

Comparative Evaluation of the Efficacy of Chlorhexidine, Herbal, and Probiotic Mouth rinses in Chronic Periodontitis Using Clinical and Microbiological Parameters: A Randomized Clinical Trial

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Abstract

Background: Chlorhexidine is considered as the most standard material of choice for mouthwashes and mouth rinses. However, there are some adverse effects associated with chlorhexidine. These adverse effects include bitter taste, brownish stains over the teeth, and mucosa and erosion of the oral mucosa. To reduce these adverse effects, herbal alternatives as mouth rinses have been introduced. Probiotics are the natural food products which have ability to modulate the bacterial environment of the oral cavity. By utilizing these properties of probiotics, they can be used to control the dental plaque and periodontal diseases. **Aim:** This study aims to carry out comparative evaluation of the efficacy of chlorhexidine, herbal, and probiotic mouth rinses in chronic periodontitis. **Material and Methods:** The patients were randomly divided into four groups: Group A – Placebo mouthwash (distilled water), Group B – Chlorhexidine mouthwash 0.12%, Group C – Herbal oral rinse (consists of *Piper betle* [Nagavalli], *Bhibhitaka* [*Terminalia bellerica*], and *Pilu* [*Salvadora persica*] commonly known as Meswak, Gandharpura Tailum, Yavani, Ela, and Peppermint Satva), and Group D – Probiotic mouth rinse (Sporlac Plus [Sanzyme Ltd. India] + distilled water). The subjects were assessed by recording the clinical parameters – plaque index (PI) (Silness and Loe, 1964), and oral hygiene index-simplified (OHI-S) (Green and Vermillion), and pocket depth – Russell's index. The clinical and microbiological parameters were recorded at baseline and were repeated after the 1st week, 2nd week, 3rd week, and 4th week. **Results:** It was found that there was a non-significant difference in findings in Group A at 1 week, 2 weeks, 3 weeks, and 4 weeks. However, there was a significant difference in findings of Group B, Group C, and Group D at 1 week, 2 weeks, 3 weeks, and 4 weeks. There was marked improvement in the OHI-S, PI, and GI scores in Groups B, C, and D. Then, there was intergroup analysis of the mean values of OHI-S, PI, and GI in Groups A, B, C, and D at 1 week, 2 weeks, 3 weeks, and 4 weeks. It was found that there was a significant difference between findings of Group A and Group B, Group A and Group C, and Group A and Group D. There was no significant difference between the findings of Group B, Group C, and Group D. **Conclusion:** The herbal mouth rinse and probiotics mouth rinses are equally effective as compared to chlorhexidine in chronic periodontitis. Therefore, they can be used as alternatives to the chlorhexidine mouthwashes in chronic periodontitis

Keywords: Chlorhexidine, Herbal mouth rinse, Probiotics, Chronic periodontitis.

INTRODUCTION

Periodontitis is considered as an important health problem among human beings nowadays. They are inflammatory diseases which are usually chronic in nature, however, acute conditions can also be present which are seen rarely. The important features of chronic periodontitis include development of periodontal pocket, resorption of alveolar bone, and loss of connective tissue. All these features are due to complicated interaction between immune responses of host and pathological bacteria.^[1,2] Initially, the effects of periodontitis

are observed in gingival tissues which later progress to the periodontal tissues of entire teeth. Then, there is a severe damage to complete periodontal tissues if the periodontitis

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is not treated at appropriate time. There may be complete destruction of the periodontal tissues causing mobility of teeth, leading to permanent loss of teeth.^[3,4]

The most important cause of periodontitis is the dental plaque. Dental plaque is also vital etiological factor in the development of dental caries. It is believed that the progression and onset of the periodontal tissues can be controlled by proper management of the dental plaque. Role of antibiotics in controlling the dental plaque is controversial in nature. Although antibiotics are effective in the management of dental plaque by destroying the harmful bacteria, there are chances of destruction of the useful bacteria also along with the harmful bacteria. Besides, the issue of antibiotic resistance has become one of the most serious problems in the world health-care system. This problem has arisen due to the injudicious use of antibiotics nowadays. Hence, there is a need to develop techniques which are not based on the use of antibiotics for the management of the periodontal diseases. There is a serious need of non-antibiotic-based techniques. Besides, there is a need to increase the profile for the prevention of periodontal diseases.^[5,6]

Nowadays, some of the non-antibiotic-based techniques for controlling periodontal diseases have been introduced. These include antimicrobial mouthwashes such as 0.2% chlorhexidine mouthwashes, herbal mouth rinses, and probiotics. Chlorhexidine is considered as the most standard material of choice for mouthwashes and mouth rinses. However, there are some adverse effects associated with chlorhexidine. These adverse effects include bitter taste, brownish stains over the teeth, and mucosa and erosion of the oral mucosa. To reduce these adverse effects, herbal alternatives as mouth rinses have been introduced. Probiotics are the natural food products which have ability to modulate the bacterial environment of the oral cavity. By utilizing these properties of probiotics, they can be used to control the dental plaque and periodontal diseases.^[7,8]

No study has been conducted in the past which has compared the effects of chlorhexidine mouthwashes against herbal mouth rinses and probiotics in prevention of dental plaque and periodontal diseases. Hence, this study has been conducted with the objective of comparative evaluation of the efficacy of chlorhexidine, herbal, and probiotic mouth rinses in chronic periodontitis using clinical and microbiological parameters.

MATERIALS AND METHODS

This randomized clinical trial in which the study population consisting of individuals who were systemically healthy, between 30 and 50 years of age and with chronic periodontitis, was enrolled in the study. In this study, 132 participants were there.

The inclusion criteria for the study included

1. Subjects between the age group of 30 and 50 years of age.
2. Subjects with chronic periodontitis.

The exclusion criteria of the study included

1. History of systemic diseases.
2. Pregnant, lactating females.
3. History of antibiotic therapy in the past 3 months
4. History of oral prophylaxis within 6 months previous to the study.
5. Subjects with orthodontic and prosthodontic appliances.
6. History of undergoing nonsurgical and surgical periodontal therapy in the past 6 months.

The patients were randomly divided into four groups.

Group A – Placebo mouthwash (distilled water)

Group B – Chlorhexidine mouthwash 0.12%

Group C – Herbal oral rinse (consists of *Piper betle* [Nagavalli], *Bhibhitaka* [*Terminalia Bellerica*], and *Pilu* [*Salvadora persica*] commonly known as Meswak, Gandharpura Tailum, Yavani, Ela, and Peppermint Satva).

Group D – Probiotic mouth rinse (Sporlac Plus [Sanzyme Ltd. India] + distilled water).

An informed written consent was obtained from patients included in the study.

An experimental site of two teeth with chronic periodontitis, a pocket depth of 4–6 mm was selected for microbiological analysis.

The subjects were assessed by recording the clinical parameters – plaque index (PI) (Silness and Loe, 1964), and oral hygiene index-simplified (OHI-S) (Green and Vermillion), pocket depth – Russell's index, and microbiological parameters (using a microscope with the dark field condenser): (1) Spirochetes, (2) motile bacteria, (3) cocci, and (4) other microorganisms by a single investigator and documented in a case history pro forma.

All the four groups were advised to rinse their mouth with 15 ml of the respective mouthwashes prescribed to them for 1 week without any dilution for 1 min twice daily 1/2 h after brushing. They were advised not to eat anything for 1/2 h after using the mouthwash. The clinical and microbiological parameters were recorded at baseline and were repeated after the 1st week, 2nd week, 3rd week, and 4th week.

Statistical analysis

Student's t-test will be applied to the mean value of various parameters at various time intervals with baseline level for the four drugs. Wherever the result is significant, it will be mentioned with the relevant probability level of significance. When the variation is not appreciable, results will be arrived by direct comparison method.

The study protocol is in accordance with the local ethical guidelines and approved by the Local Ethics Committee.

RESULTS

In this study, 64 males (48.48%) and 68 females (51.51%) were included. In Group A, Group B, Group C, and Group D,

48.48% of participants were male while 51.51% were female [Table 1].

There was analysis of OHI-S, PI, and GI in all groups at 1 week, 2 weeks, 3 weeks, and 4 weeks. It was found that there was a non-significant difference in findings in Group A at 1 week, 2 weeks, 3 weeks, and 4 weeks. However, there was a significant difference in findings of Group B, Group C, and Group D at 1 week, 2 weeks, 3 weeks, and 4 weeks. There was marked improvement in the OHI-S, PI, and GI scores in Groups B, C, and D [Table 2].

Then, there was intergroup analysis of the mean values of OHI-S, PI, and GI in Groups A, B, C, and D at 1 week, 2 weeks, 3 weeks, and 4 weeks. It was found that there was a significant difference between findings of Group A and Group B, Group A and Group C, and Group A and Group D. There was no significant difference between the findings of Group B, Group C, and Group D [Table 3].

DISCUSSION

The most important cause of periodontitis is the dental plaque. Dental plaque is also vital etiological factor in the development of dental caries. It is believed that the progression and onset of the periodontal tissues can be controlled by proper management of the dental plaque. Role of antibiotics in controlling the dental

plaque is controversial in nature.^[9,10] Although antibiotics are effective in the management of dental plaque by destroying the harmful bacteria, there are chances of destruction of the useful bacteria also along with the harmful bacteria.^[11-13] Besides, the issue of antibiotic resistance has become one of the most serious problems in the world health-care system.^[14-16] This problem has arisen due to the injudicious use of antibiotics nowadays. Hence, there is a need to develop techniques which are not based on the use of antibiotics for the management of the periodontal diseases. There is a serious need of non-antibiotic-based techniques. Besides, there is a need to increase the profile for the prevention of periodontal diseases.^[17,18]

Nowadays, some of the non-antibiotic-based techniques for controlling periodontal diseases have been introduced. These include antimicrobial mouthwashes such as 0.2% chlorhexidine mouthwashes, herbal mouth rinses, and probiotics. Chlorhexidine is considered as the most standard material of choice for mouthwashes and mouth rinses. However, there are some adverse effects associated with chlorhexidine. These adverse effects include bitter taste, brownish stains over the teeth, and mucosa and erosion of the oral mucosa. To reduce these adverse effects, herbal alternatives as mouth rinses have been introduced. Probiotics are the natural food products which have ability to modulate the bacterial environment of the oral cavity. By utilizing these properties of probiotics, they can be used to control the dental plaque and periodontal diseases.^[19,20]

No study has been conducted in the past which has compared the effects of chlorhexidine mouthwashes against herbal mouth rinses and probiotics in the prevention of dental plaque and periodontal diseases. Hence, this study has been conducted with the objective of comparative evaluation of the efficacy of chlorhexidine, herbal, and probiotic mouth rinses in chronic periodontitis using clinical and microbiological parameters.

In this study, the patients were randomly divided into four groups: Group A – Placebo mouthwash (distilled water), Group B – Chlorhexidine mouthwash 0.12%, Group C – Herbal oral rinse (consists of *P. betle* [Nagavalli], *Bhibhitaka*

Table 1: Gender-wise distribution in different groups

Groups	Male (%)	Female (%)	Total (%)
Group A	16 (48.48)	17 (51.51)	33 (100)
Group B	16 (48.48)	17 (51.51)	33 (100)
Group C	16 (48.48)	17 (51.51)	33 (100)
Group D	16 (48.48)	17 (51.51)	33 (100)
Total	64 (48.48)	68 (51.51)	132 (100)

Table 2: Intragroup comparison of mean values of variables at 1 week, 2 weeks, 3 weeks, and 4 weeks

Variable	Mean value				P-value
	1 st week	2 nd week	3 rd week	4 th week	
Group A					
OHI-S	0.31±0.21	0.29±0.12	0.28±0.23	0.28±0.12	0.001
PI	0.05±0.02	0.04±0.01	0.03±0.02	0.02±0.03	0.001
GI	0.15±0.05	0.05±0.02	0.03±0.01	0.02±0.12	0.001
Group B					
OHI-S	0.33±0.21	0.18±0.12	0.12±0.23	0.08±0.12	0.001
PI	0.06±0.02	0.05±0.01	0.04±0.02	0.03±0.03	0.001
GI	0.16±0.05	0.06±0.02	0.04±0.01	0.03±0.12	0.001
Group C					
OHI-S	0.32±0.21	0.19±0.12	0.13±0.23	0.07±0.12	0.001
PI	0.04±0.02	0.03±0.01	0.02±0.02	0.01±0.03	0.001
GI	0.14±0.05	0.04±0.02	0.02±0.01	0.01±0.12	0.001
Group D					
OHI-S	0.30±0.21	0.19±0.12	0.14±0.23	0.07±0.12	0.001
PI	0.07±0.02	0.06±0.01	0.05±0.02	0.04±0.03	0.001
GI	0.13±0.05	0.04±0.02	0.04±0.01	0.03±0.12	0.001

Table 3: Intergroup comparison of mean values of variables between three groups

		Group A	Group B	Group C	Group D
1 st week		0.58 (NS)	0.35 (NS)	0.34 (NS)	0.51 (NS)
2 nd week	OHI S	0.04 (S)	0.34 (NS)	0.20 (NS)	0.10 (NS)
3 rd week		0.03 (S)	0.35 (NS)	0.34 (NS)	0.46 (NS)
4 th week		0.02 (S)	0.34 (NS)	0.20 (NS)	0.10 (NS)
1 st week		0.66 (NS)	0.39 (NS)	0.39 (NS)	0.46 (NS)
2 nd week	PI	0.04 (S)	0.34 (NS)	0.20 (NS)	0.10 (NS)
3 rd week		0.03 (S)	0.35 (NS)	0.34 (NS)	0.46 (NS)
4 th week		0.02 (S)	0.34 (NS)	0.20 (NS)	0.10 (NS)
1 st week		0.59 (NS)	0.38 (NS)	0.45 (NS)	0.67 (NS)
2 nd week	GI	0.04 (S)	0.34 (NS)	0.20 (NS)	0.10 (NS)
3 rd week		0.03 (S)	0.35 (NS)	0.34 (NS)	0.46 (NS)
4 th week		0.02 (S)	0.34 (NS)	0.20 (NS)	0.10 (NS)

[*T. bellerica*], and Pilu [*S. persica*] commonly known as Meswak, Gandharpura Tailum, Yavani, Ela, and Peppermint Satva), and Group D – Probiotic mouth rinse (Sporlac Plus [Sanzyme Ltd. India] + distilled water).

There was an analysis of OHI-S, PI, and GI in all groups at 1 week, 2 weeks, 3 weeks, and 4 weeks. It was found that there was a non-significant difference in findings in Group A at 1 week, 2 weeks, 3 weeks, and 4 weeks. However, there was a significant difference in findings of Group B, Group C, and Group D at 1 week, 2 weeks, 3 weeks, and 4 weeks. There was marked improvement in the OHI-S, PI, and GI scores in Groups B, C, and D. Then, there was intergroup analysis of the mean values of OHI-S, PI, and GI in Groups A, B, C, and D at 1 week, 2 weeks, 3 weeks, and 4 weeks. It was found that there was a significant difference between findings of Group A and Group B, Group A and Group C, and Group A and Group D. There was no significant difference between the findings of Group B, Group C, and Group D.

It was interfered from these results that the herbal mouth rinse and probiotics mouth rinses are equally effective as compared to chlorhexidine in chronic periodontitis. Therefore, they can be used as alternatives to the chlorhexidine mouthwashes in chronic periodontitis.

The results of the present study are similar to the study conducted by Deshmukh *et al.* in which they have compared chlorhexidine mouthwash with herbal mouth rinse and probiotic based mouth rinse. Parwani *et al.* conducted a similar study and the results obtained in their study were similar to the results obtained in our study. Narayan and Mendon also found results in accordance with our study. Shetty *et al.*, Shah, and Nadkerny conducted studies and observed the results which were in accordance with the results of the present study.^[21-24]

Singh *et al.* conducted a study in which the results obtained were not similar to the results of the present study. They found that there was a significant difference between the chlorhexidine and herbal mouth rinses. However, in our study, there was no statistically significant difference between the chlorhexidine mouthwash and herbal mouthwash. Harini and Anegundi also conducted a similar study and observed that there is statistically significant difference between the chlorhexidine mouthwash and herbal mouth rinses. Their results are not in accordance with the results of the present study.^[25-27]

CONCLUSION

The herbal mouth rinse and probiotics mouth rinses are equally effective as compared to chlorhexidine in chronic periodontitis. Therefore, they can be used as alternatives to the chlorhexidine mouthwashes in chronic periodontitis.

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