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ORIGINAL ARTICLE

Novel adjunct treatment options of Periodontitis: Comparative effects of 0.4% Doxycycline and 1% Metronidazole.

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ABSTRACT… Objectives: To compare the efficacy of 1% Metronidazole gel to that of 0.4% Doxycycline gel in the adjunctive action of constant periodontitis. **Study Design:** Interventional study. **Setting:** Department of Periodontology at Isra Dental College Hyderabad. **Period:** January to June 2021. **Material & Methods:** Sixty individuals with persistent Periodontitis were selected using a non-probability convenience sample. Three sets of subjects were created. Group A received SRP in addition to 0.4% doxycycline gel, Group B received SRP in addition to 1% metronidazole gel, and Group C received SRP alone. A clinical parameter measuring CPITN probe is manually operated. Multiple surfaces were evaluated and ranked. Scaling and root planing were performed after thorough periodontal examinations. All patients got basic periodontal treatment, including oral hygiene training. Subgingival medication delivery was done by a disposible syringe and tiny needle. Each patient's baseline, 10-day, and 1-month clinical parameters were collected. SPSS 22.0 was used to examine proforma data. **Results:** Group A baseline pocket depth was 4.39 ±0.20 millimeters and decreased to 3.78 ±0.53 and 3.30±0.17 after one month. Group B baseline pocket depth was 4.45 ±0.19 millimeters and decreased to 3.89 ±0.51 and 3.340. At both the 10-day and 30-day marks, the growth was 17 mm. Starting at 4.45 ±0.18 mm, the pocket depth in Group C patients reduced to 4.10 ±0.20 mm by day 10 and to 4.06±0.27 mm at month's end. On the tenth day, the pockets were deep. Differed between A, B, and C. A and B had shallower pockets than C. **Conclusion:** Doxycycline and Metronidazole are more effective than scrubbing and root planing for chronic periodontitis. Both Doxycycline and metronidazole gels are equally effective for periodontitis patients.

Key words: Doxycycline, Metronidazole, Periodontitis.

INTRODUCTION

Pocket formation and recession are hallmarks of periodontitis, an inflammatory disease of the supporting tissues of teeth that is caused by bacteria. In dental plaque, gram-negative bacteria are prevalent and cause inflammation, which leads to tissue damage.[1] Microorganisms in plaque establish colonies readily because the biofilm they live in is so thin. Biofilm aids microbial growth by providing a conducive environment and food. The pathogenesis of periodontitis involves a joint effort between plaque biofilm and the host's inflammatory response.[2] According to previous studies Periodontitis affects around 15% of adult populations (age 21- 50 years). And it is also observed 30% higher prevalence rate at the age of more than 50. The goal of periodontal therapy is to reduce the number of disease-causing microorganisms in the mouth using a variety of approaches. Since the pathogenic bacteria are embedded deep within the soft tissues, mechanical therapy alone is ineffective in eradicating them. because of this, periodontal instruments cannot reach them. It is impossible to use mechanical instruments to reach bacteria in the root depression and furcation area.[3] In more severe cases of periodontal disease, antibiotics are used as an adjunctive therapy in addition to scaling as well as root planning (SRP) to help completely eradicate the bacteria.

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For optimal therapeutic results, antibiotics may be administered either topically or systemically. Systemic use drug may be effective than local use of drug for periodontitis, depending on the extent of the infection. However, when compared to systemic use, local administration of anti-microbials offers good efficacy without side effects.[4]

Systematic use of antibiotic therapy as a supplement to root planning and scaling may fight against problem, but antibiotic resistance is more likely to occur with systemic usage. Sysmatic usage of antibiotics have adverse effects on patient like Pseudo membranous colitis, hypersensitivity reaction, Diarrhea, gastritis and nausea. local antibiotic administration have higher concentrations just at site of infection without adverse effects.[5] Tetracyclines (Doxycycline, minocycline), Metronidazole, and Chlorhexidine are only few of the many medicinal agents utilised for local medication administration. Gels, film, polymer chips, pastes, and fibres are some of the forms these medicines taken. When compared to other antibiotics, doxycycline gel delivers higher medication concentrations in the tooth pockets while still being very safe to use.[6] Even after 7-10 days, the doxycycline concentration in the pockets has not decreased. Doxycycline has antibacterial and anti-inflammatory properties. Plaque formation above the gum line is stopped by doxycycline, and periodontal pockets are made shallower as a result. Doxycycline is very effective at penetrating root surfaces and has a long duration of action.[7]

The drug molecule metronidazole belongs to the nitroimidazole family. When taken in conjunction with scaling and root planning (SRP), metronidazole is an effective treatment for eliminating periodontal disease. The antibiotic metronidazole may be used on a wide variety of infections. It inhibits the growth of periodontal disease-causing bacteria.[8] Anaerobic microbes including “Porphyromonas gingivalis” and “Prevotella intermedia” are eliminated by the use of metronidazole.[9] Due to prevalence of periodontitis in our society and high ratio of patient in isra dental college hospital hyderabad, now its need of our society to overcome this problem. The development of periodontal therapies aimed to prevent periodontal diseases was aided gingivitis, microbial organization of plaque, and the effects of therapy and oral hygien, and evualde the efficacy of Metronidazole and Doxycycline in the adjunctive action of constant periodontitis.

MATERIAL & METHODS

This clinical trial was carried out by researchers in the Periodontology Department with ethical approval (IU/RR-10/AQK/2021/1884) at Isra Dental College, Isra University Hyderabad from January 2021 to June 2021. Using an unscientific, convenient selection method, 60 patients with chronic Periodontitis diagnosis using inclusion/ exclusion criteria. Patients were randomly assigned into three groups: GROUP A received SRP plus subgingival administration of 0.4% doxycycline gel, GROUP B received SRP plus subgingival application of 1% metronidazole gel, and GROUP C received SRP alone.., and GROUP C received SRP alone.[10-11] Each person had a clinical periodontal examination and a case history was taken. The benefits, risks, and/or potential for loss were explained to the participants. Prior to the operation, the patient gave his or her informed permission.

A manual CPITN probe was used to measure clinical parameters. Multiple surfaces were evaluated and ranked: mesiobuccal, mesiolingual, midlingual, distobuccal, and distolingual. Scaling and root planning, which included cleaning the gums and the areas just below the gum line, were performed after thorough periodontal examinations. Initial periodontal treatment was provided to all patients, which included education and encouragement on proper, oral hygiene practises. The medication was injected subgingivally using a disposable plastic syringe and a thin, curved plastic needle.[12-13] Group A received SRP in addition to 0.4% doxycycline gel, Group B received SRP in addition to 1% metronidazole gel, and Group C received SRP alone. At the beginning of the study, after 10 days, and after 1 month, the patients’ clinical parameters were recorded. Collected data was examine by using SPSS 22.0. The level of significance used

was 0.05 or less for the p-value.

RESULTS

Group A had a baseline pocket depth of 4.39±0.20 millimetres, which decreased to 3.78±0.53 millimetres by day 10 and to 3.30±0.17 millimetres after one month. The average pocket depth in Group B was 4.45±0.19 millimetres at the start, however this number dropped to 3.89±0.51 millimetres after 10 days and 3.34 0.17 millimetres after a month. Pocket depth in group C was 4.45±0.18 millimetres at baseline, 4.10±0.20 millimetres at day 10, and 4.06±0.27 millimetres after one month. Comparing pocket depth in groups A, B, and C on Day 10 revealed statistically significant differences (18). Groups A and B (Doxycycline and Metronidazole, respectively) had shallower pockets than Group C. (SRP alone). Comparing Group C to their initial state, there was no substantial progress. In comparison to baseline, day 10, and group C, Within a month, both Group A (Doxycycline) and Group B (Metronidazole) saw a dramatic decrease in pocket depth (SRP alone). Metronidazole and doxycycline both helped the Pocket heal and shrink to the same extent.

Groups	Mean	F-Value	P-Value
Group A. SRP + 0.4% Doxycycline gel	35.6±8.9	1.38	0.56
Group B. SRP + 1.0% Metronidazole Gel	38.10±9.6		
Group C. SRP alone	37.30±8.3		

Table-I. Age distribution of study population (n=60)

Groups	Male (%)	Female	Per-centage %
Group A. SRP + 0.4% Doxycycline gel	14 (70%)	06	30%
Group B. SRP + 1.0% Metronidazole gel	15 (75%)	05	25%
Group C. SRP alone	13 (65%)	07	35%

Table-II. Gender distribution of study population (n=60)

Groups	Mean	F-value	P-Value
Group A. SRP + 0.4% Doxycycline gel	4.39±0.20	1.63	0.68
Group B. SRP + 1.0% Metronidazole gel	4.45±0.19		
Group C. SRP alone	4.45±0.18		

Table-III. Pocket depth at baseline (n=60)

DISCUSSION

There are currently a variety of oral preparations of minocycline, doxycycline, chlorhexidine, and metronidazole on the market. Doxycycline hyclate and metronidazole have been proven to be therapeutically effective antibiotics for treating chronic periodontitis in in vitro investigations. Due to its lipid solubility and lack of side effects, doxycycline is chosen above other tetracyclines (including minocycline). 14 Numerous research had examined the effectiveness of locally applied antibiotics as a supplement to SRP in the management of chronic periodontitis.[15-16] According to a different study[17], minocycline is superior to SRP in treating chronic periodontitis.

In addition to scaling and root planning (SRP), Farahmand et al. in 2016 in Iran studied the clinical effects of localised doxycycline 3% + ketoprofen 2.5% (Dox+Keto) gel in the management of periodontitis. According to Farahmand et al., the additional benefit of using doxycycline and ketoprofen as a topical application as an addition to scale and root planning in patients is convincing and demonstrated in clinical outcomes with statistically significant differences. The current study and the study by Farahmand et al. are consistent in showing that topical application of doxycycline as an adjunct to Scaling and Root Planning showed additional benefit in the treatment of chronic periodontitis.[18] However, in their study, doxycycline was used at a higher concentration than in our study, which showed the same therapeutic benefit at a lower concentration. In 2012, Pardeep et al. presented their research on the effectiveness of four topical gels in the treatment of chronic periodontitis in India. He sorted the groupings into four at random. Gels in groups of one for the placebo gel, two for chlorhexidiene, three for metronidazole, and

four for both.[19] The current study and the study by Pardeep et al. support the idea that topical Metronidazole gel administration may be useful in the treatment of periodontitis.

Tonetti et al. (2012) assessed the effectiveness of slow-release doxycycline gel given alongside non-surgical treatment in patients with periodontitis. According to Tonetti et al., slow release doxycycline gel may be useful for reducing periodontal pockets and inflammation. Despite not using metronidazole, Tonetti et al's result is consistent with the current study in terms of doxycycline.[20] The studies described above and the current study's evidence-based findings show to a beneficial and superior benefit of topical antibiotic usage in chronic periodontitis compared to SRP alone.

CONCLUSION

Doxycycline and Metronidazole were found to be more effective than scaling and root planning alone in reducing pocket depth in chronic periodontitis. Since there is no difference in efficacy between doxycycline and metronidazole gels when applied to periodontitis patients.

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AUTHORSHIP AND CONTRIBUTION DECLARATION

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1	Sobia Masood	Study design, Patient Selection, Literature search.	
2	Arsalan Ahmed	Study design, Experimental work, Questionnaire design.	
3	Farhan Javed	Data collection, Data analysis, Data interpretation.	
4	Ameet Kumar Maheshwari	Surgestions, Patient selection, Experiments and patient follow-up.	
5	Pardeep Kumar	Data acquisition, Drafting, Discussion chapter.	
6	Vineeta Kumari	Review and Proof reading.