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Comparative Evaluation of the Clinical Efficacy of Oxygen Enriched Mouthwash and Chlorhexidine Mouthwash in Patients Undergoing Dental Implant Placement

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ABSTRACT

Aim: The aim of the study is to evaluate the clinical efficacy of oxygen enriched mouthwash and chlorhexidine mouthwash in patients undergoing dental implant placement.

Materials and methods: A total of 20 systemically healthy patients undergoing dental implant placement were divided into two groups. Group A had 10 patients, who were given chlorhexidine mouthwash and remaining 10 patients were given Blue M mouthwash for postoperatively following dental implant placement surgery. Pre-Operative plaque sample and post-operative plaque sample 1 week later was collected. The collected plaque samples were cultured and colony forming units were counted.

Results: There were significant changes in pre and post colony counts in individual mouthwash but there are no significant changes in the post colony count between the two different mouthwashes ($p < 0.05$).

Conclusion: Within the limitations of our study, it can be concluded that Blue M mouthwash wash can be used as a safe alternative to chlorhexidine in reducing the microbial load during the post-operative healing period following dental implant placement.

Keywords: Blue M; Chlorhexidine; Mouthwash; Antimicrobial; Oxygen therapy

INTRODUCTION

With the growing popularity of replacement of edentulous sites with dental implants, the need for proper healing is necessary for the adequate success and survival of the dental implants. Importance of healing [1].After the stage 1 implant placement procedure is necessary as any micro gaps or leaching of the oral bacterial might lead to the colonization of the bacteria in the tissues[2].It which will in turn affect the Osseo integration of the implant and lead to early failure of the dental implants. Wound healing without any intervening plaque and in turn bacteria is essential for the initial success of the implant [3].

The bacteria of the oral cavity have the potential to alter the wound healing process by interacting with keratinocytes. The oral cavity's natural micro flora is complex. Gram positive bacteria colonize the oral cavity first, and then Gram-negative anaerobes take over, particularly in sub gingival plaque [4].In both health and disease, the microbial flora in the natural dentition sulcus/pocket and the implant crevice/pocket are very close. Coccal types predominate in health, and significant numbers of Gram-negative pathogens are linked to both tooth and implant in disease [5]. It has also been shown that bacteria in the partially edentulous patients can be more pathogenic than bacteria in the completely edentulous implant case.

During tissue healing, oxygen has been discovered to be an effective substrate [6]. Electron transport for the oxidative phosphorylation, and energy generation is all dependent on oxygen in tissues. Variations in tissue oxygen requirements are caused by a variety of physiological and pathological conditions [7].Cellular hypoxia, or a lack of oxygen in the cells, can cause significant changes. These changes can be immediate or delayed, and they can affect cell development, proliferation, and survival. They can also affect pH regulation, metabolism, and angiogenesis.

Multiple wound healing processes rely on oxygen, including bacterial oxidative killing, reepithelialization, angiogenesis, and collagen synthesis. The use of oxygen as a therapeutic modality to aid wound healing has been studied in both topical and hyperbaric forms to induce healing [8]. The following are some of the potential effects of oxygen on wound healing: Infection prevention, increased re-epithelialization, collagen synthesis *via* fibroblast growth induction, and angiogenesis. Oxygen may be administered in a variety of ways for medicinal purposes. Topical oxygen therapy, which is actually less toxic, is much more convenient because it can be performed at home, is less costly, and has less to no side effects. Given the above; oxygen can play a role in reducing the severity of chronic inflammatory conditions such as peri implantitis.

Various mouthwashes have been used in the field of dentistry, with chlorhexidine being the gold standard due to its substantivity property. There has been a search for various alternatives to chlorhexidine due to its inherent limitations such as staining and alterations in taste sensation. Thus the aim of this study was to evaluate the effect of using blue m gel in comparison with chlorhexidine mouthwash for patients undergoing dental implant placement.

MATERIALS AND METHODS

Study characteristics

The participants of the study were selected from the outpatient department of Implantology Saveetha Dental College and Hospitals, Chennai, India and the study was for duration of 3 months. A total of 20 patients undergoing implant placement were selected for the study during the period of July 2020 to October 2020.

Inclusion criteria were healthy individuals with one or two missing teeth irrespective of maxilla or mandible. Patients with systemic disorders, patients receiving antibiotics or anti-inflammatory medications, patients who smoke, and lactating mothers were all excluded. All patients received a complete scaling on their first visit, as well as oral hygiene instructions using templates and audiovisual aids.

Straumann Roxolid SLA implants were used for the study and all the patients received the same type of implants with same surface characteristics. After implant placement they were given routine antibiotic and analgesics. Amoxicillin 500 mg thrice daily for 5 days was used as the antibiotic and Aceclofenac 100 mg was used as an analgesic. Chlorhexidine mouthwash was used as gold standard mouthwash and was selected to be given in 10 patients. The patients were selected randomly. The remaining 10 patients received the oxygen enriched Blue M gel for the mouth wash. Samples for sub gingival plaque were collected using a normal curette from all the patients prior to the implant placement and also one week following implant placement. Microbial colony culture and count was done for all the samples and the results were tabulated (Figure 1).

RESULTS

The results were tabulated and statistical analysis was done using the SPSS software version 23. Mann Whitney U test was done to compare the pre and post values between the chlorhexidine and blue m gel mouthwash groups. When comparing the values between the pre and post chlorhexidine, the results were statistically significant (p value=0.001). When comparing the pre and post blue m mouthwash, the results were statistically significant (p value=0.001).When comparing the post chlorhexidine and blue m gel mouthwash, the result was not statistically significant, p value=0.317. It shows total colony count of chlorhexidine and blue M (before and after 3 mins) (Tables 1 and 2).

S.No	X	Mean and Std. deviation	N	Std. error mean
Pair 1	Prech x	319.80 ∓ 121.297	10	38.357
	Postchx	175.90 ∓ 66.102	10	20.903
Pair 2	Preblue	309.60 ∓ 113.327	10	35.837
	Postblue	167.00 ∓ 53.133	10	16.802

Table 1: Paired sample t test between the pre and post chlorhexidine shows p value >0.05, depicting that it is statistically significant.
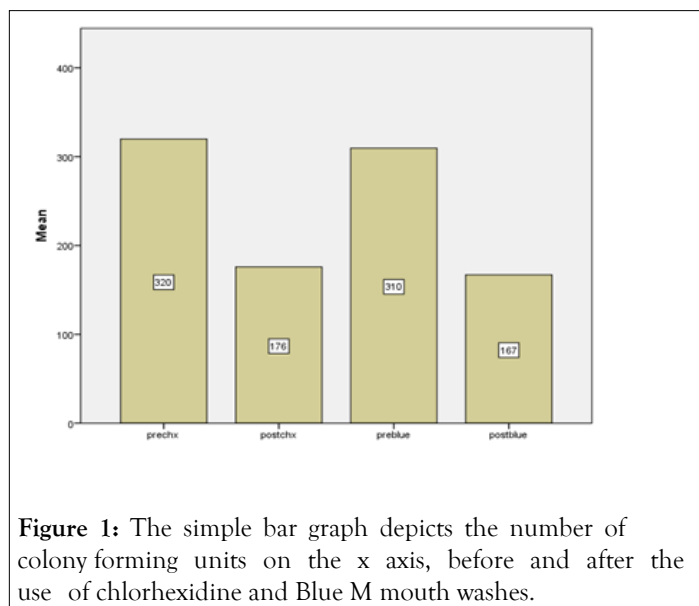

Figure 1: The simple bar graph depicts the number of colony forming units on the x axis, before and after the use of chlorhexidine and Blue M mouth washes.

Values	Prechx to Postchx	Pre blue m to post blue m
Mann-Whitney U	0.004	0.003
Wilcoxon W	1	1
Z	-1	-1
P value	0.001	0.002

Table 2: It shows the test statistics.

DISCUSSION

The main failure after the placement of implants is peri implantitis. In Spite of the successful Osseo integration of a fully functional and loaded implant, the formation of tissue inflammation caused by the increased microbial load due to the formation of dental plaque biofilm leads to a host inflammatory response. If the treatment of peri implantitis is left unattended, it can most likely lead to implant failure. If the microbial load is reduced, the state of peri implant mucosal health would significantly improve which would reduce the inflammation and lead to the increased success of the implant. This can be achieved by the introduction of local drug delivery systems that improve the periodontal health, condition and status. Recently the employment of antimicrobial agents in the form of gels and chips directly delivered to the site of infection has seen clinical success and has been accepted and employed by various clinicians.

The most popular anti-plaque agent till date is Chlorhexidine, which is considered as a 'gold standard' due to its effective antiplaque action. The efficacy of this agent is attributed to its bactericidal and bacteriostatic properties. However it has certain drawbacks, prolonged use of chlorhexidine in any form leads to brownish discolorations of the tooth as well as altered taste. As an alternative, Blue oral gel formula was developed to counter the disadvantages faced by chlorhexidine. Bluem® oral gel formula was created by Peter Blijdrop, a man on a mission, for specific mouth ailments, and contains the following ingredients: Alcohol, Water, Silica, Sodium Saccharin, Sodium Perborate, Glycerin, Lactoferrin, Citric Acid, PEG-32, Sodium Gluconate, Xanthan Gum and Cellulose Gum have different purposes. The application of the gel leads to a significant reduction in deep periodontal pockets due to the release of active oxygen. This leads to fast and progressive healing. Previous studies did have shown a reduction in the colony forming units of bacteria, which gives similar results as compared to chlorhexidine.

These results are similar to the current study where we have compared the microbial colonies before and after the usage of Chlorhexidine and BlueM mouthwashes after the placement of implants.

It was found that there was a significant reduction in the colony forming units after treatment, but there was no difference between the two groups. The only limitation of the study is its small sample size and the treatment was for a short duration of time. Further research should be carried out with a larger sample size.

CONCLUSION

Blue M can be used as a safe alternative to chlorhexidine in reducing the microbial load after the placement of implants. There was a promising result in reducing the bacterial load very similar to chlorhexidine. But when compared to each other there wasn't a significant change between them. Chlorhexidine has the edge in being very cheaper compared to Blue M. Further studies are required with conclusive evidence to be able to determine whether oxygen enriched mouthwashes can replace chlorhexidine in the future.

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