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THE EFFECT OF COCONUT OIL PULLING VS CHLORHEXIDINE MOUTHWASH ON STREPTOCOCCUS MUTANS COUNT IN SALIVA - A RANDOMIZED CONTROLLED STUDY

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ABSTRACT

Introduction: To reduce the side effects of modern medicine, natural medicine is gaining importance. Coconut oil pulling is one such ancient practice that has a renewed interest in oral hygiene practice due to its use as an adjunct in maintenance of oral health. This study found the efficacy of natural remedies in periodontal disease management. **Methodology:** This randomized control study was conducted in department of periodontics at Vivekanandha dental college for women with sample size of n=60(18-23 years). The study population was divided into 3 groups each with 20 patients. GROUP A received mouth rinsing with virgin coconut oil 5ml for 5 mins. GROUP B receive mouth rinsing with chlorhexidine for 5 mins. GROUP C- Rinsing mouth with distilled water for 5 mins. Unstimulated saliva is analysed for microbiological assay at baseline and 14 days. **Results:** On microbiological comparison, group A patients had p value 0.0027; group B had p value of 0.0013; group C had p value of 0.0286 with statistically significant results from baseline suggesting that coconut oil pulling is effective in periodontal microbiology control comparative to chlorhexidine. There is also improved clinical parameters from baseline with p value (<0.005) similar to other groups. **Conclusion:** It can be concluded that Oil pulling with coconut oil can be explored as a safe and effective alternative to Chlorhexidine. Virgin coconut oil can be used as the alternative for short term maintenance therapy and has an advantage of having fewer side effects. Hence it can be used as effective home remedy.

INTRODUCTION

"EVERY MACHINE COMES WITH A MANNUAL AYURVEDA IS THE MANNUAL FOR THE MACHINE KNOWN AS HUMAN BODY"

Dental caries and periodontal disease are a chronic bacterial disease influencing large number of people by affecting mineralized tissues of the teeth. It is caused by a complex interaction of oral microorganisms in dental plaque, diet, and a broad array of host factors.[1] It is a continuous disease and if there is no intervention, the caries progression increases and may cause pulp degeneration, pain, loss of tooth vitality, and eventually tooth loss.[2]

Streptococcus mutans are most common microorganisms related to dental caries, these bacteria can produce lactic acid on metabolism of fermentable carbohydrates, and this acid have the capacity to disintegrate the mineralized tissue. This acidogenic bacteria found in dental plaque in lower concentration may produce periodontal problems by its various interactions with periodontal bacteria. The commensal flora changes to pathogenic one due to the local change in environment caused by this microbe also with multiple sugar intake or no removal of biofilm may worsen the effect. Therefore, suppression of these microorganisms could decrease the incidence and susceptibility to dental caries.[2,3]

Antibacterial agents' adjunct to periodontal therapy may prohibit the bacterial attachment, aggregation and metabolic activity which is effective in controlling the dental infections. Among these microbial agent Chlorhexidine is the most prescribed mouth rinse. Chlorhexidine is an agent of broad-spectrum biocide effect. It is highly effective against numerous oral microorganisms. It has both bactericidal and bacteriostatic effect and is regarded as gold standard for differentiation with other products due to its proven effectiveness. It causes local oral side effects like taste disturbance, extrinsic tooth and tongue staining, desquamation of oral mucosa etc. These side effects limit its extrinsic use and promote interest in research to investigate new agents that have antiplaque activity with minimal side effects.[4,5]

To reduce the side effects of modern medicine, numerous studies have highlighted the importance and beneficial effects towards ancient medicine and their properties. Oil pulling is one such ancient practice that has a renewed interest in oral hygiene practice due to its use as an adjunct in maintenance of oral health.[6] Virgin coconut oil is different from other edible oil because predominant composition is of medium chain fatty acids. It contains

92%saturated acids and approximately 50% of which is auric acid. Human breast milk is only other naturally occurring substance with auric acid. Virgin coconut consists of higher amount of free fatty acids, low level of proteins, antioxidant and tocopherols.[7]

It is found that alkalis in saliva reacts with oil leading to saponification and formation of soap like substance which can reduce adhesion of plaque, and auric acid reacts with sodium hydroxide in saliva forming sodium laureate, which might be responsible for cleansing action and decreased plaque accumulation. In ancient times it was practiced as Kavala graha and Kavala gandoosh. Kavala graha is an ayurvedic oral hygiene maintenance practice, wherein suitable amount of oil is held in mouth on an empty stomach for some period and swished till it becomes thin and milky white after which it is spited out.[8,9,10]

The main aim of this study was to estimate the effect of oil pulling vs. Chlorhexidine mouth wash on streptococcus mutans count in saliva.

MATERIALS AND METHODS

A randomized control study was conducted in department of periodontics at Vivekanandha dental college for women with sample size of n=60(18-23 years)

The study population was divided into 3 groups each with 20 members.

Group A- Oil pulling mouth RINSE

Rinsing with virgin coconut oil 5ml for 5 mins

Group B- Chlorhexidine mouthrinse

Rinsing mouth with chlorhexidine for 5 mins

Group C-Distilled water mouthrinse

Rinsing mouth with distilled water for 5 mins

Inclusion criteria

Systemically healthy individuals

Age 18-25 years

Exclusion criteria

Systemic diseases like diabetes mellitus, renal disease, auto immune disease, liver disease, cerebro-vascular accident, tuberculosis.

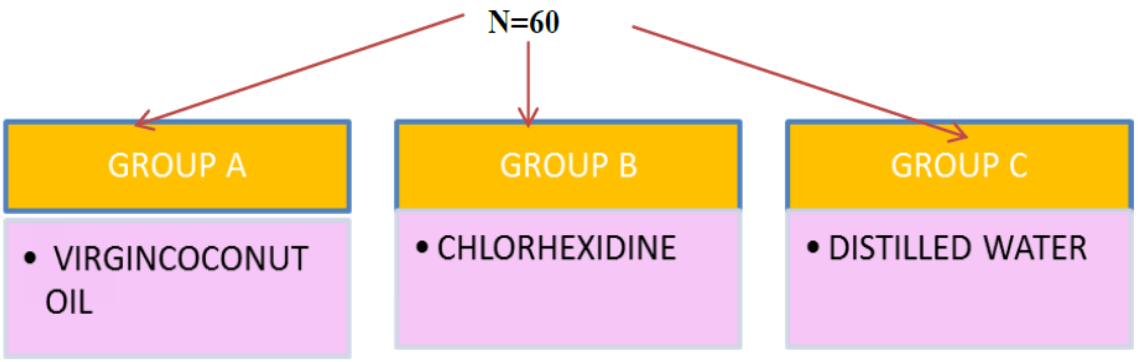
Patients under antibiotics

Pregnant or lactating female

Day 1

Unstimulated Saliva samples was collected before brushing.[11]

Plaque index (Silness and Loe 1964)[12] and Bleeding index (Ainamo and Bay, 1975).[13] have been recorded. After brushing scaling has been performed. The participants have been divided into 3 groups as follows.



Day 14

After 14 days all participants were gathered post examination samples were collected, Plaque index and Bleeding index was recorded.

Laboratory investigation

Unstimulated saliva was collected before brushing and cultured on first day and after two weeks, from all subjects and colonies were counted to compare the efficiency of coconut oil and Chlorhexidine mouthwash with distilled water.[11]

- The samples were immediately transferred to sterile "EPPENDORF TUBES" containing 1ml of "phosphate buffered solution" each and were taken within two hours to the microbiological laboratory.
- Three-fold dilution were performed using phosphate buffered solution, the samples were Vortexed for 30 seconds and 50micro liter of each sample is inoculated into "Mitis salivarius agar"
- 60 such agar plates were incubated at 37 degree Celsius for a period of 48 hours. Colony forming units were counted using digital colony counter.
- All the participants were brushed and rinsed their teeth once daily in the morning throughout the duration of study. Mouth rinses was performed by the subjects for the

period of "two weeks." At the end of two weeks, the saliva samples were again collected transported, and inoculated in agar plates and the colonies were counted by the digital colony counter and were recorded.

Statistical analysis

Paired t test –used to compare between control and test group

ANOVA – To compare groups at different time intervals

RESULTS

Table 1: Pre and Post value with oil pulling.

Parameter	Time interval	Mean	Standard deviation	P-value
Gingival index	0 day 14 day	1.71 1.57	0.48 0.39	0.001*
Plaque index	0 day 14 day	2.42 2.29	0.33 0.21	0.000*

* - P <0.005 Statistically significant

Table 2: Pre and Post value with chlorhexidine.

Parameter	Time interval	Mean	Standard deviation	P-value
Gingival index	0 day 14 day	1.74 1.52	0.61 0.50	0.000*
Plaque index	0 day 14 day	2.62 2.16	0.55 0.43	0.000*

* - P <0.005 Statistically significant

Table 3: Pre and Post value with distilled water.

Parameter	Time interval	Mean	Standard deviation	P-value
Gingival index	0 day 14 day	1.74 1.65	0.48 0.44	0.000*
Plaque index	0 day 14 day	2.57 2.49	0.45 0.41	0.000*

* - P <0.005 Statistically significant

Table 4: Comparsion for microbiological analysis between 3 groups.

Groups	Time	Mean	Std.dev	Mean diff.	Sd diff	Paired t test	P-value
Group a	Day1 Day 14	137.3 105.60	48.01 45.29	29.72	55.82	2.4329	0.0027
Group b	Day1	125.35	49.64	30.85	35.68	3.7474	0.0013

	Day 14	90.25	27.46				
Group c	Day1 Day 14	106.65 98.75	29.34 28.44	0.93	1.37	3.4740	0.0286

*-P <0.005 – statistically significant

Figure 1: Colony forming unit in three groups.

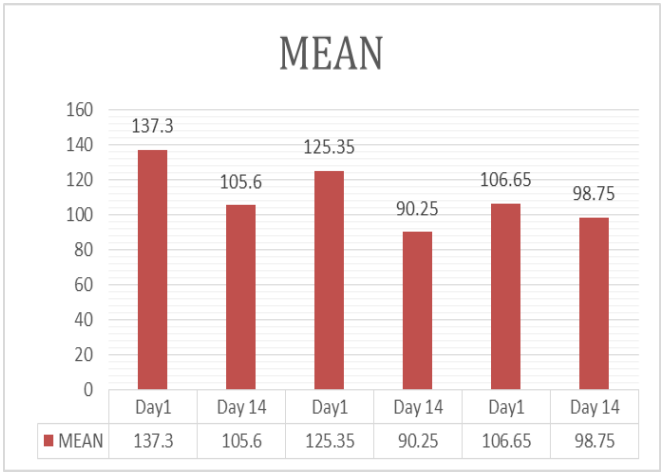


Figure 2: Comparison of mean between three groups for microbiological analysis.

DISCUSSION

Dental plaque contains complex oral microbes that are considered crucial for the initiation and progression of dental caries and periodontal disease.

The benefits of natural medicine in dentistry are gaining importance, as the products and practices used are natural and safe and helps in treatment and prevention. Oil pulling is one such natural oral hygiene practice in ayurvedic medicine which aids in oral health. Various oils such as sesame oil, sunflower oil, coconut oil, olive oil, and almond oil have been widely used for oil pulling therapy.[14]

Various studies demonstrated that oil pulling therapy could improve plaque and gingival scores and decrease total oral microbial load. It is proved to be beneficial over other available mouthwashes due to prevention of side effects like discoloration on the tooth, taste alteration and no reported sensitivity reaction.[15]

Coconut oil pulling is effective and completely safe compared to chlorohexidine mouthwash as it composed of lauric acid with anti-inflammatory and antimicrobial properties. It is an edible oil and easily obtainable in market which uses has been demonstrated in this present study. Its efficacy in reducing streptococcus mutans level comparative to chlorhexidine was demonstrated by Axellsson and Lindhe 1987 with lesser side effects, after prolonged use[4] Verallo et al[16] (2008) hypothesized that monolaurin and other medium chain monoglucoside had the capacity to alter bacterial cell wall, disrupt cell membrane and leads to death of bacteria. In concordance to it, this study also shows a definite reduction of mutans counting saliva after oil pulling group A, the viscosity oil inhibits bacterial adhesion and co-aggregation with mean value reduced from 137.3 to 105.60 at day 14 (p-value- 0.0286) (Table 3)

Sharath Asokan et al[15] (2009) conducted a randomized control trial to evaluate the effect of oil pulling with sesame oil on plaque induced gingivitis and compared its efficiency with chlorhexidine mouth wash. The result showed significant reduction of pre and post operative values of plaque and gingival scores and considerable reduction in total colony count of aerobic microorganisms. Marina campos zicker et al[17] (2019) conducted a study in mice and mentioned an interesting potential dietary approach to attenuate obesity and its metabolic and inflammatory alterations. In accordance with the above studies, the anti-inflammatory property has demonstrated in terms of gingival index with statistically significant p-value (<0.005) (Table 1&2)

Faizal C Peedikayil et al[18] 2016 conducted an invivo study in children to determine the antibacterial efficiency of coconut oil and compared it with chlorhexidine. The results showed that there is a statistically significant reduction in S.mutans count in coconut oil pulling and chlorhexidine group. Mamta kaushik et al[1] (2016) conducted a randomized controlled study to evaluate effect of coconut oil on streptococcus mutans in saliva in comparison with chlorhexidine mouthwash. Their findings statistically show significant reduction in S. mutans count in both coconut oil and chlorhexidine users, and this suggest oil pulling can be effective alternative for chlorhexidine. Similarly, our study shows strong

reduction in mutant count with p-value= 0.0286 in oil pulling group and p-value=0.0013 in CHX group (Table 2)

Yasemin Sezgin et al[19] (2019) conducted a randomized control trial to evaluate the plaque-inhibiting effects of oil pulling using 4- day plaque regrowth study model compared to 0.2% Chlorhexidine (CHX) containing mouthrinse. This study showed that oil pulling therapy presented similar inhibitory activity on plaque regrowth compared with CHX with less staining. Sriram Kaliamoorthy et al[20] (2018) on comparing the effect of oil pulling using sesame oil and coconut oil in plaque induced gingivitis concluded that coconut oil is very effective compared to sesame oil in reduction of severity of gingivitis at 7^{th}, 15^{th}, 21^{st} days. In concordance with the above studies, plaque score has reduced from day 1 to day 14 in coconut oil group comparable to chlorhexidine group with statistically significant values with p-value (<0.005) (Figure 1&2).

The most used adjuvant in maintaining oral hygiene is chlorhexidine mouthwash. But the long-term use of which resulted in several side effects. Considering that coconut oil is naturally available, widely used and with lesser side effects. The auric acid in coconut oil and its biochemical derivative mono-laurin has anti-microbial and anti-inflammatory properties. Hence it can be considered as a preventive therapy at home to maintain oral hygiene.

Limitation

However, present study acknowledges certain limitations such as:

- Short duration study, study period and single institutional study
- Included only females, hence generalization of results should be cautioned.
  Though study showed immediate positive effects, changes observed for short duration cannot be predicted for long run.

CONCLUSION

"THE ART OF MEDICINE CONSIST IN AMUSING THE PATIENT WHILE NATURE CURES THE DISEASE"

It can be concluded that Oil pulling with coconut oil can be explored as a safe and effective alternative to Chlorhexidine. For short term antiplaque effect 0.2% Chlorhexidine remains chemical toothbrush of choice. Virgin coconut oil can be used as the alternative for short term maintenance therapy and has an advantage of having fewer side effects. Hence it can be used as effective home remedy.

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