

Effectiveness of Salt water and Chlorhexidine Mouth rinses on Oral hygiene of School Children: An In Vivo study

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Abstract

Aim: To determine the efficacy of 0.2 Molar solution of salt water and chlorhexidine mouth rinse of 0.2% in reducing debris and calculus.

Methodology: The present study was conducted among school children of Government school; 0.2 Molar solution of salt water were given to 50 school children and 0.2% of Chlorhexidine mouth rinse given to other 50 school children. Oral hygiene status was assessed at baseline, 1 month using Simplified Oral hygiene Index (OHI-S).

Result and Conclusion: It was observed from the present study that both salt water and chlorhexidine mouth rinse

group were equally effective in reduction in debris score and calculus score.

Keywords: Salt water, Chlorhexidine, OHI-S

Introduction

Dental caries is a common chronic disease affecting children.¹ The factors involved in the caries process include cariogenic microorganisms and, the tooth surface, and time. Dental caries, if left untreated, continues to form cavities on tooth surfaces, which are painful and infectious.² Dental plaque is mainly responsible for caries. Brushing teeth and other mechanical plaque removal procedures can most effectively control plaque, apart from

chemical plaque control agents. However, chemical agents show many side effects and unfavorable compliance.³

The first reference credited for mouth rinse as a formal practice to Chinese medicine about 2700 BC for the treatment of gum disease. Mouth rinse as an adjunct to mechanical cleaning became popular with the upper class in Roman period, Pliny recommending salty water as the mouth rinse, Hippocrates advocated mouth rinse with a mixture of alum, salt and vinegar.³

The micro-organism on tooth surface is an important etiological factor in most common oral disease like dental caries, gingivitis and destructive periodontal disease.⁴

Many mouth rinses are used as an adjunct to regular oral hygiene practices such as chlorhexidine gluconate, Listerine, Cetyl pyridium chloride, hydrogen peroxide, benzoic acid, methyl parabene etc.⁴

Chlorhexidine mouth rinse is considered to be the gold standard in prevention of plaque formation and development of gingivitis. But in the long term usage product it has some side effects such as extrinsic tooth staining, poor taste, tooth discoloration, sensitivity, change in taste, pain and Irritation because of alcohol content. These side effects led to the search of new alternative.⁵

Mouth rinse that is natural, safe, cost effective, readily available, and culturally acceptable is essential for oral health promotion in India. Thus, the present study is planned to verify if salt water rinse is effective in reducing debris and calculus.

Methodology

Study design: A Randomized controlled double blind clinical trial was done in government school children to compare 0.2 Molar solution of salt water mouth rinse to positive control 0.2% of chlorhexidine for one month duration.

The study received ethical approval from the institutional ethical board committee. The school children reported to the clinical study were screened by the dental examiner based on inclusion and exclusion criteria.

Inclusion criteria

- Child with good general and oral health
- Child willing to participate in the study
- Child aged between 10-14 year
- They should have a minimum of 20 sound teeth
- Debris and calculus score of > 2.0 using Simplified oral hygiene index(OHI-S)

Exclusion criteria

- Handicapped child
- Orthodontic appliance or one or more incisor with prosthetic crown.
- Required immediate health care/ destructive periodontal disease
- Undergone antibiotic, steroid therapy or any anti-inflammatory drugs in the preceding month.
- History of allergies to dental products or their ingredients.
- Oral prophylaxis in the preceding month or periodontal therapy in the preceding 3 months.

Total 100 school children satisfying the inclusion and exclusion criteria were enrolled for the study. School children were divided in two groups of 50 each.

Group I: Chlorhexidine group

Group II: Salt water group

Baseline examination of all the study subjects was done by a single investigator under natural light.

The Index used to measure debris and calculus status of the subject was done using Simplified Oral hygiene Index (OHI-S).

After obtaining base line data, mouth rinse containing 0.2% of Chlorhexidine distributed in group I and 0.2 M

salt water rinse was distributed to group II. The instruction was given to the study subjects to use the mouth rinse i.e. 5 ml of mouth rinse, twice daily for 30 days. During the study the participants were informed not to use any other mouth rinses and not to visit any other dentist for treatment which interferes the study results. The subjects were re-assessed after 1 month, to check any adverse effect present after the use of mouth rinse were excluded from the study, followed by assessment of debris and calculus status using Simplified Oral hygiene Index (OHI-S). The values obtained were tabulated and subjected to statistical analysis.

Result

A total of 100 school children were included in the study and were randomly allocated into 2 groups with 50 in each group. The study subjects were followed for a period of 1 month.

At one month interval both group shows reduction in mean (OHIS) score from baseline (Table no.1). On intergroup comparison between chlorhexidine group salt water group reduction in mean OHI-S score was observed which was statistically significant from baseline to one month. (Table no.2)

Table no 1		
Group	Mean OHI-S score	P Value
Group I (Chlorhexidine)		
Baseline to 1 month (OHI-S) Scores	4.2 ± 0.51 2.90 ± 0.40	<0.05
Group II (Salt water)		
Baseline to 1 month (OHI-S) Scores	4.4. ± 0.45 3.01± 0.50	<0.05

Table 2			
Time Duration	Mean OHI-S score Group I	Mean OHI-S score Group II	P Value
Baseline	4.2 ± 0.51	4.4. ± 0.45	>0.05
1 month	2.90 ± 0.40	3.01± 0.50	<0.05

Discussion

The present randomized controlled trial was conducted to assess efficacy of salt water mouth rinse in reducing debris and calculus. Chlorhexidine, sodium hypochlorite, amine fluoride and cetylpyridinium chloride are widely used as mouthwashes and irrigating agents that can inhibit the growth of potentially pathogenic oral bacteria. Although these antimicrobial agents are widely used, side effects such as immediate hypersensitivity reactions, toxicity, tooth staining and other side effects have been reported. Moreover, it has been reported that chlorhexidine and sodium hypochlorite possess cytotoxicity toward human periodontal ligament cells, inhibit protein synthesis, and affect mitochondrial activity, thus having detrimental effects on oral tissues.^{6,7}

Herbal mouth rinses such as neem, shallot extract, garlic, white pepper extract, and aloe vera have been tested and proven to be effective against oral microbes. However, preparation of majority of herbal mouth rinses demands intense laboratory preparation. Thus, the present study evaluated the effectiveness of readily available salt water against oral microbes. 0.2% chlorhexidine was used as the benchmark control in the present study.^{8,9}

Salt solution has a different mechanism in inhibiting the growth of oral bacteria. In low concentration of salt solution, the surrounding environment is hypotonic. Oral bacteria have the ability to pump in ions with the energy from adenosine triphosphate by respiratory enzyme found in mesosomes. Water moves into the cell by osmosis and

this gives an aqueous environment which is favourable for growth and reproduction of oral bacteria. At high concentration of salt solution, the solute concentration in the surrounding solution is greater than the cytoplasm of oral bacteria. Water moves out from cell by osmosis. Oral bacteria become dehydrated and eventually die within a minute.^{12,13}

In present study we have used 0.2M salt water which was prepared by dissolving 1.2 gm of salt in 100 ml of distilled water. The result of the present study among 2 groups showed statistically significant reduction ($P < 0.05$) in the mean debris and calculus scores using (OHI-S) index from baseline to one month in salt water mouth rinse group and even in Chlorhexidine mouth rinse. Aravinth V et al. (2017) conducted a study to compare the effectiveness of salt water rinse with chlorhexidine mouth rinse in reducing dental plaque and oral microbial count and found that the Salt water rinse can be used as adjunct to routine mechanical plaque control for prevention of oral diseases which in accordance to our study.¹³

Limitations of the present study also included the comparatively small sample size, the relatively short trial period, and possibly compliance issues within the test subjects who were provided bottles of the salt water rinses to take home and were, therefore, unsupervised. Although written and verbal directions were provided, it is likely that some individuals may not have used the rinse as per instructions. In addition, the relatively short follow-up period of thirty days and the rinsing time of thirty seconds may have been not enough to produce a meaningful result and could be considered a limitation. This study was designed as a preliminary study to estimate the parameters for test and control measurements. Hence, it consisted of a convenience sample. Further, the time restraints (the study was conducted during the school term) and the cost

involved to conduct the study using a larger population for an extend period of time also limited the sample size and the duration of the study.

Conclusion

Salt water mouth rinse can be used as an adjunct to chlorhexidine mouth rinse for regular oral hygiene practices as it showed equal reduction in plaque and gingival inflammation with no adverse effects.

Other larger clinical studies are required for evaluating the efficacy of salt water rinse.

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