ORIGINAL RESEARCH

Efficacy of two commercially available Oral Rinses - Chlorohexidine and Listrine on Plaque and Gingivitis - A Comparative Study

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ABSTRACT

Background: Chemotherapeutic agents have been shown to be useful adjuncts to daily oral home care in the control of plaque and gingivitis. The objective of the study was to evaluate effect of two oral rinses; Chlorohexidine and Listerine on Plaque and Gingivitis.

Materials and Methods: A doubled blind study was done on 150 patients visiting OPD of oxford general hospital for 2 months to compare the efficiency of two commercially available mouth rinses i.e. chlorohexdine (0.2%) & Listerine on plaque & gingivitis, along with a Placebo.

Results: At the end of 28 weeks chlorohexdine & listerine significantly reduced plaque growth & gingivitis compared to a Placebo however chlorohexdine was more effective than Listerine.

Conclusion: Chlorehexidine (0.2%) and a phenolic mouth rinse significantly reduced plaque growth and gingival inflammation compared to a placebo mouthrinse, however chlorhexidine rinse was more effective against plaque regrowth than the phenolic rinse.

Key Words: Mouthrinse, Plaque, Gingivitis, Oral Hygiene.

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INTRODUCTION

The mouth is considered as the mirror of the body and the health of the oral cavity has been closely associated with systemic health. Periodontal disease is the most frequent oral disease in the world. It consists of a bacterial inflammatory process in the periodontal tissue that results from the accumulation of dental plaque on the external surface of the tooth.

It is widely accepted in dentistry that plaque containing a combination of pathogenic micro-organisms is a principal etiological factor associated with periodontal disease. Although mechanical plaque control can effectively prevent gingivitis if conscientiously applied, the wide distribution of gingivitis existing in the general population suggests that additional measures may prove beneficial. Chemotherapeutic agents have been shown to be useful adjuncts to daily oral home care in the control of plaque and gingivitis[1]

Beginning in the 1960's the preventive and therapeutic studies of oral antimicrobials began to shift from caries, which was beginning to respond dramatically to fluorides, to gingivitis and periodontitis - where plaque and calculus were considered the dominant etiologic

factor in periodontal diseases. The plaque and mineral deposits (calculus) were the target, and a number of antimicrobial agents were examined.

Active agents shown effective in clinical trials include chlorhexidine and an oral rinse containing phenolic compounds (Listerine). Recently, the American Dental Therapeutics has adopted "guidelines for acceptance of chemotherapeutic products for the control of supragingival dental plaque and gingivitis", Until Now, only 2 agents have been accepted by this council: Chlorhexidine and Listerine. The efficacy of Chlorhexidine and Listerine was compared in a study in which these mouthrinses were used as supplements to regular toothcleaning measures. The maintenance of satisfactory standards oral hygiene for long periods of time by mechanical tooth cleaning measures is, however, laborious and efforts have therefore been made to utilize various chemical agents incorporated in mouth rinses and dentifrices as adjunctive measures in the control of supragingival plaque[2]

Hence, this study envisages evaluating the efficacy of two commercially i.e. chlorohexdine and Listerine available oral rinses on plaque and gingivitis.

MATERIALS AND METHODS

A Double blind parallel study was done on 150 patients visiting OPD of Oxford General Hospital. The study was done for a period of 2months.

The following inclusion and exclusion criteria were used for the study.

Subjects:

Inclusion criteria

Patients with all 32 permanent teeth were considered.

Patients were in the age group of 20-35 years.

Exclusion criteria

Patients with systemic diseases with not considered.

Grossly carious, fully crowned or restored and orthodontically bonded teeth were excluded.

Subject with destructive periodontal disease or those on antibiotic or anti-inflammatory drugs were excluded from the study.

METHODOLOGY

Among 150 subjects, 74 males and 76 females were included in the study, all of whom were in the age group of 25-35 years. The subjects had a documented high standard of oral hygiene and gingival health, with no probing depths of >2mm. The periodontal status at time of selection as well as the age range of the individuals was very similar in all groups. The subjects were divided into 3 groups. Group A, Group B and Group C. All of the above group consisted of 50 subjects each.

Group A (n=50)-Rinsed with 0.9% sterile saline solution.

Group B(n=50)-Rinsed with Phenolic compound (Listerine)

Group C(n=50)-Rinsed with 0.2% Chlorhexidine Digluconate.

Because of the double blind design, all solution had the same color and were kept in the same kind of bottle. The manufactures were requested to give the investigator the same color for all the 3 formulations.

The study was conducted in 2 phases:

Pre-treatment phase

Treatment phase

Table 1: Shows the age distribution of the group between ages 21-35 years. Samples are aged matched with P=0.158

Groups	Age in years	
	Range	Means ±SD
Group A	21.35	28.98 ±4.31
Group B	21-35	27.96 ± 4.35
Group C	21-35	27.38 ± 3.91
Inference	Samples are age matched with P=0.158	

Table 2: Shows the gender distribution were equally matched p>0.05)

	Gender	
Groups	Male No(%)	Female No(%)
Group A	25(50.0%)	25(50.0%)
Group B	25(50.0%)	25(50.0%)
Group C	24(48.0%)	26(52.0%)
Inference	Samples are Gender matched (P>0.05)	

Table 3: Shows Lost to Follow up Analysis. No lost to follow up is not statistically different between three groups.			
Groups	**Number(%) cases Lost-to follow up**		
	Group A	**Group B**	**Group C**
Baseline	-	-	-
Week 1	1(2.0%)	-	1.(2.0%)
Week 2	2(4.0%)	1(2.0%)	1(2.0%)
Week 3	4(8.0%0	3(6.0%)	2(4.0%)
Week 4	4(8.0%)	3(6.0%)	4(8.0%)
Inference	Lost-to follow up is not statistically significant between three groups (P>0.05)		

Table 4: shows statistical analysis of reduction of plaque scores in Group C and Group B when compared to Group A after 1st week onwards however reduction of plaque is higher in group C than Group B in 2nd, 3rd, & 4th week subsequently.				
Groups	**Plaque Index Mean ± SD (Min-Max)**			**P Value**
Baseline	**Group A**	**Group B**	**Group C**	
Week 1	0.30±0.09 (0.15-0.47)	0.33±0.09 (0.15-0.47)	0.33±0.09 (0.13-0.97)	P=0.172
Week 2	1.11±0.12^{a} (0.94-1.39)	1.03±0.15^{b} (0.77-1.33)	0.96±0.39^{b} (0.31-1.56)	P=0.0172*
Week 3	1.53±0.36^{a} (0.97-2.21)	1.26 ± 0.26^{b} (0.78-1.79)	0.86±0.31^{c} (0.33-1.34)	P<0.001**
Week 4	1.58±0.39^{a} (0.95-2.18)	0.95 ± 0.22^{b} (0.62-1.33)	0.58±0.20^{c} (0.23-0.93)	P<0.001**
Moderately significant **Strongly significant Identically superscript are non-significant, non-identical uperscripts are significant by Tukey test.				

Table 5: compare of gingival index between three groups showing a significant reduction of gingival scores in Group C and Group B when compared to Group A after 1st week onwards however reduction of plaque is higher in group C than Group B in 2nd , 3rd , & 4th week subsequently.				
Groups	**Gingival Index Mean ± SD (Min-Max)**			**P Value**
	Group A	**Group B**	**Group C**	
Baseline	0.11±0.03 (0.04-0.16)	0.11±0.05 (0.03-0.22)	0.12±0.06 (0.03-0.26)	P=0.254
Week 1	0.38±0.11^{a} (0.15-0.58)	0.35±0.13^{ab} (0.13-0.62)	0.23±0.12^{b} (0.04-0.43)	P<0.001**
Week 2	0.46±0.17^{a} (0.19-0.80)	0.41 ± 0.14^{ab} (0.17-0.71)	0.29±0.18^{b} (0.02-0.62)	P<0.001**
Week 3	0.51±0.19^{a} (0.19-0.85)	0.48 ± 0.18^{ab} (0.22-0.80)	0.36±0.18^{b} (0.08-0.71)	P<0.001**
Week 4	0.56±0.20^{a} (0.18-0.89)	0.53 ± 0.17^{ab} (0.27-0.80)	0.41±0.21^{b} (0.08-0.80)	P<0.001**
Moderately significant **Strongly significant Identically superscript are non-significant, non-identical superscripts are significant by Tukey test.				

Pre-treatment Phase:

This phase was for a period 2 weeks. All the subjects were given a thorough oral prophylaxis (scaling and rubber cup polishing) before entering into this phase to remove all plaque, calculus and extrinsic tooth stains. A period of two weeks was allowed to lapse in order to obtain realistic and objective levels of plaque and gingival health. Oral hygiene instructions were given by the examiner to all subjects in order to standardize the oral hygiene procedures. Subjects were given similar brush and paste by the investigator. All subjects continued to practice regular, non-supervised oral hygiene. All were therefore placed in a similar situation at day 14-scaling, polishing, new toothbrush and identical dentifrice.

Treatment Phase:

This phase lasted for 28 days.

Subjects began a regimen of rinsing with 10 ml of the assigned products for 60 seconds(1minute) twice daily, starting from the day 1 of the treatment phase. Each of the subjects was provided with a dispenser which was graduated at 10 ml. The subjects were asked to rinse twice daily, once in morning soon after breakfast and in the night, after dinner. The rinses were given to the study subjects for duration of one week in required quantities. For the entire study period, the rinsing was unsupervised. The subjects were required to maintain a record of these unsupervised rinsing.

All subjects were examined seated on a dental chair by the investigator himself.

INDICES USED FOR ASSESSING PLAQUE AND GINGIVITIS WERE:

Plaque Index (Turesky Modification Of Quigley Hein Plaque Index(1970)[3]

Gingival Index (Loe And Silness) (1967)[4]

Subjects were examined at 0,7,14,21 and 28 days, Examination was carried out by a single investigator, who was calibrated by the Professor and head of the department of Community dentistry. Weighted kappa statistic was 0.8 which showed good intra-reliability of the examiner.

All instruments were sterilized by autoclave before using.

Informed consent was obtained from each subject participating in the study.

Statistical Method: Chi square test has been used to find the homogeneity of gender distribution and lost-to-follow up distribution between three groups, Analysis of variance has been used to find the significant change of plaque and gingival index between three groups with Post hoc Turkey test has been carried out to find pair wise significance.

Statistical software: The statistical software namely SPSS 11.0 and Systat 8.0 were used for the analysis of the data and Microsoft word and Excel have been used to generated graphs, tables etc.

RESULTS

Table 1 shows the age distribution of subjects in the age range of 21 – 35 years. The samples were age matched with P value being P=0.158.

Table 2 shows the gender distribution in Group A, Group B, Group C. the gender i.e males and females were equally matched with P> 0.05.

Table 3 shows Lost to follow up analysis in Group A, group B and Group C showing no statistical differences in drop out ratio between the three groups.

Table 4 shows comparison of plaque scores between the three groups after the first week. Plaque score is reduced in Group C and group B than Group A in second, third and fourth week subsequently but reduction of plaque is higher in Group C than Group B whose significance is showed by Tukey test.

Table 5 shows comparison of gingival scores between the three groups after the first week. Gingival score is reduced in Group C and group B than Group A in second, third and fourth week subsequently but reduction of plaque is higher in Group C than Group B whose significance is showed by Tukey test.

DISCUSSION

Bacterial plaque is one of the major etiologic agents involved in the initiation and progression of periodontal disease. The role of microorganisms in the onset of gingivitis and evolution of periodontitis increased dramatically following the recognition of

bacterial plaque as the major cause of chromic gingivitis. The association of organisms with periodontal disease has been established long ago. Based on the strong association between certain micro organisms and periodontal diseases, there has been an increasing interest in the use of antimicrobial agents in their management. For the most part, chemical therapy has been used as an adjunct to mechanical therapy.[5]

Since its conception, chlorhexidine has proven its effectiveness beyond dispute, and the different formulations of chlorhexidine are used routinely for both general dental practice and teaching institutions. In the pharmaceutical profession, chlorhexidine has been recognized as the gold standard by which the efficacy of alternative antiplaque agents is measure.[6]

How ever the present study being a double blind study, it was mandatory of ask all participants to use mouthwashes with same instructions, even if that was not according to the manufacturer's labeled instructions.

As seen the result, both Listerine and Chlorhexidine groups showed a significant reduction in plaque accumulation as compared in the placebo group from second week onwards.

There are already a reasonable number of studies on chlorhexidine and phenolics to make general observations.

Chlohexidine gluconate had generated considerable interest in the dental community since its introduction as a 20% mouthrinse in an experimental gingivitis study since time immemorial. It virtually prevented plaque accumulation or development of gingivitis over the 21 day period of no oral hygiene. The many subsequent studies have been reviewed in numerous publications. The acceptance by the Council on Dental Therapeutics was base on 6-month studies that followed the Council's guidelines and employed a mouthrise containing 0.12% chlohexidine gluconate. The rinse has also been accepted by the FDA(Food and Drug Administration) for sale on a prescription basis. In one of the studies, in school children aged 10 to 12, plaque was reduced 16% and gingivitis 67% compared to placebo. In a second study, conducted on adults, plaque was reduced 61% and gingivitis 39%[6]

Listerine, a combination of phenol related essential, oils is a direct descendant and is the prototype first generational antibacterial mouthrinse. It received a positive endorsement from W.D. Miller as a " very useful and active antiseptic" against oral bacteria a century ago. Despite a plethora of germicidal claims, for most of the twentieth century. Mouthrinses have not been taken seriously by the dental profession. The conventional wisdom considered them as cosmetic adjuncts with transitory effects.[7]

Although numerous antiplaque, antigingivitis studies have been conducted with first generational agents the largest body of work has been presented with Listerine antiseptic. Short term studies in the 1970s and long term in the 1980s lead to acceptance by the council of Dental Therapeutics. In the long term studies the plaque reduction varied from 14% to 34% when compared to placebo and the reduction in gingivitis was 22% to 34%. There were no mucosal aberrations or development of extrinsic stain reported in these studies. Some patients noted and initial burning sensation but accommodation usually occurred in few days.[8]

In general, the level of reduction in plaque and gingivitis seen with chlorhexidine is greater than that noted for the phenolic mouth rinses. This difference has been attributed to its substantively. This must be balanced against the disquieting characteristic of chlorhexidine to form a yellowish brown stain on teeth and tongue, on plastic and composite restorations, and on artificial teeth. Despite 20 years of research on analogues and modifications in formulation, staining constitutes to be a problem. The stain and calculus, is of course reversible by office prophylaxis and hence it is only a limited deterrent; but it can be concern to some people.[1]

The study sample was obtained from a homogenous population with respect to age. During the course of the study it was apparent that there was very little knowledge about the influence of mouthrinses on plaque and gingivitis.

The data from this study is completely consistent with the finding of several studies and confirm that both Chlorhexidine and Listerine are highly efficacious in reducing plaque and gingivitis, though Chlorhexidine is proven to significantly better than Listerine.[9]

The finding of a previous study demonstrated the beneficial effects of chlorehexidine digluconate and Listerine antiseptic both in terms of plaque inhibition

and resolution of gingivitis.[10]. The findings are similar even in this study.

The finding of a previous study demonstrated that the 0.2% chlorhexidine rinse offers greater oral hygiene benefits than the phenolic rinse.[1] The data of this study also correlated with the above findings.

In a previous study, the mean GI scores at day 21 in the chlorhexidine group were significantly lower than the scores in the placebo group.[9] The study also supported the same findings.

In a previous study it was noted that 0.12% chlorhexidine digluconate was superior to Listerine in its ability to maintain optimal gingival health during the entire three weeks of mouth rinse use.[11] A similar correlation was found in this study as well.

The result of a previous study demonstrated that Listerine antiseptic mouth rinse significantly reduced the development of plaque and gingivitis at 1, 6 and 9 months, as compared to it's water control.[12] The feedings of this study also presented the same fact.

As the study was a concurrent parallel design no wash out period was considered, so to know more suitable results crossover study for a longer duration of time period should be considered for further studies.

CONCLUSION

This study showed that both a 0.2% chlorehexidine and a phenolic mouth rinse significantly reduced plaque growth and gingival inflammation compared to a placebo mouthrinse. However, the chlorhexidine rinse was more effective against plaque regrowth than the phenolic rinse. The role of mouthrinses as adjuncts to normal oral hygiene needs reassessment given the paucity of data supporting the long term unsupervised use of most of these products.

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