

Comparative efficacy of oil pulling and Chlorhexidine on pH and buffering capacity of saliva in children: A randomized controlled trial.

¹Nagarathna PJ, MDS, Professor and head of department, Pediatrics and preventive dentistry, Chhattisgarh dental college and research institute, Rajnandgaon

²Nikita Bhure, Postgraduate student 3rd year, Department of Pediatrics and preventive dentistry, Chhattisgarh dental college and research institute, Rajnandgaon

³Sagar Bhure, Postgraduate student, 3rd year, Department of Oral and Maxillofacial Surgery, Chhattisgarh Dental College and Research Institute Rajnandgaon

⁴Nivedita Dindokar MDS, Senior Lecturer, Pediatrics and preventive dentistry, Chhattisgarh dental college and research institute, Rajnandgaon

⁵Assjad Hussain Ansari, MDS, Senior Lecturer, Pediatrics and preventive dentistry, Saraswati dhanwantri dental college and hospital, parbhani

⁶Sakshi Jain, Postgraduate student, 3rd year, Department of Pediatrics and preventive dentistry, Chhattisgarh dental college and research institute, Rajnandgaon

Corresponding Author: Dr. Nikita Bhure, Postgraduate student 3rd year, Department of Pediatrics and preventive dentistry, Chhattisgarh dental college and research institute, Rajnandgaon

Citation of this Article: Nagarathna PJ, Nikita Bhure, Sagar Bhure, Nivedita Dindokar, Assjad Hussain Ansari, Sakshi Jain, “Comparative efficacy of oil pulling and Chlorhexidine on pH and buffering capacity of saliva in children: A randomized controlled trial.”, IJDSIR- July - 2020, Vol. – 3, Issue -4, P. No. 143 – 148.

Copyright: © 2020, Dr. Nikita Bhure, et al. This is an open access journal and article distributed under the terms of the creative commons attribution noncommercial License. Which allows others to remix, tweak, and build upon the work non commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Oil pulling, also called as oil swishing is an ancient healing practice and was first developed in Ayurvedic medicine. Coconut oil is one of the natural constituents in Indian food and is readily available.

Aim: This research aims to compare the efficacy of pH and buffering capacity of saliva utilizing oil pulling with coconut oil and Chlorhexidine in children.

Setting and design: A randomized controlled trial was conducted among 20 children under the age group of 9-15 years. Children were selected based on inclusion and exclusion criteria and randomized into two intervention groups, namely, Group A: Coconut oil and Group B: Chlorhexidine (control group). Informed consent was obtained from their parents.

Material and methods: All the children were divided into two groups; namely, Group A: 10 children performed oil

pulling utilizing 10ml coconut oil for 12 minutes, Group B: 10 children were advised to perform routine oral hygiene using 5ml of chlorhexidine for 1 minute. Saliva samples were collected on the first day, and after two weeks from the entire participants, pH and buffering capacity were assessed using a saliva check buffering kit.

Statistical analysis used: Student t-test was used for statistical analysis between both the groups.

Results: There was no significant difference in the mean scores of all parameters within coconut oil, and chlorhexidine group was observed.

Conclusions: Oil pulling with coconut oil is equally efficacious as Chlorhexidine for maintaining healthy oral hygiene. However, Oil pulling can be explored as a better alternative preventive home therapy, which is natural, safe, and has no side effects.

Keywords: buffering capacity, coconut oil, oil pulling, pH.

Introduction

It is a common belief that oral health serves as a gateway to general health. This implies that oral health significantly impacts the general health and wellbeing of an individual. Tooth brushing with toothpaste is the most accepted practice for the maintenance of oral hygiene and is generally followed worldwide. In addition to the mechanical cleansing of teeth using toothbrush, chemotherapeutic agent such as mouthwash containing Chlorhexidine has been suggested as an adjuvant to reduce plaque formation in the oral cavity, and these chemotherapeutic agents have certain undesirable adverse effects.^[1]

Saliva plays a critical role in maintaining oral homeostasis^[2] The important aspects of saliva that plays in protecting against the dental caries are flow, pH, and buffering capacity. They play an important role in the initiation and progression of dental caries.^[3] Various antimicrobial

agents have been used in the oral cavity with varying efficacy. Among the various chemotherapeutic agents used in mouthwashes, Chlorhexidine is considered as the 'gold-standard' for comparison with other substances due to its proven efficacy.^[4]

Recently, various forms of alternative or traditional medicinal treatments, such as Ayurveda, have started to gain popularity due to their natural origin, cost-effectiveness, negligible side effects, and improved patient compliance.^[5] Oil pulling or oil swishing is an ancient natural healing practice that originated in India and has been described as *Kavalagraha or Gandhoosha(oil pulling)* in the ayurvedic texts of Charaka Samhita and Sushruta Samhita. It is the act of simply holding or swishing a comfortable quantity of oil in the mouth for 10–20 min and spitting it out without swallowing. It is believed that the act of swishing oil draws out microbes from various parts of the mouth and detoxifies the toxins.^[6]

Coconut (*Cocos nucifera* L.) is one of the major commercial crops grown in southern India. The lauric acid in coconut oil is a proven antimicrobial, anti-inflammatory properties, which prevents dental caries and is beneficial to oral health. In addition to this, it also has a pleasant taste with alternate and evidence-based medicine, gaining popularity in recent times. The purpose of our study was to evaluate the Effect of oil pulling on pH and Buffering capacity of saliva and to compare its efficacy with chlorhexidine mouthwash in children.

Subjects and Methods

The nature of the study was explained to the participants and to their respective parents. Informed consent was obtained.

Each subject was randomly divided into two groups of 10 subjects each namely,

Group A: Coconut oil pulling. with 10 ml (one tablespoon) of virgin coconut oil (Natuur oral detox, oil pulling blend) [figure 1] for 10 minutes before brushing, on an empty stomach in the morning.



Figure 1: Commercially available Natuur oil pulling blend (coconut oil).

Group B: Chlorhexidine mouthwash. With 5 ml chlorhexidine for 1 minute (Rexidine; Warren India). pH and buffering capacity were estimated using GC Saliva Check Kit (GC Asia Dental Pvt. Ltd.) As shown in [figure 2] All the data was recorded according to the description provided in the manufacturing chart. The rinsing was initiated after a baseline saliva sampling was done (day 1). Subjects of all two groups were kept seated for 5 min in a relaxed state and was instructed to expectorate pooled saliva by spitting method into a

collection cup provided in a kit, usually once every 60s for 1 min.



Figure2: Saliva Check-Buffer to determine pH and buffering capacity of saliva.

Before the practice of oil pulling therapy, one tablespoon (10 ml) of coconut oil (coded in similar bottles) was measured and distributed to each subject, and then instructed the participants to pour the oil into the mouth on an empty stomach in the morning. With the mouth closed and chin up, without speed or effort, the subjects were instructed to sip, suck, swish, and pull the oil in the mouth between the teeth in a relaxed way, and also exercise the jaw as if chewing action for a period of 12 mins. They were instructed not to gargle the oil in the throat. Initially, the oil was viscous but slowly lost its viscosity and turns into thin and milky white color. The subjects were instructed to spit it out and wash the mouth and teeth thoroughly with lukewarm water for the 30s. On the other hand, the participants of group B were given a coded bottle of Chlorhexidine and was instructed to use 5ml of mouthwash for 1 minute every day.

The study was continued for two weeks, and salivary samples were taken and evaluated as follows:

- For measurement of pH, a Sample of saliva was brought into contact for 10 seconds, and then the colour of the strip was checked according to the manufacturing chart provided. [figure 3]

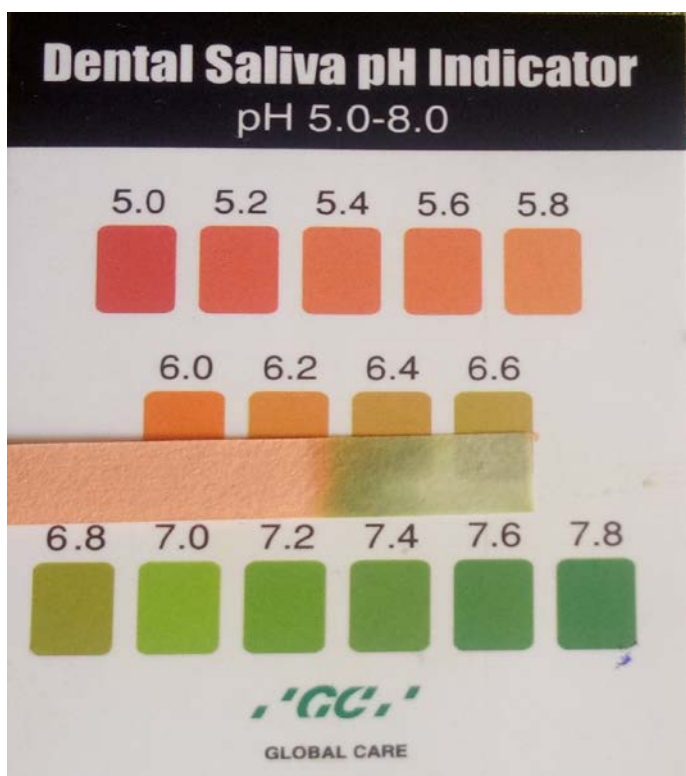


Figure 3: Measurement of pH of saliva.

- For measurement of buffering capacity, buffering test foil pack was unpacked with the help of pipette, which was used to draw saliva from the cup & 1-1 drop was dispensed onto each of the 3 test pads. [figure 4]

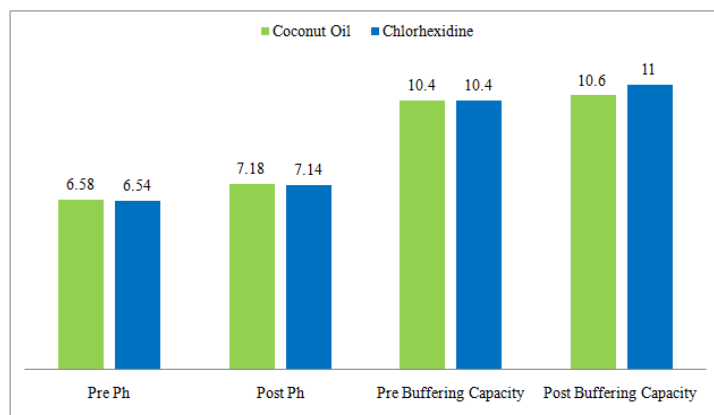


Figure 4: Measurement of buffering capacity of saliva.

The values were noted, and comparison was made between both the groups. Student T-test was applied to compare the mean differences between and within groups.

Result

The protocol of the study was strictly followed by all the participants in the study, with no reported systemic side effects in the two groups. Mean pH and buffering capacity at baseline and after two weeks were tabulated. All data collected were analysed by statistical software SPSS (BM Corp. Released 2010. IBM SPSS Statistics for Windows, Version 19.0. Armonk, NY). The student's t-test was used for the analysis of intra and intergroup comparison. [Graph1]



Effect on pH: The baseline mean pH of oil pulling with coconut oil and Chlorhexidine was found to be 6.5800 (SD .23944) and 6.5400 (SD .25033), respectively. After two weeks, mean pH values were 7.1800 (SD .14757) and 7.1400(SD .18974), respectively. All the two groups exhibited values pre and post-tests values and showed pre and post pH using coconut oil pulling was found to be statistically significant ($P = 0.00$), and for Chlorhexidine it was not significant ($P=.343$) [Table 1]

Effect on buffering capacity: At baseline, pre-buffering capacity of oil pulling with coconut oil and Chlorhexidine was the same i.e. 10.4000 (SD.84327) for both the groups. After two weeks of the study buffering, capacity was determined and found to be 10.6000 (SD.96609) and 11.0000 (SD1.05409), respectively. Which was not significant ($P=.081$) [Table 1]

Table 1: Comparison of mean pre and post values of pH and buffering capacity with coconut oil and chlorhexidine groups.

Parameter	Groups	N	Mean	Std. Deviation	Std. Error mean	p-value (P<0.05)
Pre pH	Coconut Oil	10	6.5800	.23944	.07572	p=.000
Post pH	Coconut Oil	10	7.1800	.14757	.04667	
Pre pH	Chlorhexidine	10	6.5400	.25033	.07916	P=.000
Post pH	Chlorhexidine	10	7.1400	.18974	.06000	
PreBuffering Capacity	Coconut Oil	10	10.4000	.84327	.26667	P=.343
PostBuffering Capacity	Coconut Oil	10	10.6000	.96609	.30551	
Pre Buffering Capacity	Chlorhexidine	10	10.4000	.84327	.26667	P=.081
Post Buffering Capacity	Chlorhexidine	10	11.0000	1.05409	.33333	

Discussion

Oral microorganisms present in dental plaque are crucial for the initiation and progression of dental caries, in the era of shifting our daily life more towards natural products and habits. So as ayurvedic medicines are gaining popularity worldwide as they are natural, safe, helps in balancing and causes no side effects. In our study, we intend to use one such product that is virgin coconut oil. Coconut oil also has antiseptic properties and can be safely used as emollient and moisturizer. Coconut oil does not have adverse effects produced by chlorhexidine such as brown staining and altered taste sensation.^[8]

The pH of saliva is a critical component of maintaining the integrity of the oral cavity. However, the pH increases the remineralization of the tooth surface because of the increased degree of supersaturation. The acidic pH can cause the maximum incidences of dental caries. It has been well documented that the dissolution of enamel occurs when the pH falls below the critical pH. The determination of the buffering capacity of saliva helps to establish the role of the buffering system in tooth integrity. pH and buffering capacity are contributory factors in

maintaining the integrity of the oral cavity. The increase in these factors can result in a decrease in caries activity.^[9]

The present randomized controlled trial compared the efficacy of oil pulling and chlorhexidine on pH and buffering capacity. Oil pulling is a traditional Indian folk remedy. It also antioxidants that kill microbes and cause their cell wall damage. In the present trial, coconut oil was used for oil pulling as it is the most commonly used oil for the therapy and is known for several medicinal properties and desirable health benefits. Its palatability is better compared to the other refined edible oils. It does not cause staining, lingering after taste and allergy, unlike chlorhexidine. It is five to six times cost-effective than chlorhexidine and is readily available in every household.^[10]

Chlorhexidine, on long term use, alters taste sensation and produces brown staining on the teeth, which is very difficult to remove. The mucous membranes and the tongue can also be affected and may be related to the precipitation of chromogenic dietary factors on to the teeth and mucous membranes. Staining is also associated with the long-term use of Phenol compound and stannous fluoride-containing mouthwashes. In the present study, there were no reported alterations in the taste or noticeable staining from coconut oil at the end of 2 weeks.^[11] Intergroup comparison for pre and post pH for coconut oil was statistically significant and was not significant for chlorhexidine. Furthermore, for buffering capacity, it was found to be not significant.

Test participants were also asked about their familiarity with the use of oil pulling therapy. The oil pulling group felt that the duration of the procedure was long, and the amount of oil was more. The palatability improved after one to two uses. Few of the study subjects from the chlorhexidine group reported lingering aftertaste.

Conclusion

There are no disadvantages in oil pulling therapy except for the extended duration of the procedure compared with Chlorhexidine. Although oil pulling therapy can be recommended for use as a treatment adjunct as of now, it can be considered as a preventive home therapy to maintain oral hygiene.

References

1. Scully C, Ettinger RL. Oral Health in America: A Report of the Surgeon General. Washington, DC, USA: Department of Health and Human Services, US Public Health Service; 2000.
2. Ramesh G, Nagarajappa R, Madhusudan AS, Sandesh N, Batra M, Sharma A, et al Estimation of salivary and tongue coating pH on chewing household herbal leaves: A randomized controlled trial. *Ancient Sci Life* 2012;32:69-75
3. Shafer WG, Hine MK and Levy B.M et al. A textbook of oral pathology. 5th Edition; 1993 p 567-658.
4. Kaushik M, Reddy P, Roshni, Udameshi P, Mehra N, Marwaha A. The Effect of Coconut Oil pulling on Streptococcus mutans Count in Saliva in Comparison with Chlorhexidine Mouthwash. *J Contemp Dent Pract* 2016; 17(1):38-41.
5. Pal SK, Shukla Y. Herbal medicine: Current status and the future. *Asian Pac J Cancer Prev* 2003; 4:281-288.
6. Kaliamoorthy S, Pazhani A, Nagarajan M, Meyyappan A, Rayar S, Mathivanan S. Comparing the effect of coconut oil pulling practice with oil pulling using sesame oil in plaque-induced gingivitis: A prospective comparative interventional study. *J Nat Sc Biol Med* 2018;9:165-168.
7. Pavithran VK, Krishna M, Kumar VA, Jaiswal A, Selvan AK, Rawlani S. The effect of oil pulling with pure coconut oil on Streptococcus mutans: A randomized controlled trial. *J Indian Assoc Public Health Dent* 2017; 15:200-204.
8. Peedikayil F.C., Sreenivasan P., Narayanan A. Effect of coconut oil in plaque related gingivitis – a preliminary report. *Niger Med J.* 2015;56:143–147
9. Chitharanjan Shetty, Mithra N. Hegde, Darshana Devadiga. Correlation between dental caries with salivary flow, pH, and buffering capacity in adult South Indian population: an in-vivo study. *Int. J. Res. Ayurveda PHarm.*2013;4(2):219-223.
10. Sood P, Devi M A, Narang R, V S, Makkar DK. Comparative Efficacy of Oil Pulling and Chlorhexidine on Oral Malodor : A Randomized Controlled Trial .
11. Dultra F, Barroso JM, Carrasco LD, et al. Evaluation of apical microleakage of teeth sealed with four different root canal sealers. *J Appl Oral Sei* 2006; 14:341-54.