

Efficacy of Non-Surgical Periodontal Therapy with Azithromycin in Chronic Periodontitis: A Quasi-Experimental Study

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ABSTRACT

Objective: To evaluate the effectiveness of non-surgical periodontal therapy alone versus in combination with Azithromycin in improving mean probing pocket depth (PPD) and mean clinical attachment level (CAL) in patients with moderate to severe chronic periodontitis.

Study Design: Quasi-experimental study.

Place and Duration of Study: Department of Periodontology, Khyber College of Dentistry, Peshawar, Pakistan, from Oct 20 to Apr 21.

Methodology: A total of 70 patients with chronic periodontitis were randomly assigned into two groups: Group-A received scaling and root planing alone, while Group-B received scaling and root planing with adjunctive Azithromycin. Periodontal parameters including PPD and CAL were assessed using a William's probe at baseline and three months post-treatment.

Results: Group-B showed significantly better clinical outcomes than Group-A. The mean PPD in Group-B was 2.44 ± 0.24 mm compared to 3.43 ± 0.15 mm in Group-A ($p=0.020$). Similarly, the mean CAL in Group-B was 0.34 ± 0.09 mm versus 0.40 ± 0.10 mm in Group-A (p -value 0.020), indicating a statistically significant improvement in both parameters.

Conclusion: Adjunctive use of Azithromycin with non-surgical periodontal therapy resulted in significant improvements in probing pocket depth and clinical attachment level. These findings support the selective use of systemic antibiotics in the management of chronic periodontitis to enhance clinical outcomes.

Keywords: Azithromycin, Chronic periodontitis, Clinical attachment level, Non-surgical periodontal therapy, Probing pocket depth.

How to Cite This Article: Khan W, Bakht K. Efficacy of Non-Surgical Periodontal Therapy with Azithromycin in Chronic Periodontitis: A Quasi-Experimental Study. *Pak Armed Forces Med J* 2025; 75(Suppl-7): S1078-S1082. DOI: <https://doi.org/10.51253/pafmj.v75iSUPPL-7.12551>

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INTRODUCTION

Plaque biofilm accumulation is the primary cause of periodontitis, an inflammatory disease that weakens the supporting structures of teeth. According to the World Health Organization, chronic periodontitis affects over 30% of Pakistani population, making it a significant public health concern.^{1,2} About 500 distinct species of bacteria live in the periodontal pocket, where they form complex microbial communities that communicate with each other through quorum sensing; this makes antimicrobials less effective when taken alone.³ As a result, disturbing their ecological niches requires mechanically disturbing these biofilms. Scaling and root planing (SRP) and other non-surgical periodontal therapies aim to degrade these biofilms, stop the advancement of disease, and provide an environment that encourages periodontal regeneration.⁴ Even while SRP works, it cannot manage intricate anatomical

locations like furcation involvements or deep pockets where calculus could still be present.⁵ According to recent studies, the period of attachment can occur even after extensive SRP and regular treatment. Since mechanical treatment is ineffective against germs in deeper gingival and connective tissues, supplementary antimicrobial therapy is essential.⁶

Patients suffering from deep periodontal pockets, invasive subgingival infections, or progressive attachment loss may benefit most from a combination of systemic antimicrobials (e.g., Amoxicillin, Metronidazole, or Azithromycin) and SRP.^{7,8} Recent studies have explored the adjunctive use of systemic antibiotics, particularly Azithromycin, to enhance the effectiveness of non-surgical periodontal therapy. In one randomized controlled trial, patients who received scaling and root planing (SRP) along with systemic Azithromycin achieved a mean PPD of 2.82 ± 0.30 mm at three months, compared to 2.48 ± 0.28 mm in those treated with SRP alone. This yielded a mean difference of 0.34 mm with a pooled standard deviation of 0.29 mm.⁹

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Received: 31 Jul 2024; revision received: 25 May 2025; accepted: 29 May 2025

A compelling argument for adding systemic antimicrobials like Azithromycin into periodontal treatment procedures is provided by the limits of mechanical therapy alone. By addressing the microbiological hurdles presented by biofilm resilience, this technique improves clinical results and provides a more comprehensive approach to managing chronic periodontitis. Chronic periodontitis is a prevalent inflammatory disease leading to progressive destruction of the supporting structures of the teeth. Non-surgical periodontal therapy (NSPT) remains the cornerstone of its management; however, adjunctive use of systemic antibiotics such as azithromycin has been proposed to enhance clinical outcomes.

Keeping in view the above argument presented in the literature the study aims to evaluate the effectiveness of NSPT alone versus in combination with azithromycin in improving mean probing pocket depth (PPD) and clinical attachment level (CAL) is essential to determine whether adjunctive antimicrobial therapy provides additional therapeutic benefit in patients with moderate to severe chronic periodontitis.

METHODOLOGY

This quasi-experimental research was conducted from Oct 20 to Apr 21 at the Department of Periodontology, Khyber College of Dentistry, Peshawar, Pakistan. After obtaining permission from the institute (Ethical Approval Ref no. 1549/ERB/KCD dated 06 Oct 2020) patient selection criteria was developed.

Non-probability, sequential sampling was conducted to select the participants. Probing pocket depth (PPD) was the principal outcome measured. The sample size was calculated using OpenEpi, based on the three-month probing pocket depth (PPD) values reported in a previous randomized controlled trial. In that study, patients who underwent scaling and root planing with adjunctive Azithromycin achieved a mean PPD of 2.82 ± 0.30 mm, compared to 2.48 ± 0.28 mm in the group receiving SRP alone. The observed mean difference of 0.34 mm, with a pooled standard deviation of 0.29 mm, indicated that a minimum of 12 participants per group would be sufficient to detect a statistically significant difference with 80% power and a 95% confidence level. Therefore, the sample size of 70 participants (35 in each group) employed in the present study to validate the observed outcomes.

Inclusion Criteria: All male and female volunteers were included in the study who had to have a full set of teeth and ranged in age from 18 to 60 years, with least one of the following: a probing pocket depth (PPD) of 5 mm, a clinical attachment level (CAL) of 5 mm, and, in more than 30% of cases, bleeding on probing.

Exclusion Criteria: Patients who had used antibiotics in the previous six months, had scaling done during the prior six months, or had a history of systemic or immunologic disorders were not allowed to participate. People who were allergic to Azithromycin, pregnant or nursing, or smokers were also not the part of the trial.

Prior to the commencement of the study, all participants were required to submit written informed consent.

One group got just scaling and root planing, whereas the other additionally received Azithromycin as shown in figure. Participants were randomly assigned to either group. After collecting thorough medical and dental histories, a thorough oral and intraoral examination was conducted. At both the baseline and three-month post-treatment visits, a William's probe was used to record the mean CAL and PPD at six sites per tooth. Azithromycin was given following the second of two 24-hour sessions of treatment using ultrasonic scalers. The researcher supervised data collection, and each visit focused on oral hygiene advice.

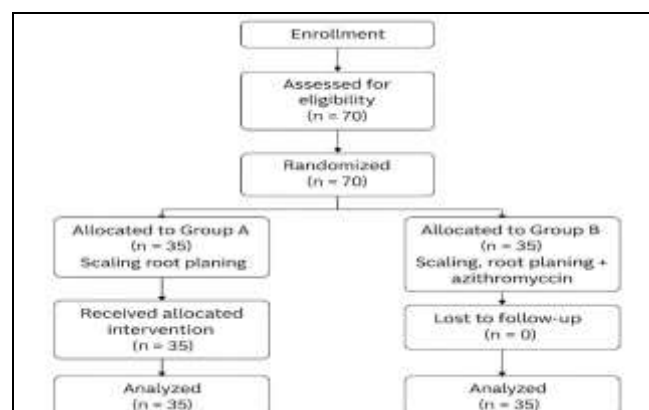


Figure: Patient Flow Diagram for comparative analysis of Scaling and Root Planing with and without Azithromycin Therapy

Data analysis was conducted using Statistical Package for Social Sciences (SPSS) version 22. When analyzing quantitative data, we used Mean \pm SD. When

analyzing qualitative data, we used percentages and frequency. A p -value less than 0.05 was deemed statistically significant when an independent t-test was employed to compare the two groups.

RESULTS

A total of 70 patients diagnosed with chronic periodontitis were enrolled and equally divided into two groups ($n=35$ each). In Group-A, 18 (51.4%) were male and 17 (48.6%) were female, whereas Group-B included 21 (60.0%) males and 14 (40.0%) females. The difference in gender distribution between the groups was not statistically significant ($p=0.470$). Regarding educational status, Group-A had 14 (40.0%) illiterate participants, 14 (40.0%) with primary and above education, and 7 (20.0%) with secondary and above education. In Group-B, 17 (48.6%) were illiterate, 5 (14.3%) had primary and above education, and 13 (37.1%) had secondary and above education. A statistically significant difference was observed between the groups in terms of education ($p=0.042$) (Table-I).

With respect to clinical outcomes, the mean probing pocket depth (PPD) in Group-A was 3.43 ± 0.15 mm, while in Group-B it was significantly lower at 2.44 ± 0.24 mm ($p=0.020$). Similarly, the mean clinical attachment level (CAL) was 0.40 ± 0.10 mm in Group-A and 0.34 ± 0.09 mm in Group-B, with the difference also being statistically significant ($p=0.020$) (Table-II). No adverse events or dropouts were reported during the study period.

Table-I: Demographic Characteristics of Participants Between Groups ($n=70$)

| Groups (n = %) | | | |
|-----------------------|----------------|----------------|---------|
| Categorical Variables | Study Groups | | p-value |
| | Group-A (n=35) | Group-B (n=35) | |
| Gender (n=%) | | | |
| Male | 18(51.4%) | 21(60.0%) | 0.470 |
| Female | 17(48.6%) | 14(40.0%) | |
| Education (n=%) | | | |
| Illiterate | 14(40.0%) | 17(48.6%) | 0.042 |
| Primary & above | 14(40.0%) | 05(14.3%) | |
| Secondary & above | 07(20.0%) | 13(37.1%) | |

Table-II: Comparison of Clinical Outcomes Between Groups ($n=70$)

| Outcome Variables | Study Groups | | p -value |
|-------------------------------------|--------------------|--------------------|------------|
| | Group-A ($n=35$) | Group-B ($n=35$) | |
| | Mean \pm SD | Median \pm SD | |
| Mean Probing Pocket Depth (mm) | 3.43 ± 0.15 | 2.44 ± 0.24 | 0.020 |
| Mean Clinical Attachment Level (mm) | 0.40 ± 0.10 | 0.34 ± 0.09 | 0.020 |

*mm=millimeters

DISCUSSION

This study analysis resulted that adding Azithromycin to non-surgical periodontal therapy did not significantly improve clinical outcomes, such as probing pocket depth (PPD) and clinical attachment level (CAL). This finding is consistent with newer studies that have shown systemic antibiotics to be ineffective when applied alongside SRP.

A study conducted by Graziani *et al.*, in 2017 indicated that antibiotics may help in the short term, but they have negligible effect on clinical indicators like PPD and CAL eventually, particularly for individuals suffering from chronic periodontitis.¹⁰ The benefits of complementing SRP with systemic antibiotics are usually limited and may not justify the hazards, such as the emergence of antibiotic resistance, as pointed out by Feres *et al.*, in 2020.¹¹

On the other hand, supplementary antibiotic therapy has shown better benefits in certain studies like Bongo *et al.*, in 2018 found that adding Azithromycin to SRP significantly improved PPD and CAL in patients with severe periodontitis.¹² Nevertheless, the present study's results are more aligned with outcomes measured by Teles *et al.*, in 2021, who stressed the need of mechanical debridement in effective periodontal treatment and found that systemic antibiotics offered minimal additional benefits.¹³ Explanations for the contradictory results seen in different research include variations in study methodology, patient characteristics, and the extent to which periodontal disease was present. The relevance of personalized treatment techniques is underscored by the common theme among various research, including this one, which is the emphasis on selective and prudent antibiotic usage in periodontal therapy. This study adds to the growing amount of evidence that questions the regular use of systemic antibiotics for periodontal treatment; it found no substantial therapeutic advantage to include Azithromycin in non-surgical periodontal therapy. The inconsistency in the findings of several studies on the supplementary use of antibiotics like Azithromycin shows how complicated periodontal disease management is, as is the role of antibiotics.

Results from a meta-analysis by Teughels *et al.*, in 2020, on systemic antibiotic use in periodontal therapy showed that while some patients did see improvements in clinical attachment level (CAL) and reductions in probing pocket depth (PPD), these

improvements were small and not statistically significant.¹⁴ The research highlighted that advanced periodontitis or patients with particular microbiological profiles that are especially resistant to mechanical debridement alone exhibited the most consistent improvements.

On the other side, research conducted by Keestra *et al.*, in 2015 highlighted the significance of responsible antibiotic usage, highlighting that the emergence of bacteria resistant to antibiotics could result from over-prescribing these drugs, particularly in cases where their benefits are not sufficiently proven.¹⁵ This lines up with what was found in the present trial, that scaling and root planing alone were more effective rather than adding Azithromycin.

Previously, supplementary antibiotic medication did improve CAL and PPD at first, many patients reverted to their baseline levels after a year, according to a study by Zandbergen *et al.*, in 2019 that looked at the long-term consequences of the treatment.¹⁶ These results emphasize the need to re-evaluate the clinical justification for adjunctive antibiotic use in periodontal therapy, particularly in determining whether the short-term improvements in clinical parameters outweigh the potential risks associated with antimicrobial resistance and adverse effects. The necessity for customized periodontal treatment techniques was highlighted by a recent study of Hammami *et al.*, in 2021, which questions the efficacy of supplementary antibiotics in chronic periodontitis management and highlights the fact that different patient groups experience varying clinical results.¹⁷ It is worth noting that a study conducted by Delatola *et al.*, 2020 suggested that systemic antibiotics may have a greater impact when used in conjunction with advanced periodontal therapies rather than alone with SRP. Our finding could explain why our study did not find any significant differences.¹⁸

LIMITATIONS OF STUDY

The findings of this study should be interpreted with caution due to certain limitations. Firstly, the relatively small sample size may have limited the statistical power to detect subtle differences between the treatment groups. Secondly, the short follow-up duration of three months may not have been sufficient to assess the long-term efficacy and stability of the treatment outcomes. Lastly, as the study was conducted at a single center, the results may not be generalizable to broader populations or different clinical settings.

CONCLUSION

The outcomes of this experiment showed that adding Azithromycin to non-surgical periodontal therapy did not significantly enhance periodontal pocket depth (PPD) or clinical attachment loss (CAL). These findings highlight the significance of being cautious when taking antibiotics for periodontal care, considering the risk for antibiotic resistance. Finding out which patient populations might gain from antibiotic adjunct therapy and looking into other ways to make periodontal treatment more effective are two goals of future study.

ACKNOWLEDGEMENT

None.

Conflict of Interest: None.

Funding Source: None.

Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

WK & KB: Data acquisition, data analysis, critical review, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

REFERENCES

1. Nazir MA. Prevalence of periodontal disease, its association with systemic diseases and prevention. *Int J Health Sci* 2017; 11(2): 72-80.
2. Shafique M, Masood A, Mubeen H, Waseem A, Manan A, Naveed Q. The Prevalence of Periodontal Disease in Different Age Groups and Different Populations of Pakistan. *Pak J Sci Ind Res* 2024; 67A(2): 113-119.
3. Lamont RJ, Koo H, Hajishengallis G. The oral microbiota: dynamic communities and host interactions. *Nat Rev Microbiol* 2018; 16(12): 745-759.
<https://doi.org/10.1038/s41579-018-0089-x>
4. Chapple ILC, Van der Weijden F, Doerfer C, Herrera D, Shapira L, Polak D, et al. Primary prevention of periodontitis: managing gingivitis. *J Clin Periodontol* 2015; 42(Suppl 16): S71-S76.
<https://doi.org/10.1111/jcpe.12366>
5. Prakasam A, Elavarasu SS, Natarajan RK. Antibiotics in the management of aggressive periodontitis. *J Pharm Bio allied Sci* 2012; 4(Suppl 2): S252-S255.
<https://doi.org/10.4103/0975-7406.100226>
6. Kapoor A, Malhotra R, Grover V, Grover D. Systemic antibiotic therapy in periodontics. *Dent Res J* 2012; 9(5): 505-515.
<https://doi.org/10.4103/1735-3327.104866>
7. Chung WC, Huang CF, Feng SW. Clinical Benefits of Minimally Invasive Non-Surgical Periodontal Therapy as an Alternative of Conventional Non-Surgical Periodontal Therapy-A Pilot Study. *Int J Environ Res Public Health* 2022; 19(12): 7456.
<https://doi.org/10.3390/ijerph19127456>
8. Pradeep AR, Bajaj P, Rao NS, Agarwal E, Naik SB. Efficacy of locally delivered 0.5% clarithromycin and 0.5% metronidazole gel in the treatment of chronic periodontitis: a randomized controlled clinical trial. *J Periodontol* 2012; 83(9): 1155-1163.
<https://doi.org/10.1902/jop.2012.110650>

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9. Navarrete M, Oñate H, Loyola K, Olivares P. Effect of Periodontal Debridement plus Systemic Azithromycin in subjects with Stage III Periodontitis: A Randomized Controlled Clinical Trial. *J Oral Res* 2022; 11(5): 1-16.
<https://doi.org/10.21203/rs.3.rs-87207/v1>
 10. Graziani F, Karapetsa D, Alonso B, Herrera D. Nonsurgical and surgical treatment of periodontitis: how many options for one disease? *Periodontol* 2000 2017; 75(1): 152-188.
<https://doi.org/10.1111/prd.12201>
 11. Feres M, Figueiredo LC, Soares GM, Faveri M. Systemic antibiotics in the treatment of periodontitis. *Periodontol* 2000 2020; 82(1): 181-211.
<https://doi.org/10.1111/prd.12332>
 12. Bongo AS, Brustad M, Oscarson N, Jönsson B. Periodontal health in an indigenous Sámi population in Northern Norway: a cross-sectional study. *BMC Oral Health* 2021; 21(1): 334.
<https://doi.org/10.1186/s12903-021-01631-y>
 13. Teles F, Teles R, Frias-Lopez J, Paster B, Haffajee A. Lessons learned and unlearned in periodontal microbiology. *Periodontol* 2000 2013; 62(1): 95-162.
<https://doi.org/10.1111/prd.12010>
 14. Teughels W, Feres M, Oud V, Martín C, Matesanz P, Herrera D. Adjunctive effect of systemic antimicrobials in periodontitis therapy: A systematic review and meta-analysis. *J Clin Periodontol* 2020; 47: 257-281.
<https://doi.org/10.1111/jcpe.13264>
 15. Keestra JA, Grosjean I, Coucke W, Quirynen M, Teughels W. Non-surgical periodontal therapy with systemic antibiotics in patients with untreated chronic periodontitis: a systematic review and meta-analysis. *J Periodontol Res* 2015; 50(3): 294-314.
<https://doi.org/10.1111/jre.12221>
 16. Zandbergen D, Slot DE, Cobb CM, Van der Weijden FA. The clinical effect of scaling and root planing and the concomitant administration of systemic amoxicillin and metronidazole: a systematic review. *J Periodonto.* 2013; 84(3): 332-351.
<https://doi.org/10.1902/jop.2012.120040>
 17. Hammami C, Nasri W. Antibiotics in the Treatment of Periodontitis: A Systematic Review of the Literature. *Int J Dent* 2021; 2021: 6846074. <https://doi.org/10.1155/2021/6846074>
 18. Delatola C, Loos BG, Laine ML. Three periodontitis phenotypes: Bone loss patterns, antibiotic-surgical treatment and the new classification. *J Clin Periodontol* 2020; 47(11): 1371-1378.
<https://doi.org/10.1111/jcpe.13356>
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