Annals of International Medical and Dental Research
E-ISSN: 2395-2822 | P-ISSN: 2395-2814
Vol-8, Issue-5 | September-October 2022
DOI: 10.53339/aimdr.2022.8.5.2
Page no- 11-16 | Section- Research Article (Periodontics)

Effectiveness of Different Concentrations of Chlorhexidine and Metronidazole Gels in the Management of Gingivitis: A Randomized Clinical Trial

Bushra Iftikhar[1]*, Suhail Majid Jan[2], Roobal Behal[3]

[1]Postgraduate Student, Department of Periodontics, Govt. Dental College and Hospital, Shireen Bagh, Srinagar, India. Email: bushra.iftikhar11@gmail.com. Orcid ID: 0000-0002-3518-2954.
[2]Professor and Head, Department of Periodontics, Govt. Dental College and Hospital, Shireen Bagh, Srinagar, India. Email: suhail38182@gmail.com. Orcid ID: 0000-0002-9025-894X.
[3]Associate Professor, Department of Periodontics, Govt. Dental College and Hospital, Shireen Bagh, Srinagar, India. Email: roobalbehal0@gmail.com Orcid ID: 0000-0002-5292-7460

*Corresponding author

Received: 24 May 2022
Revised: 14 July 2022
Accepted: 25 July 2022
Published: 22 August 2022

Abstract

Background: Management of gingivitis is commonly done by the removal of etiological agents by Periodontist. However, use of topical applications of antibiotic combinations has been shown to improve the treatment outcome. Various drugs alone or in combination have been used. So this study was conducted to determine the effect of different concentrations of combination drugs on gingivitis. **Material & Methods:** 100 patients of gingivitis were divided into two groups of 50 each – Group-A and Group-B. After scaling and root planing, Group-A patients were made to apply Metronidazole 1% and Chlorhexidine 0.25% for period of 12 weeks while as Group-B patients applied Metronidazole 1.5% and Chlorhexidine 0.50% for 12 weeks. Baseline scores of gingival index and bleeding index were recorded followed by readings at 4 and 12 weeks. **Results:** Results showed that there was a significant improvement in gingivitis and bleeding on probing at 4 and 12 weeks after local application of Metronidazole and Chlorhexidine gel in both the groups. However there were no statistically significant differences between two groups. **Conclusions:** Topical application of Metronidazole and Chlorhexidine gel as an adjunct to scaling and root planing is an effective treatment modality for the management of gingivitis and the concentrations of the combination do not have any significant effect on the treatment.

Keywords:- Gingivitis, Chlorhexidine, Metronidazole, Topical drug application.

INTRODUCTION

Gingivitis is characterized by inflammation of the gums or gingiva. It commonly occurs due to film of plaque, bacteria accumulating on the tooth surface.[1] When approximately 30% or less of the gingival tissue bleeds upon periodontal probing, gingivitis is then classified as localized, and if is more than 30% bleeds on probing then its generalized. In gingivitis, there is no evidence of periodontal tissue destruction and loss of tooth attachment observable from x-ray film.[2] Gingivitis is a non-destructive type of periodontal disease, but untreated gingivitis can progress to periodontitis. Scaling and root planning (SRP) is the most commonly performed procedure

Annals of International Medical and Dental Research
E-ISSN: 2395-2822 | P-ISSN: 2395-2814
Vol-8, Issue-5 | September-October 2022
DOI: 10.53339/aimdr.2022.8.5.2
Page no- 11-16 | Section- Research Article (Periodontics)

for the treatment of periodontitis. Apart from SRP use of different medicated agents can slow the progression of disease process.[3] But, the prolonged use of systemic antimicrobials can lead to increased antibiotic resistance, along with gastric problems resulting in nausea and diarrhoea. Therefore, now the focus is on the development of localized drug delivery systems that can allow maximum concentration on the target site, thus minimizing the potential systemic effects.[4,5]

Metronidazole (MTZ) is a well-known antibiotic which is effective against various types of species including gram-negative rods and spirochetes.[6] The use of Metronidazole antimicrobial therapy for treating gingivitis has persuaded interest in clinicians as the therapy is site specific, with reduced side effects and can be applied topically with better compliance and reduced systemic consequences.[7] Along with other numerous antimicrobial therapeutic agents, Chlorhexidine (CHX) still remains ideal chemical with reasonable antiplaque efficacy and is considered one of the most effective mouth rinses used for successfully treating plaque related gingivitis.[8] Both the agents have been widely used for treating gingivitis however perusal of literature showed lack of studies comparing effects of different concentration combinations on gingivitis. So this study was conducted to know the efficacy of Metronidazole 1% and Chlorhexidine 0.25% gel versus Metronidazole 1.5% and Chlorhexidine 0.5% gel in the treatment of gingivitis.

MATERIAL AND METHODS

Patients reporting to the Department of Periodontics and Oral Implantology, Government Dental College and Hospital, Srinagar were examined clinically and radiographically for various periodontal issues. Patients fulfilling the inclusion and exclusion criteria were included in the study. Study was approved by the institutional ethical clearance committee.

Inclusion Criteria

Patients in the age group of 12- 40 years with minimum of 20 teeth present in oral cavity presenting with bleeding on probing and probing depths of less than or equal to 3mm were included in the study.

Exclusion Criteria

Patients with the positive history of smoking or using smokeless tobacco products, history of drug intake, pregnant or lactating women, documented ANUG and gingival enlargement cases and patients with systemic diseases such as acquired immune deficiency syndrome/HIV, diabetes mellitus, renal disorders and cardiovascular disorders were excluded from the study.

Patients fulfilling inclusion and exclusion criteria were explained in detail about the clinical trial and written consent was taken. The study was conducted according to World Medical Association declaration of Helsinki. 100 patients were included in a 12-week parallel arm Randomized Clinical Trial. At the beginning of study all patients were assessed for gingival inflammation by using the Gingival Index -Loe and Silness,1967 (six sites per tooth) and Bleeding index- Muhlemann HR, Son S 1971 and after recording baseline scores every study participant underwent through full-mouth supra and sub gingival

Annals of International Medical and Dental Research
E-ISSN: 2395-2822 | P-ISSN: 2395-2814
Vol-8, Issue-5 | September-October 2022
DOI: 10.53339/aimdr.2022.8.5.2
Page no- 11-16 | Section- Research Article (Periodontics)

scaling with ultrasonic scaler irrigated with normal saline.[9,10] Pre or postoperative antibiotics were not prescribed in any group and subjects were randomly allocated into either of the two groups of 50 participants each.

Group A- Metronidazole 1% and Chlorhexidine 0.25% gel is applied on day 0 and for next 12 weeks. (Metrohex Gel, Dr Reddy's Laboratories Ltd, H.P. India)

Group B– Metronidazole 1.5% and Chlorhexidine 0.5% gel applied on day 0 and for next 12 weeks. (Metrogyl® DG Gel Forte. Lekar Pharma Ltd, Panoli, India)

All of our group participants were instructed to maintain proper oral hygiene (Bass brushing technique) and to apply a pea-sized amount of gel gently with index finger to the gums after brushing for about two minutes twice a day. After application of different gels to all groups, further recording and scoring was done by principal investigator and other trained examiners at four weeks and 12 weeks.

Data was expressed as Mean and standard deviations. Statistical analysis was performed with statistical software SPSS – Version 20.0 (SPSS, Chicago, IL, USA). Paired t-test was conducted to determine the differences within the group and between the groups. P value of <0.001 was considered statistically significant.

RESULTS

All the patients reported back at 4 weeks and 12 weeks indicating no drop out of the patients from any group. None of the patients recruited in the study reported adverse outcomes with either of the therapies used.

Gingival Index

A significant improvement in gingival scores was noted in both the groups from baseline. At four weeks MTZ 1% and CHX 0.25% (1.30 ± 0.315), MTZ 1.5% and CHX 0.5% (1.47 ± 0.386) compared to baseline MTZ 1% and CHX 0.25% (2.60 ± 0.300), MTZ 1.5% and CHX 0.5% (2.42 ± 0.320) demonstrated substantial improvement (p<0.001). However, gingival scores showed further decline at 12 weeks MTZ 1% and CHX 0.25% (0.98 ± 0.296), MTZ 1.5% and CHX 0.5% (1.07 ± 0.277) with significant difference to week 4 and baseline (p<0.001).

Interventional group	Baseline score	Score at 4 weeks	Score at 12 weeks
Group A: MTZ 1% and CHX 0.25%	2.60 ± 0.300*	1.30 ± 0.315*	0.98 ± 0.296
Group B: MTZ 1.5% and CHX 0.5%	2.42 ± 0.320*	1.47 ± 0.386*	1.07 ± 0.277

(p<0.001: comparison of baseline with week 4 and between week 4 and week 12 while intergroup comparison p>0.001).

Bleeding Index

A significant improvement in bleeding scores was noted in both the groups from baseline. At four weeks MTZ 1% and CHX 0.25% (1.39 ± 0.387), MTZ 1.5% and CHX 0.5% (1.22 ± 0.380) compared to baseline MTZ 1% and CHX 0.25% (3.13 ± 0.416), MTZ 1.5% and CHX 0.5% (2.67 ± 0.324) demonstrated substantial improvement (p<0.001). However, gingival bleeding scores showed further decrease at 12 weeks MTZ 1% and CHX 0.25% (1.22 ± 0.380), MTZ 1.5% and CHX 0.5% (1.39 ± 0.233) with significant difference to week 4 and baseline scores (p<0.001).

Annals of International Medical and Dental Research
E-ISSN: 2395-2822 | P-ISSN: 2395-2814
Vol-8, Issue-5 | September-October 2022
DOI: 10.53339/aimdr.2022.8.5.2
Page no- 11-16 | Section- Research Article (Periodontics)

Interventional group	Baseline score	Score at 4 weeks	Score at 12 weeks
Group A: MTZ 1% and CHX 0.25%	3.13 ± 0.416*	1.39 ± 0.387*	1.22 ± 0.380
Group B:MTZ 1.5% and CHX 0.5%	2.67 ± 0.324*	1.65 ± 0.207*	1.39 ± 0.233

(p<0.001: comparison of baseline with week 4 and between week 4 and week 12 while intergroup comparison p>0.001).

Intergroup comparison showed non-significant differences in gingival and bleeding index at 4weeks and 12 weeks of application of different concentrations of medications (p>0.001).

DISCUSSION

As gingivitis is a reversible disease, so its treatment is aimed primarily at reduction of etiologic factors which in turn reduces or eliminates inflammation, thereby allowing gingival tissues to heal.[11] Patients with chronic gingivitis, but without any significant calculus, alterations in gingival morphology, or systemic diseases that affect oral health, may respond to a therapeutic regimen consisting of improved personal plaque control alone.[12] But various clinical trials have indicated that only self-administered plaque control programs, without any periodic professional reinforcement, are inconsistent in providing long-term inhibition of gingivitis.[13,14,15]

SRP is non-surgical type of treatment and is considered to be the cornerstone in treating all gingival and periodontal conditions. It is recommended by all dentists round the world.[16] Systemic antibiotic therapy leads to many side effects, so today the researchers are focusing on topical agents. Several antimicrobials including Chlorhexidine and Metronidazole have been used as an adjuvant to mechanical plaque removal.[17] The effectiveness of localized use of Metronidazole as an adjunct to scaling and root planning has been well demonstrated in meta-analysis.[18] However, in a study by Leiknes et al, the use of Metronidazole gel alone did not improve the treatment outcome when used in combination with scaling and root planning.[19] Although in another study it was concluded that the use of Metronidazole gel significantly reduces the total bacterial count in the gingival crevicular fluid.[20]

Pannuti et al. in his study found CHX to be effective against gingivitis along with controlling inter dental bleeding.[21] Now both the combinations have also been studied; a study conducted by Pradeep et al. showed that both Metronidazole gel and Chlorhexidine gel are effective in the treatment of gingivitis.[22] Similar results were found in other studies comparing CHX gel, MTZ gel and a combination of MTZ+CHX gels.[23]

No previous study was done comparing the efficacy of different concentrations of MTX+CHX gels in treatment of gingivitis. In our study topical application of MTZ 1% and CHX 0.25% was compared with MTZ 1.5% and CHX 0.5%. Statistically significant results were obtained comparing baseline with 4-week score and 4-week score with 12-week score. Hence, extension of application of MTZ and CHX combination for 12 weeks improves the clinical outcome of treatment and should be considered while treating cases of gingivitis.

Annals of International Medical and Dental Research
E-ISSN: 2395-2822 | P-ISSN: 2395-2814
Vol-8, Issue-5 | September-October 2022
DOI: 10.53339/aimdr.2022.8.5.2
Page no- 11-16 | Section- Research Article (Periodontics)

Also inter group comparison by paired t-test showed statistically insignificant results ($p>0.001$).

CONCLUSIONS

From this study, it can be conclude that both the concentrations of MTZ+CHX ie MTZ 1% + CHX 0.25% and MTZ 1% + CHX 0.25% are equally efficacious as an adjunct to SRP in the treatment of gingivitis and none of them was better over the other. Any of the combination could be used as an adjunct to SRP in the treatment of gingivitis.

REFERENCES

1. Chiou LJ, Yang YH, Hung HC, Tsai CC, Shieh TY, Wu YM, et al. The association of psychosocial factors and smoking with periodontal health in a community population. J Periodontal Res. 2010;45:16-22.
2. Trombelli L, Farina R, Silva CO, Tatakis DN. Plaque-induced gingivitis: case definition and diagnostic considerations. J Periodontol. 2018;89:46–73.
3. Niazi F, Naseem M, Khurshid Z, Zafar MS, Almas K. Role of Salvadora persica chewing stick (miswak): A natural toothbrush for holistic oral health. Eur J Dent. 2016;10:301-8.
4. Loesche WJ. Antimicrobials in dentistry: with knowledge comes responsibility. J. Dent. Res. 1996;75:1432–33.
5. Rams TE, Slots J. Local delivery of antimicrobial agents in the periodontal pocket. Periodontol 2000. 1996;10:139–59.
6. Pourhajibagher M, Chiniforush N, Raoofian R, Ghorbanzadeh R, Shahabi S, Bahador A. Effects of sub-lethal doses of photo-activated disinfection against Porphyromonas gingivalis for pharmaceutical treatment of periodontal-endodontic lesions. Photodiagnosis Photodyn Ther. 2016;16:50-3.
7. Vohra F, Akram Z, Safii SH, Vaithilingam RD, Ghanem A, Sergis K, Javed F. Role of antimicrobial photodynamic therapy in the treatment of aggressive periodontitis: A systematic review. Photodiagnosis Photodyn Ther. 2016;13:139-47.
8. Jones CG. Chlorhexidine: is it still the gold standard? Periodontol 2000. 1997;15:55-62. doi: 10.1111/j.1600-0757.1997.tb00105.x.
9. H Loe. The gingival index, the plaque index and the retention index systems. J Periodontol. 1967;38:610-6
10. Muhlemann H R and Son S. Gingival sulcus bleeding – A leading symptom in initial gingivitis. Helv Odontol Acta. 1971;15:107-13
11. Research, Science and Therapy Committee Guidelines of the American Academy of Periodontology. Treatment of plaque induced gingivitis, chronic periodontitis, and other clinical conditions. J Periodontol. 2001;72:1790-800.
12. Löe H, Theilade E, Jensen SB. Experimental gingivitis in man. J Periodontol. 1965;36:177-87.
13. Suomi JD, Greene JC, Vermillion JR, Doyle J, Chang JJ, Leatherwood EC. The effect of controlled oral hygiene procedures on the progression of periodontal disease in adults: Results after third and final year. J Periodontol. 1971;42:152-60.
14. Listgarten MA, Schifter CC, Laster L. 3-year longitudinal study of the periodontal status of an adult population with gingivitis. J Clin Periodontol. 1985;12:225-38.
15. Agerbaek N, Melsen B, Lind OP, Glavind L, Kristiansen B. Effect of regular small group instruction per se on oral health status of Danish schoolchildren. Community Dent Oral Epidemiol. 1979;7(1):17-20. doi: 10.1111/j.1600-0528.1979.tb01179.x.
16. Drisko CH. Nonsurgical periodontal therapy. Periodontol 2000. 2001;25:77-88. doi: 10.1034/j.1600-0757.2001.22250106.x.
17. Badar SB, Zafar K, Ghafoor R, Khan FR. Comparative evaluation of Chlorhexidine, Metronidazole and combination gels on gingivitis: A randomized clinical trial. Int J Surg Protoc. 2019;14:30-3.
18. Pavia M, Nobile CG, Bianco A, Angelillo IF. Meta-analysis of local metronidazole in the treatment of chronic periodontitis. J Periodontol. 2004;75(6):830-8. doi: 10.1902/jop.2004.75.6.830.

Annals of International Medical and Dental Research
E-ISSN: 2395-2822 | P-ISSN: 2395-2814
Vol-8, Issue-5 | September-October 2022
DOI: 10.53339/aimdr.2022.8.5.2
Page no- 11-16 | Section- Research Article (Periodontics)

19. Leiknes T, Leknes KN, Böe OE, Skavland RJ, Lie T. Topical use of a metronidazole gel in the treatment of sites with symptoms of recurring chronic inflammation. J Periodontol. 2007;78:1538-44.
20. Miani PK, do Nascimento C, Sato S, Filho AV, da Fonseca MJ, Pedrazzi V. In vivo evaluation of a metronidazole-containing gel for the adjuvant treatment of chronic periodontitis: preliminary results. Eur J Clin Microbiol Infect Dis. 2012;31(7):1611-8. doi: 10.1007/s10096-011-1484-7.
21. Pannuti CM, Saraiva MC, Ferraro A, Falsi D, Cai S, Lotufo RFM. Efficacy of a 0.5% chlorhexidine gel on the control of gingivitis in Brazilian mentally handicapped patients. J Clin Periodontol. 2003;30:573–76.
22. Badar SB, Zafar K, Ghafoor R, Khan FR. Comparative evaluation of Chlorhexidine, Metronidazole and combination gels on gingivitis: A randomized clinical trial. Int J Surg Protoc. 2019;14:30-33. doi: 10.1016/j.isjp.2019.04.001.
23. Panhwar M, Rajpar SP, Abrar E, Alqutub M, Abduljabbar T. Effectiveness of Chlorhexidine and Metronidazole Gels in the management of gingivitis. A clinical trial. Pak J Med Sci. 2021;37:1425-29.

Source of Support: Nil, Conflict of Interest: None declared