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RESEARCH ARTICLE

Comparative Analysis on the effect of Chlorhexidine Gluconate and Povidone Iodine mouthrinses on plaque accumulation and gingival inflammation

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Abstract

Background: To compare the efficacy of Chlorhexidine Gluconate (0.2%) and Povidone Iodine in controlling plaque and gingival scores.

Materials and methods: Ultrasonic scaling was performed on the study group, following which plaque and gingival baseline scores were recorded. The subjects were prescribed Chlorhexidine Gluconate(0.2%) mouthrinse during the first week, and Povidone Iodine mouthrinse during the second week to be rinsed twice a day, following which plaque and gingival scores were obtained. A wash out period of one week was given between the solutions. A statistical analysis using a two-sample T-test was performed to assess the control of plaque and gingivitis between the mouthrinses.

Results: None of the variables were statistically significant but the mean values of Plaque Index(PI) and Gingival Index(GI) were higher in the Chlorhexidine group than the Povidone Iodine group. Plaque Index(PI) values were seen to increase more in the Chlorhexidine group than the Povidone Iodine group, whereas Gingival Index(GI) was seen to decrease more in the Chlorhexidine group.

Introduction:-

Dental Plaque is the major contributing factor in most prevalent infectious oral diseases in humans, and the use of mechanical agents for plaque control has been demonstrated to be the most simple and cost effective method. The efficiency of mechanical plaque control however, depends on individual manual ability and motivation. Adjuncts to mechanical agents such as chemical approaches are widely used to aid in removal of plaque.

Chlorhexidine gluconate (CHX) is one of the most effective antimicrobial agents for plaque control. It is a dicationic Bisbiguanide, bacteriostatic at low concentration and bacteriocidal at high concentration. One charged end binds to the tooth surface, and the other remains available to initiate the interaction with the bacterial membrane. The cellular transport of the bacterial cell is damaged with the creation of pores in the cell membrane. CHX acts as a reservoir and desorbed in bacteriostatic concentrations 12 hours after rinsing.. In higher concentration, the solution penetrates the bacterial cell and leads to cell death.

Povidone Iodine is a complex compound containing polyvinylpyrrolidone and iodine in an aqueous solution. This compound is reported to have the same antimicrobial property of Iodine, whilst considerably reducing the irritation, staining and allergic phenomena associated with Iodine. It is also widely used as an irrigant solution, as well as a mouthrinse. The bactericidal effect can almost entirely be attributed to free molecular iodine. The non-complexed,

freely mobile elemental iodine, the active form of which reacts with enzymes of the respiratory chain along with cell wall proteins leads to cell destruction.

Therefore, it was the aim of this study to compare the effectivess of Chlorhexidine Gluconate and Povidone Iodine on plaque control and gingival bleeding.

Subject exclusion criteria:-

1. Patients with prosthetic/orthodontic appliances
2. Periodontal disease
3. Systemic disease that would influence oral health
4. Patients on antimicrobial treatment/drugs
5. Pregnant women
6. Smokers
7. Patients with gingival score >=1 and plaque score >=1

Materials and methods:-

This study was conducted in the Department of Periodontology, Manipal College of Dental Sciences, Mangalore as a cross over study, and was approved by the ethical committee of Manipal College of Dental Sciences, Mangalore. 17, male and female subjects, aged 20-25 participated in the study. All the subjects were briefed on the aims of the study and written consent was taken to take part in the same. Oral prophylaxis/ultrasonic scaling was performed on the subjects, following which plaque and gingival baseline scores were recorded. The subjects were prescribed commercial Chlorhexidine Gluconate(0.2%) mouthrinse to be used twice a day, for a period of one week, following which plaque and gingival scored were obtained. A wash out period of one week was given. The subjects were recalled for oral prophylaxis, plaque and gingival baseline scores were recorded before prescribing Povidone Iodine(Betadine) mouthrinse- to be used twice a day for one week. The plaque and gingival scores were obtained and compared with the Chlorhexidine scores. The recorded values were subjected to student's paired T test.

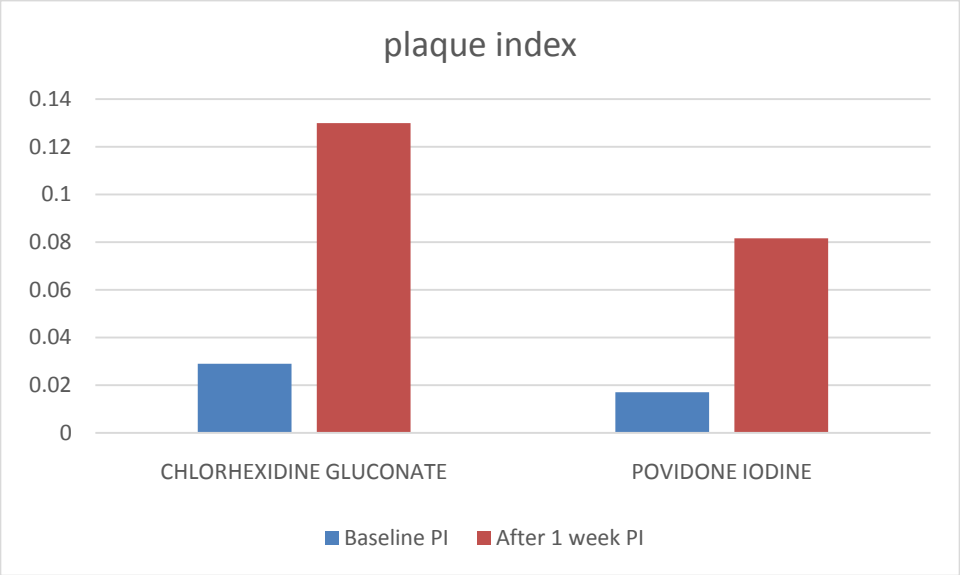
Results:-

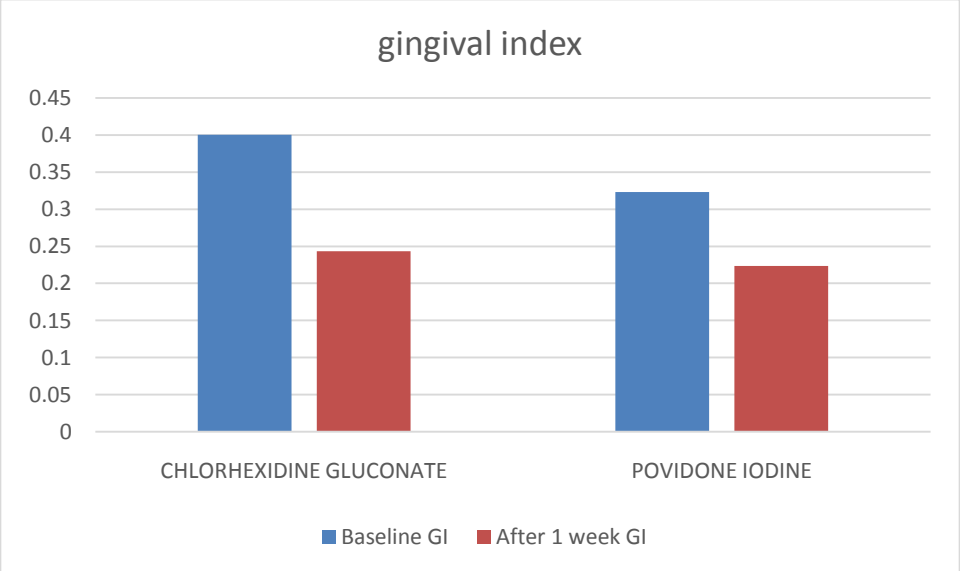
	group	N	Mean	Std. Deviation	t	df	P VALUE
Baseline PI	CHLORHEXIDINE GLUCONATE	17	0.029	0.024094	1.742	32	0.091
	POVIDONE IODINE	17	0.017	0.015031			
After 1 week PI	CHLORHEXIDINE GLUCONATE	17	0.13	0.094818	1.635	32	0.112
	POVIDONE IODINE	17	0.081582	0.076875			
difference PI	CHLORHEXIDINE GLUCONATE	17	-0.101	0.086116	-1.327	32	0.194
	POVIDONE IODINE	17	-0.06458	0.073462			
Baseline GI	CHLORHEXIDINE GLUCONATE	17	0.400588	0.274907	0.987	26.657	0.332
	POVIDONE IODINE	17	0.323235	0.169795			
After 1 week GI	CHLORHEXIDINE GLUCONATE	17	0.243382	0.139457	0.456	32	0.652
	POVIDONE IODINE	17	0.223547	0.112917			
difference GI	CHLORHEXIDINE GLUCONATE	17	0.157206	0.181544	1.121	26.15	0.272
	POVIDONE IODINE	17	0.099688	0.108595			

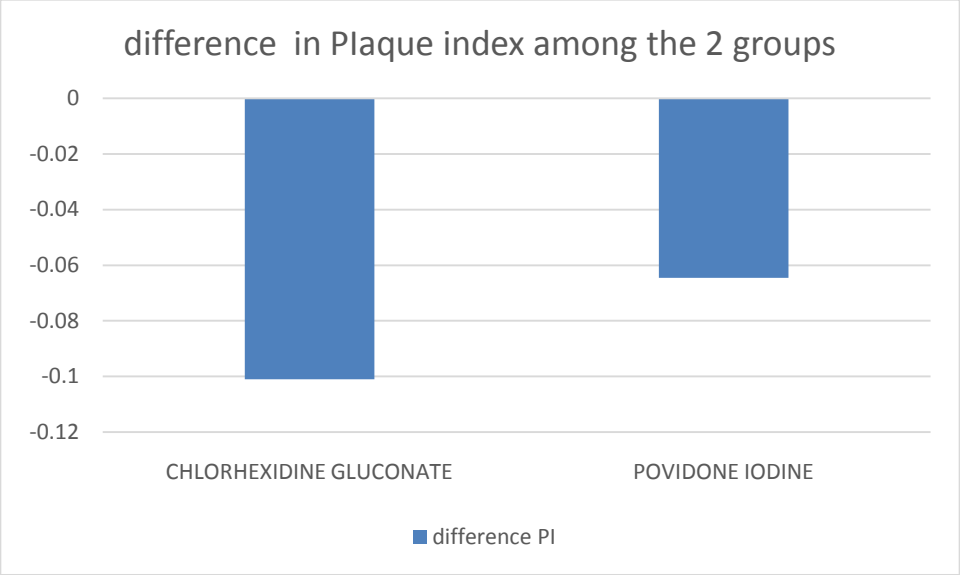
None of the variables are statistically significant but the mean values of Plaque index and Gingival index are higher in the chlorhexidine group than the povidone iodine group.

Plaque index was higher in the chlorhexidine group when compared to the povidone iodine group whereas the Gingival index was seen to have been decreased in the chlorhexidine group.

Graph:-







Discussion:-

Numerous studies exist comparing efficacy of Povidone Iodine over Chlorhexidine mouth rinse. In surgical site asepsis, Povidone Iodine was found to be more effective in controlling the infection. However, it lacks the persistent action of Chlorhexidine, and absorption of significant levels of Iodine through the oral mucosa may make this compound unsatisfactory for prolonged use in the oral cavity. It has a broader microbicidal property especially on spore forming bacteria, etc. in comparison with Chlorhexidine.

Our study is in accordance with a clinical and laboratory study carried out by M. Addy, R. Wright to compare the antimicrobial properties of Chlorhexidine Gluconate and Povidone Iodine mouthrinses. In a group of 10 subjects, after a single rinse an immediate fall of aerobes and anaerobes occurred, followed by return to normal 1 hour post rinse. With chlorhexidine gluconate ,a similar but greater decrease of microorganisms was found, and persisted upto 7 hours of post rinsing. Saliva samples collected from the subjects 2 minutes after rinsing with Povidone Iodine produced little or no inhibition to the growth of a test organism in vitro, whereas following Chlorhexidine, antibacterial properties was found in the saliva samples upto the 3-hour sampling time. The results suggest that Povidone Iodine, as a mouthwash exerts only an immediate antibacterial effect and unlike Chlorhexidine, is not retained at antibacterial levels in the oral cavity after expectoration.

A study conducted by Carlos Alfredo Franco Neto, Clarissa Cavalcanti Fatturi Parolo, Cassiano Kuchenbacker Rosing, Marisa Maltz was to evaluate the effect of two chlorhexidine rinsing solutions (0.12% and 0.2%) on plaque and gingival bleeding. Ten dental students participated in this double-blind, cross-over study, rinsing twice a day, for one minute, with each one of the tested solutions for fourteen days. A wash-out period of one week between treatments was observed. In order to assess gingival bleeding, the van der Weijden *et al* (1994) index was used. The plaque indexes used were those of Quigley, Hein (1962) and Silness, Löe (1964). In the pre-experimental period, subjects received oral hygiene instructions and dental prophylaxis. The results revealed no significant differences between both concentrations in relation to plaque and gingival bleeding. Mean values (± standard deviation) of the Quigley & Hein index were 0.25 ± 0.16 for the 0.12% solution and 0.23 ± 0.26 for the 0.2% solution ($p = 0.4838$). Mean values (± standard deviation) of the Silness-Löe index were 0.12 ± 0.10 for the 0.12% solution and 0.11 ± 0.11 for the 0.2% solution ($p = 0.7592$). The bleeding index mean values at the end of the study were not different for both concentrations with mean values (± standard deviation) of 14.93% ± 6.68% and 13.95 ± 9.24% for the 0.12% and 0.2% solutions, respectively. Although an increase in gingival bleeding was observed, both concentrations were able to control dental plaque.In a study conducted by J. Maruniak, W.B Clark, C.B Walker titled ‘effect of 3 mouthwashes in plaque and gingivitis development’, Chlorhexidine(Peridex) , thymol(Listerine) and Povidone Iodine-Hydrogen Peroxide(Perimed) was used in a randomized, double blind study for 14 days. At baseline, bleeding index and plaque index was similar in all groups. At the end of 2 weeks, the bleeding and plaque index scores were significantly lower for Peridex and Perimed than for Listerine antiseptic. It was concluded that

both Peridex and Perimed were effective in controlling plaque and gingivitis when used as a twice daily mouthrinse in subjects refraining from other oral hygiene procedures. Our study is not in accordance with this study as we found povidone iodine to be better in controlling gingivitis.

Conclusions:-

It was found that the mean values of PI and GI were higher in the CHX group than in the Povidone Iodine group, which concludes that the mean effect of Povidone Iodine on plaque and gingival bleeding was more effective than Chlorhexidine Gluconate. Plaque index values increased more after baseline readings in the CHX group, and Gingival index values decreased more in the CHX group.

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