparison of a 0.12% chlorhexidine mouthrinse and an essential oil mouthrinse on oral health in institutionalized, mentally handicapped adults: one-year results. Journal of Periodontolology 1992;63:187—93.
7. Gross KB, Overman PR, Clark BR, Eberhart A, Love J. Sanguinarine and essential oil mouthrinses. Effects on plaque and gingivitis. Dental Hygiene (Chic) 1987;61: 62—6.
8. Busscher HJ, Perdok JF, van der M. Bacterial growth inhibition and short-term clinical efficacy of a vegetableoil-based mouthrinse: preliminary study. Clinical and Preventative Dentistry 1992;14:5—8.
9. Arweiler NB, Donos N, Netuschil L, Reich E, Sculean A. Clinical and antibacterial effect of tea tree oil—a pilot study. Clinical Oral Investigations 2000;4:70—3.
10. Campan P, Planchand PO, Duran D. Pilot study on n-3 polyunsaturated fatty acids in the treatment of human experimental gingivitis. Journal of Clinical Periodontology 1997;24:907—13.
11. Rolla G, Gaare D, Ellingsen JE. Experiments with a toothpaste containing polydimethylsiloxan/triclosan. Scandinavian Journal of Dental Research 1993;101:130—2.
12. Turesky S, Gilmore ND, Glickman I. Reduced plaque formation by the chloromethyl analogue of victamine C. Journal of Periodontology 1970;41:41—3.
13. Quigley G, Hein J. Comparative cleansing efficiency of manual and power brushing. Journal of the American Dental Association 1962;65:26—9.
14. DePaola DP. Saliva: the precious body fluid. J Am Dent Assoc. 2008 May;139 Suppl:5S-6S.
15. Dawes C. Salivary flow patterns and the health of hard and soft oral tissues J Am Dent Assoc. 2008 May;139 Suppl:18S-24S.
16. Omar S.H. (2010) Sci. Pharm., 78(2), 133-154.
17. Cicerale S., Lucas L., Keast R. (2010) Int. J. Mol. Sci., 11(2), 458-479.
18. Martin A., Bustamante P. and Chun A.H.C. (1993) Physical Pharmacy physical Chemical Principles in the Pharmaceutical Sciences, 4th ed., Lippincott Williams and Wilkins Philadelphia, USA, 324-392.
19. Stegeman C.A. and Davis J.R. The Dental Hygienist's Guide to Nutritional Care, 2nd ed., Elsevier Saunders St Louis Missouri, USA, 2005: p99-123

20. Bekeleski, G. M., McCombs, G., & Melvin, W. L. Oil Pulling: An Ancient Practice for a Modern Time. Journal of International Oral Health, 2012;4(3), 1-10.
21. Asokan S. Oil pulling therapy. Indian J Dent Res 2008;19(2):169.
22. Asokan S, Emmadi P, Chamundeswari R. Effect of oil pulling on plaque induced gingivitis: A randomized, controlled, triple-blind study. Indian J Dent Res 2009;20(1):47-51.
23. Amith HV, Ankola AV, Nagesh L. Effect of oil pulling on plaque and gingivitis. J Oral Community Dent 2007;1(1):12-8.
24. Busscher HJ, Perdok JF, Mei VD. Bacterial growth inhibition and short-term clinical efficacy of a vegetable oil-based mouthrinse: Preliminary study. Clin Prev Dent 1992;14(3):5-8.
25. Anand TD, Pothiraj C, Gopinath RM, Kayalvizhi B. Effect of oil-pulling on dental caries causing bacteria. Afr J Microbiol Re. 2008;2:063-6.
26. Anand TD, Pothiraj C, Gopinath RM, Kayalvizhi B. Effect of oil-pulling on dental caries causing bacteria. Afr J Microbiol Re. 2008;2:063-6.
27. Asokan S, Rathan J, Muthu MS, Rathna PV, Emmadi P, Chamundeswari R. Effect of oil pulling on Streptococcus mutans count in plaque and saliva using Dentocult SM Strip mutans test: A randomized, controlled, triple-blind study. J Indian Soc Pedod Prev Dent 2008;26(1):12-7.
28. Aguiar AA, Saliba NA. Toothbrushing with vegetable oil: A clinical and laboratorial analysis. Braz Oral Res 2004;18(2):168-73.
29. Asokan S, Saravana Kumar R, Emmadi P, Raghuraman R, Sivakumar N. Effect of oil pulling on halitosis and microorganisms causing halitosis: A randomized controlled pilot trial. J Indian Soc Pedod Prev Dent 2011;29(2): 90-4.
30. Langmuir I. The constitution and fundamental properties of solids and liquids. II. Liquids. J. Am. Chem. Soc., 1917, 39 (9), pp 1848–1906
31. Listl S, Galloway J, Mossey PA, Marcenes W. Global Economic Impact of Dental Diseases. J Dent Res. 2015 Oct;94(10):1355-61.
32. Kensche A, Reich M, Kümmerer K, Hannig M, Hannig C. Lipids in preventive dentistry. Clin Oral Investig. 2013 Apr;17(3):669-85.