



OLIVE OIL AND WATER - ROLE IN ORAL CARE

MATH M.V.*

Department of Physiology, MGM Medical College, Kamothe, Navi Mumbai- 410209, MS, India.

*Corresponding Author: Email- mathmv@rediffmail.com

Received: June 25, 2013; Accepted: July 09, 2013

Abstract- Dental and periodontal diseases are affecting large number of people in the developing countries. In India the prevalence of dental and periodontal disease in adults (from 60%-80%) is more than in developed countries. Dryness of mouth is common in the adults and in people taking multiple medicines. This can affect the oral health. Aim of this study is to study the effect of olive oil on the evaporation of water.

Objective: To find out whether olive oil decreases the evaporation of water at room temperature.

Design: The lower container of clean and dry petri dishes (internal diameter- 91mm and height-15mm) were used and study was done in two sets

- For one set (set A) of five petri dishes-(internal diameter- 91mm and height-15mm) 20 ml of distilled water was added to each petri dish. A total of 15 observations were made.
- For another set (set B) of five petri dishes first 20 ml of distilled water was added to each petri dish and later 2 ml of virgin olive oil (Figaro) was added to each one. A total of 15 observations were made.

Method: Both the sets of petri dishes were kept at room temperature and they were weighed at the end of one hour, two hours, three hours, four hours and five hours.

Results: there is a significant decrease in the evaporation of water in the petri dishes containing distilled water and olive oil.

Conclusions: Olive oil is very effective in reducing the evaporation of water and this can be of help in the protection of gums and teeth.

Keywords- Olive oil, Water, saliva, oral health

Citation: 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.

Copyright: Copyright©2013 Math M.V. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution and reproduction in any medium, provided the original author and source are credited.

Introduction

Dental and periodontal diseases are affecting large number of people in both the developed and developing countries. According to the First National Oral Health Survey the prevalence of dental and periodontal disease in India (in 15 year age group- above 60% and in 35-44 years age group above 80%) is more than in developed countries [1].

Nutritional factors and general health affect the oral health. The nutrients interact with the tissues in the oral cavity [2]. In the developing countries lack of knowledge, ignorance and neglect are mainly responsible for increase in dental and periodontal diseases. At present dental health care costs are increasing and people are becoming aware about home oral health care [3]. Salivary flow and the various substances present in saliva (water, proteins, mucin, antimicrobial peptides and others) are essential for the oral health [4,5]. Saliva lubricates oral cavity, and pharynx and protects them against mechanical, thermal and chemical irritants [4]. Saliva acts as a solvent and provides protection against caries and soft tissue diseases of the oral cavity [4]. Salivary flow is influenced by age,

sex, time of the day, degree of hydration, body position, exposure to light, previous stimulation, gland size, emotional state, drug use, and circadian rhythms [6-8]. The salivary secretion from parotid, submandibular and sublingual glands is intermittent and under nervous control [9]. The secretion from accessory salivary glands (in tongue, soft palate, anterior part of the hard palate, the lips and cheeks) is continuous and occurs during basal conditions between the meals during the waking hours [9,10]. The salivary secretion is negligible during sleep [6-11].

The volume of saliva in the mouth before and after swallowing is about 1.1 ml and 0.8 ml respectively [6]. The mean surface area of the mouth is 215 square centimeters [6]. Collins and Dawes have calculated that the salivary film covering the teeth and oral mucosa may be 70-100 micrometers thick [12]. Wolf and Kleinberg have observed that the thickness of the salivary film is more on the posterior part of tongue and it is very thin on the hard palate [13].

Most of the microorganisms in saliva are not free and they are bound to desquamated oral epithelial cells [6]. There is an equilibrium between the number of free microorganisms in saliva and the

number bound to oral epithelial cells or teeth (6). Olive oil is a vegetable oil having 73% monounsaturated fatty acids and oleic acid 55-83%. It also contains antioxidants, carotenoids oleuropein and a phenolic compound oleocanthal, which contribute for its antibacterial and anti-inflammatory effects [14,15].

Olive oil formulation dentrifice (tooth paste) has been used and a decrease in bacterial growth and adhesion has been observed in the presence of olive oil [16]. The present study was done to know the effect of olive oil on the evaporation of water at room temperature.

Materials and Methods

This study was done in the department of physiology. Clean and dry petri dishes were used on each day and the lower container of the petri dishes (internal diameter- 91mm and height-15mm) were weighed on an electronic balance. For one petri dish (set A) 20 ml of distilled water was added. For another petri dish (set B) first 20 ml of distilled water was added and later 2 ml of virgin olive oil (Figaro) was added. Air was blown to mix the contents of the petri dishes containing water and olive oil. Both the sets of petri dishes were kept at room temperature were weighed at the end of one hour, two hours, three hours, four hours and five hours. The decrease in the weight from the initial weight (initial weight of petri dishes containing distilled water only and those containing both distilled water and olive oil) were recorded over the five hours. This study was repeated over the next 14 days. The results are shown in the table below. A total of 15 observations were made in each set.

Results

Results are given below in the [Table-1]

Table 1- Decrease in weight of petri dishes of set A and set B at the end of each hour over 5 hours

Petri dish	1st hour (grams)	2nd hour (grams)	3rd hour (grams)	4th hour (grams)	5th hour (grams)
Set A(15)					
Mean	0.1722	0.4167	0.6338	0.9235	1.1585
± SD	±0.0185	±0.0292	±0.0832	±0.0592	±0.0851
Set B(15)					
Mean	0.1284	0.2772	0.4242	0.6079	0.759
± SD	±0.0419	±0.0661	±0.1107	±0.1482	±0.1958
Statistical Significance	P<0.001	P<0.001	P<0.001	P<0.001	P<0.001

(Number of observations in each set=15)

Set A- petri dishes containing distilled water only

Set B- petri dishes containing both distilled water and olive oil

Our results show that there is a significant decrease in the evaporation of water in the petri dishes containing distilled water and virgin olive oil.

Discussion

Olive oil has absolute viscosity of 100 cP, specific gravity 0.9150 to 0.9180, surface tension 35.8 dynes/cm and interfacial tension against water is 22.9 dynes/cm [14,15,17]. Olive oil floats over the water because its density is less than that of water. Because of these physical characteristics olive oil spreads as film on the water. Olive oil is a better lubricant than water.

Olive oil has high concentration of oleic acid and this may help in the growth of lactic acid bacteria and inhibit the streptococcal organisms [18]. Oleic acid is also structural component of teeth [18].

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 [18].

Bacteria occur in the oral cavity in gingival crevices, periodontal pockets and dorsum of the tongue. Dorsum of the tongue can retain large number of desquamated cells, leucocytes, and microorganisms as it has a large papillary surface [19]. In dryness of mouth there is increase in tongue deposits leading to an increase in oral malodour [19]. In people having dry mouth (xerostomia) the salivary film is thinner than 10 micrometer [13]. Erosion of teeth occurs when the teeth are exposed to extrinsic acids present in the soft drinks when they are consumed [20]. Xerostomia affects about 50% of older adults and there is a decrease in thirst sensation with aging [21]. It also causes significant morbidity and a reduction in the quality of life leading to dental caries, candidiasis, and decrease in nutrient intake [21,22]. People may not realise that there is reduction in salivary secretion. Dryness of mouth is seen in adults taking multiple medicines (analgesics, anti-anxiety agents, anticholinergics, anticonvulsants, antidepressants, antihistamines, antihypertensives, anti-inflammatory agents, anti obesity agents, antipsychotics, decongestants, diuretics, narcotics, and others), radiation therapy, autoimmune diseases, significant nutrient deficiency and dehydration [21-24]. Xerostomia causes difficulty in chewing and swallowing and may also be associated with dry nose and throat with difficulty to use dentures [22].

Olive oil formulation dentrifice (tooth paste) has been used and a decrease in bacterial growth and adhesion has been observed in the presence of olive oil [16]. Tooth brushing with vegetable oil (Til oil-Almond oil) reduces dental plaque, improves salivary buffer capacity, decreases salivary streptococcus mutans and also less dental abrasion has been observed [25].

Recently oil pulling with 5-15 ml of sesame oil (for 10 minutes in the morning after brushing) has been found to be effective in prevention of dental caries [26]. In the above studies vegetable oil has been used as a mouth wash. As olive oil is a nutrient its presence and movement by swishing in the oral cavity will stimulate the salivary secretion. Vigorous brushing can stimulate the outflow of neutrophils via gingival sulcus. The junctional epithelium is innervated with nerve fibers releasing substance P and irritation caused by vigorous brushing may stimulate release of substance P which has chemotactic activity to cause the local release of neutrophils [27]. Holding and swishing of 1-2 ml of olive oil for 5-10 minutes both in the morning and at night after brushing of teeth and later swallowing the same will be helpful to form a oil film coat over the gums, teeth, mucus membrane of oral cavity and pharynx [6,12]. Coating of the oral cavity with olive oil can be of help in decreasing the bacterial growth, preventing bacterial adhesion and plaque aggregation [16,26]. Daily use of olive oil at night before going to sleep can also be of help in retaining water in the saliva and prevention of dental and periodontal infections as there is a decrease in salivary secretion during sleep. The olive oil can be later swallowed as it is a nutrient. Many oral health programs have been started by the World Health Organisation for improving the oral health and prevention of periodontal diseases [28-30]. A strong positive link has been observed between periodontal infections and cardiovascular diseases [31-33].

Consumption of a Mediterranean diet enriched with virgin olive oil is associated with increased serum osteocalcin concentration and this may have protective effect on bone [34].

Commercially available mouthwashes are expensive. Hence swishing of 1-2 ml of olive oil for 5-10 minutes both in the morning and at night after brushing of teeth can be of use as an oral care agent in the morning and at night can be safe and economical for maintaining oral hygiene as it forms oil film over oral cavity and acts as a protective layer to prevent infection of gums and teeth.

Conclusions

Our study shows that olive oil can be of help in reducing water evaporation and also to form a protective barrier over the oral tissues. Thus daily use of 1-2 ml of olive oil (or other vegetable oil rich in oleic acid) in the morning and at night and moving it in the oral cavity for 5-10 minutes can be of help as an oral care agent. This will be very safe as it is a nutrient rich in monounsaturated fatty acids, antioxidants carotenoids oleuropein and a phenolic compound oleocanthal, and economical compared to various other products available for oral hygiene.

Acknowledgements

Author Dr. Mahantayya V. Math is thankful to Professor and Head department of Physiology and Professor and Head department of Pharmacology for their support in this study.

References

- [1] Bali R.K., Mathur V.B., Talwar P.P., Chanana H.B. (2004) *National Oral Health Survey and Fluoride Mapping- 2002-2003*, Dental Council of India, India.
- [2] Depaola D.P., Faine M.P., Palmer C.A. (1999) *Modern Nutrition in Health and Disease*, 9th ed., Williams and Wilkins Baltimore, 1099-1124.
- [3] Dean J.A., Hughes C.V. (2000) *Dentistry for the Child and Adolescent*, 7th ed., Harcourt Asia Pvt. Ltd., Mosby Singapore, 247-271.
- [4] Depaola D.P. (2008) *Journal of the American Dental Association*, 139(5), 5S-6S.
- [5] Edgar M., Dawes C., O'Mullane D. (2004) *Saliva and Oral Health*, 3rd ed., British Dental Association, London, 50-70.
- [6] Dawes C. (2008) *Journal of the American Dental Association*, 139(5), 18S-24S.
- [7] Edgar M., Dawes C., O'Mullane D. (2004) *Saliva and Oral Health*, 3rd ed., British Dental Association, London, 32-49.
- [8] Lentner C. (1981) *Geigy Scientific Tables Vol. 1, Units of Measurement, Bodyfluids, Composition of the Body, Nutrition 8th Revised and Enlarged Edition*, 114-122.
- [9] Johnson F.R. (1987) *Cunningham's Text Book of Anatomy*, 12th ed., Oxford University Press, Oxford, 411-489.
- [10] Guyton A.C. and Hall J.E. (2000) *Text Book of Medical Physiology*, 10th ed., Saunders- Elsevier, New Delhi, 738-753.
- [11] Schneyer L.H., Pigman W., Hanahan L., Gilmore R.W. (1956) *J. Dent. Res.*, 35(1), 109-114.
- [12] Collins L.M., Dawes C. (1987) *J. Dent. Res.*, 66(8), 1300-1302.
- [13] Wolff M., Kleinberg I., (1998) *Arch. Oral. Biol.*, 43(6), 455-462.
- [14] Omar S.H. (2010) *Sci. Pharm.*, 78(2), 133-154.
- [15] Cicerale S., Lucas L., Keast R. (2010) *Int. J. Mol. Sci.*, 11(2), 458-479.
- [16] Pretty I.A., Gallagher M.J., Martin M.V., Edgar W.M., Higham S.M. (2003) *J. Dent.*, 31(5), 327-32.
- [17] 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.
- [18] Stegeman C.A. and Davis J.R. (2005) *The Dental Hygienist's Guide to Nutritional Care*, 2nd ed., Elsevier Saunders St Louis Missouri, USA, 99-123.
- [19] Porter S.R. and Scully C. (2006) *British Medical Journal*, 333: 632-635.
- [20] Lentner C. (1981) *Geigy Scientific Tables Vol. 1, Units of Measurement, Bodyfluids, Composition of the Body, Nutrition 8th Revised and Enlarged Edition*, 266.
- [21] Stegeman C.A. and Davis J.R. (2005) *The Dental Hygienist's Guide to Nutritional Care*, 2nd ed., Elsevier Saunders St Louis Missouri, USA, 317-334.
- [22] Guggenheimer J. (2003) *Journal of the American Dental Association*, 134, 61-69.
- [23] Stegeman C.A. and Davis J.R. (2005) *The Dental Hygienist's Guide to Nutritional Care*, 2nd ed., Elsevier Saunders St Louis Missouri, USA, 435-446.
- [24] Johansson I., Saellstrom A.K., Rajan B.P., Parameswaran A. (1992) *Caries Res.*, 26, 38-43.
- [25] Aguiar A.A., Saliba N.A. (2004) *Braz. Oral. Res.*, 18(2), 168-73.
- [26] Asokan S., Emmadi P., Chamundeswari R. (2009) *Indian J. Dent. Res.*, 20(1), 47-51.
- [27] Dale B.A., Tao R., Kimball J.R., Jurevic R.J. (2006) *BMC Oral Health.*, 15(6), 1, S13.
- [28] Petersen P.E. (2003) *Community Dent Oral Epidemiol.*, 31(1), 3-23.
- [29] Petersen P.E., Yamamoto T. (2005) *Community Dent Oral Epidemiol.*, 33(2), 81-92.
- [30] Petersen P.E., Ogawa H. (2005) *J. Periodontol.*, 76(12), 2187-93.
- [31] Demmer R.T. and Desvarieux M. (2006) *Journal of the American Dental Association*, 137(2), 14S-20S.
- [32] Seymour G.J., Ford P.J., Cullinan M.P., Leishman S., West M.J., Yamazaki K. (2009) *Future Cardiology.*, 5(1), 5-9.
- [33] Saini R., Saini S., Saini S.R. (2010) *Ann. Card. Anaesth.*, 13, 159-61.
- [34] Fernández-Real J.M., Bulló M., Moreno-Navarrete J.M., Ricart W., Ros E., Estruch R., Salas-Salvadó J. (2012) *J. Clin. Endocrinol. Metab.*, 97(10), 3792-8.