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Comparative and clinical evaluation of 1% curcumin chip versus 1% tetracycline chip as a local drug delivery agent in treating chronic localised periodontitis - a randomized control trial.

Dr. Chetan A[1*], Dr. Ali Mirhajiri[2], Dr. Krishna Kripal[3], Dr. Mahek Khan[4], Dr. Sabah Farheen[5]

[1*]Postgraduate, Department of periodontology, Raja Rajeswari dental college and hospital Bangalore, Karnataka, India,
Email ID : chetansjbit123@gmail.com
[2*]Dental surgeon
Email ID: ,hajirisaeid@gmail.com
[3*] Professor, Department of periodontology, Raja Rajeswari dental college and hospital Bangalore, Karnataka, India,
Email ID: kripalkrishna@yahoo.com
[4*]Postgraduate, Department of periodontology, Raja Rajeswari dental college and hospital Bangalore, Karnataka, India,
Email ID : mahekkhan16@gmail.com
[5*]Postgraduate, Department of periodontology, Raja Rajeswari dental college and hospital Bangalore, Karnataka, India
Email ID : sabah24farheen@gmail.com

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ABSTRACT

Aim: To assess the efficacy of 1% Tetracycline chip and 1% Curcumin chip in management of CP patients when used as an adjunct to SRP.

Materials and methods: 30 patients with CP contributing a total of 90 sites [n = 30 each] were randomly assigned to receive one of the three treatment protocols; i.e., Group 1: SRP + 1% Tetracycline chip, Group 2: SRP + 1% Curcumin chip. Group 3: SRP alone. The following clinical parameters such as Probing Pocket Depth, Plaque Index, Gingival Index, Bleeding index were assessed at Baseline, 1 month, 3 months. Microbiological assessment was done at Baseline & 3 months.

Conclusion: The results of this study suggested that local application of 1% Tetracycline chip was as effective and as beneficial as 1% Curcumin chip, in the treatment of CP patients and hence can be recommended as a treatment option for CP patients.

Keywords: Tetracycline chip, curcumin chip, scaling and root planing, chronic periodontitis.

1. INTRODUCTION

Periodontitis is a chronic inflammatory disease affecting the supporting structures of the teeth, including the alveolar bone, periodontal ligament, cementum, and gingiva. It is characterized by the progressive destruction of periodontal tissues due to a complex interaction between pathogenic bacterial biofilms and the host immune response. Chronic localized periodontitis (CLP) is a specific form of the disease that affects a limited number of sites in the dentition and is often associated with deep periodontal pockets and alveolar bone loss. If left untreated, periodontitis can lead to tooth mobility and eventual tooth loss, significantly impacting oral health and overall well-being. [1]

The primary objective of periodontal therapy is to reduce the microbial load, thereby tending to an improvement in the clinical parameters using non-surgical and surgical therapies. The treatment of chronic localized periodontitis follows a phased approach, beginning with non-surgical therapy and progressing to surgical intervention when necessary. Scaling and root planing (SRP) is the cornerstone of non-surgical therapy, aiming to remove subgingival plaque, calculus, and bacterial endotoxins from root surfaces. However, SRP alone may not always achieve complete pathogenic bacterial eradication, especially at the base of deep periodontal pockets and areas inaccessible to periodontal instruments. [2] This has led to the adjunctive use of antimicrobials, assuming that chemicals would compensate for technical limitations, prevent early microbial recolonisation, and provide a chance for clinical improvements.

Putative pathogens associated with periodontal disease are susceptible to a variety of antiseptics and antimicrobials. Adjunctive antimicrobial therapy has been explored to enhance periodontal healing and suppress bacterial recolonization. Systemic antibiotics such as tetracyclines, metronidazole, and amoxicillin-clavulanate have been used in conjunction with SRP. [3] However, these agents have several limitations, such as high dosage, toxicity, and development of antimicrobial resistance. Local drug delivery agents (LDDAs) have been developed to overcome these limitations.

Goodson, in 1979, proposed the concept of a controlled local drug delivery (LDD) system as an alternative method of delivering antimicrobial agents for the treatment of periodontitis. [4] Local drug delivery (LDD) involves the application of therapeutic agents directly into periodontal pockets, allowing for sustained drug release at the infection site while minimizing systemic exposure and side effects. LDD agents are formulated as gels, fibers, films, or biodegradable chips that gradually release antimicrobial or anti-inflammatory drugs over a specified period. [5]

AIM

To evaluate the efficacy of curcumin and tetracycline as local drug delivery agent in the form of chips in treatment of patients with chronic periodontitis.

OBJECTIVES

To Evaluate the efficacy of curcumin chip when used as an adjunct to scaling and root planing in chronic periodontitis

To Evaluate the efficacy of tetracycline chip when used as an adjunct to scaling and root planing in chronic periodontitis

To Assess and compare the effect of curcumin chip versus tetracycline chip on clinical parameters (clinical attachment loss, probing depth, plaque index, gingival index, bleeding on probing) at different time points.

To evaluate interleukin 6 levels using elisa method before and after placement of curcumin chip and tetracycline chip.

2. MATERIAL AND METHODS

STUDY POPULATION:

A split mouth randomized double blinded study will be carried out on 90 sites in patients diagnosed with chronic periodontitis in the age group of 25 to 60 years visiting the Department of Periodontology, Rajarajeshwari Dental College and Hospital, Bangalore, will be enrolled for the study.

3. METHOD OF COLLECTION OF DATA

30 patients with chronic periodontitis (as per The Classification of Periodontal diseases and conditions, 1999) will be selected based on a lottery method from the outpatient section of the Department of Periodontology, RajaRajeswari Dental College and Hospital, Bangalore, Karnataka, India. All the participants will be explained about the need and design of the study. Written informed consent for the study will be obtained from each patient. The subgingival plaque samples will be collected at baseline and after 90 days in all the groups. All the participants will have to meet the following criteria.

4. INCLUSION CRITERIA

1) Patients who are systemically healthy.

2) Patients who are nonsmokers.

3) Patients with clinical diagnosis of chronic periodontitis with pocket depth 5-6 mm with evident radiographic horizontal bone loss. (1999 AAP Classification).

4) Patients who have not undergone any periodontal therapy in the previous 6 months

5) Patients exhibiting good oral hygiene.

6) Patients who are compliant and are able to follow up.

7) Patients who are willing to provide informed consent.

5. EXCLUSION CRITERIA

1) Pregnant and lactating women.

2) Teeth with endo-Perio lesions.

3) Patients under antibiotic therapy within 3 months of time period from the study.

4) Patients who have undergone periodontal therapy.

5) Patients using mouthwash regularly

6) Patients diagnosed with aggressive periodontitis

7) Patients allergic to curcumin and tetracycline chip.

PROCEDURE

All the participants will be explained about the need and design of the study informed consent will be obtained from those willing to participate in the study. A full mouth probing and charting will be done to assess the suitability of the subjects for

the study. After SRP the study sites will be randomly assigned to placement of curcumin chip, tetracycline chip and only SRP in one site. Groups will be divided as follows.

GROUP I: SRP along with administration of tetracycline chip

GROUP II: SRP along with administration of curcumin chip

GROUP III: SRP alone

Scaling and root planing will be performed for all cases. Before placement of LDD agents (into the sulcus, the sites will be isolated with cotton rolls, and surrounding areas dried up. 26

▪ Plaque index (PI) (Silness P and Loe H-1964)

▪ Bleeding index (BI) (Ainamo and Bay-1975)

▪ Probing pocket depth (PPD) measured using graduated Williams periodontal Probe from the crest of gingival margin to base of the pocket.

The chips will be grasped using forceps with the rounded edges away from the forceps and inserted into the periodontal pocket to its maximum depth until resistance is felt. After the placement of the chips a periodontal dressing will be given to maintain higher concentration of drug for longer duration. The patients are then advised not to use any chemical plaque control methods other than normal brushing and rinsing and not to floss in the test sites and adjacent interproximal areas to prevent dislodgement of the chip.

The patients will be recalled on 7th day for removal of periodontal pack and to assess the oral hygiene status. To make sure the patients follow the oral hygiene instructions given, recall will be continued for 1st, 2nd and 3rd month.

The following clinical parameters will be assessed at baseline (T0) and 3 months (T1).

The total anaerobic bacterial count will be assessed at baseline (T0) and 3 months (T1).

6. STUDY PROTOCOL

A proforma was designed for the present study to have a systematic and methodical recording of all the observations and information. The relevant data comprising details of the chief complaint and preliminary history, was recorded in the proforma. Clinical examination was carried out in a dental chair, under standard conditions of light.

7. ARMAMENTARIUM

Mouth mirror

UNC 15 Periodontal Probe

Tweezers

Kidney Tray

Ultrasonic scaler

Gracey curette – 3/4, 5/6, 7/8, 11/12, 13/14

Cotton rolls

Disposable gloves & Mouth masks

1% Tetracycline chip

1% Curcumin chip

Coe Pak

8. SCREENING EXAMINATIONS

Includes recording of clinical parameters:

Gingival index GI (Loe & Silness,1963)

Plaque index (PI) (Silness P and Loe H-1964)

Bleeding index (BI) (Ainamo and Bay-1975)

Probing pocket depth (PPD) measured using periodontal Probe from the crest of gingival margin to base of the pocket.

9. MICROBIOLOGICAL ANALYSIS

Pooled subgingival plaque samples will be collected with the help of sterile periodontal Gracey curette at baseline which is considered as control value prior to SRP. On 90th day, subgingival plaque samples will be collected from respective quadrants and transported in fluid thyoglycolate medium to be processed immediately. 20µl of suspension will be cultured in selective Brucella blood agar and incubated anaerobically using Gas Pak system to assess for total anaerobic bacterial count.

Semi-quantitative estimation of organisms will be done before and after intervention by counting the number of colonies and taking into consideration of significant number of colonies. i.e. colony forming units (CFU).

The samples will be processed in Department of Microbiology, RRMCH, Bangalore.

10. INSTRUCTION TO THE PATIENTS

After the treatment patients will be instructed to,

Avoid hard and spicy foods.

Avoid smoking or use of tobacco products.

Avoid consumption of alcoholic beverages.

To inform in case of any allergic reactions.

11. STATISTICAL ANALYSIS

The Statistical software SPSS 19.0 will be used for the analysis of the data and Microsoft word and Excel will be used to generate graphs, tables etc**.** Descriptive and Inferential statistical analysis will be carried out in the present study. Results on continuous measurements would be presented in Mean and Standard Deviation. Significance is assessed at 5 % level of significance.

If required additional tests will be used at the time of analysis.

12. RESULTS

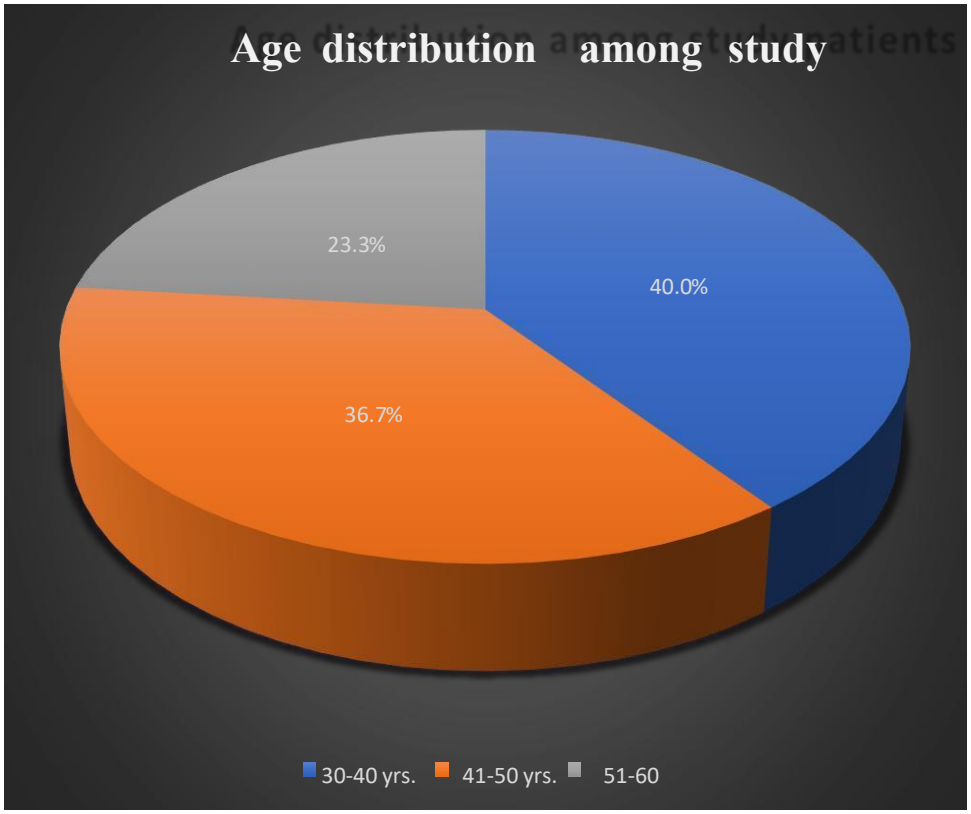
Table 1 shows the age and gender distribution of the study subject. The study subjects were in the age range of 30-58 years with a mean age of 43.27 ± 8.84. The males (n = 26) contributed

86.7% while females (n = 4) contributed 13.3% of the study sample (Graph 1 & 2).

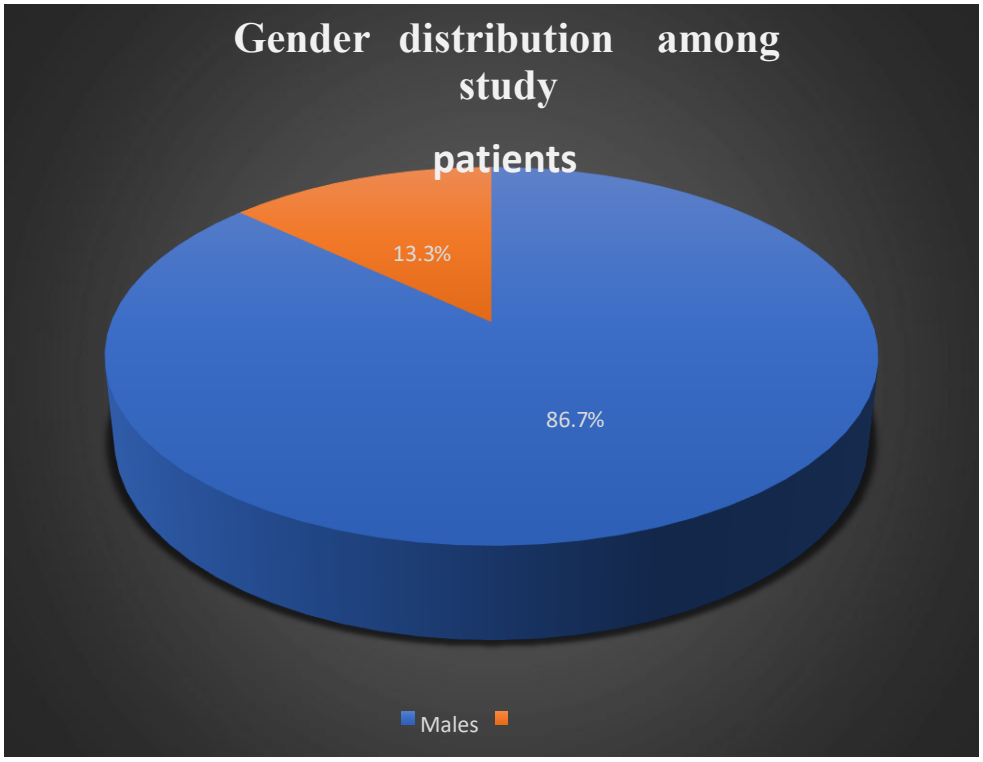
TABLE 1: AGE & DISTRIBUTION AMONG STUDY PATIENTS

Age & Distribution among study patients			
Variable	Category	n	%
Age	30-40 yrs.	12	40.0%
	41-50 yrs.	11	36.7%
	51-60 yrs.	7	23.3%
		Mean	SD
	Mean	43.27	8.84
	Range	30 - 58	
Gender	Males	26	86.7%
	Females	4	13.3%

* - Statistically Significant



GRAPH 1: AGE DISTRIBUTION AMONG STUDY PATIENTS



GRAPH 2: GENDER DISTRIBUTION AMONG STUDY PATIENTS

PLAQUE INDEX

TABLE 2: COMPARISON OF MEAN PI SCORES BETWEEN TIME INTERVALS

Comparison of mean PI Scores between time intervals using Repeated Measures of ANOVA Test followed by Bonferroni's post hoc Test						
Time	N	Mean	SD	p-value [a]	Sig. Diff	p-value [b]
BL	30	1.83	0.346	<0.001*	BL vs 3M	<0.001*
3M	30	1.35	0.295		BL vs 6M	<0.001*
6M	30	1.49	0.305		3M vs 6M	0.271

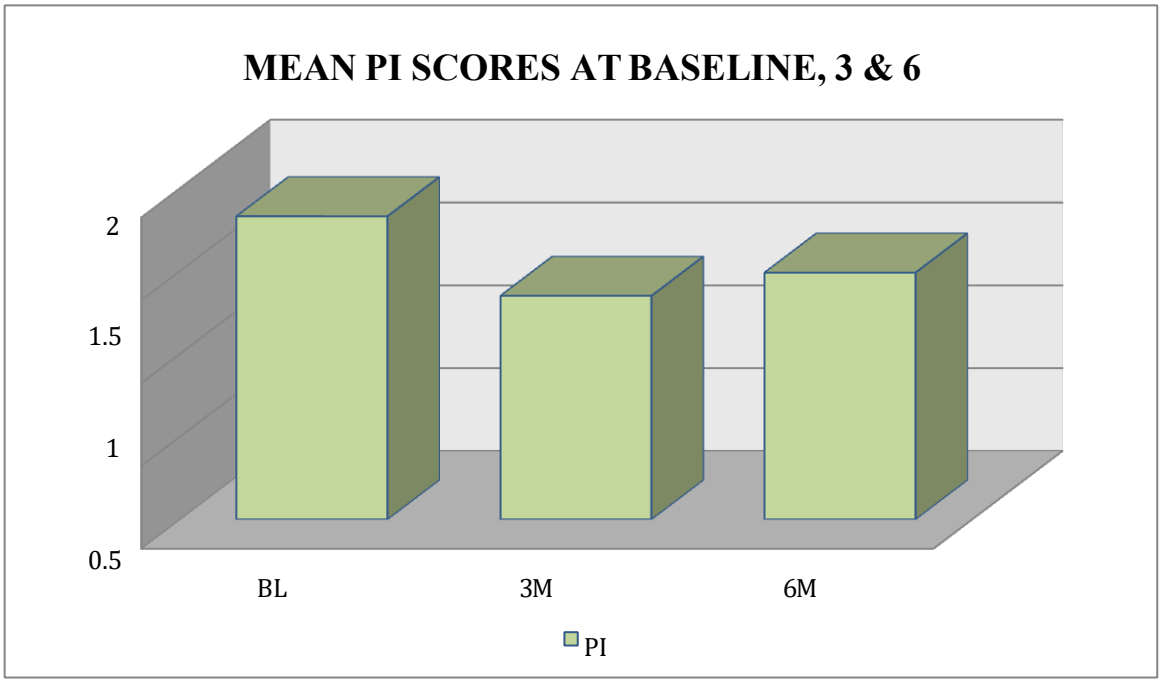
* - Statistically Significant

Note:

Repeated Measures of ANOVA Test

Bonferroni's post hoc Test

Table 2 compares the mean plaque index scores between time intervals using the Repeated Measures of ANOVA Test followed by Bonferroni's post hoc Test. There was a statistically significant reduction in Plaque Index scores from baseline to 3 months and from baseline to 6 months ($p < 0.001$). However, the difference between 3 and 6 months was not significant ($p = 0.271$), indicating stable plaque control post-treatment.



GRAPH 3: GRAPH REPRESENTING THE FREQUENCY OF PLAQUE INDEX

SCORE AT BASELINE,3 MONTHS AND 6 MONTHS

Graph 3 shows a decline in Plaque Index (PI), from baseline to 3 months and slight increase from 3 months to 6 months.

GINGIVAL INDEX

TABLE 3: COMPARISON OF MEAN GI SCORES BETWEEN TIME INTERVALS

Comparison of mean GI Scores between time intervals using Repeated Measures of ANOVA Test followed by Bonferroni's post hoc Test						
Time	N	Mean	SD	p-value [a]	Sig. Diff	p-value [b]
BL	30	1.696	0.408	<0.001*	BL vs 3M	<0.001*
3M	30	1.213	0.264		BL vs 6M	<0.001*
6M	30	1.300	0.266		3M vs 6M	<0.893

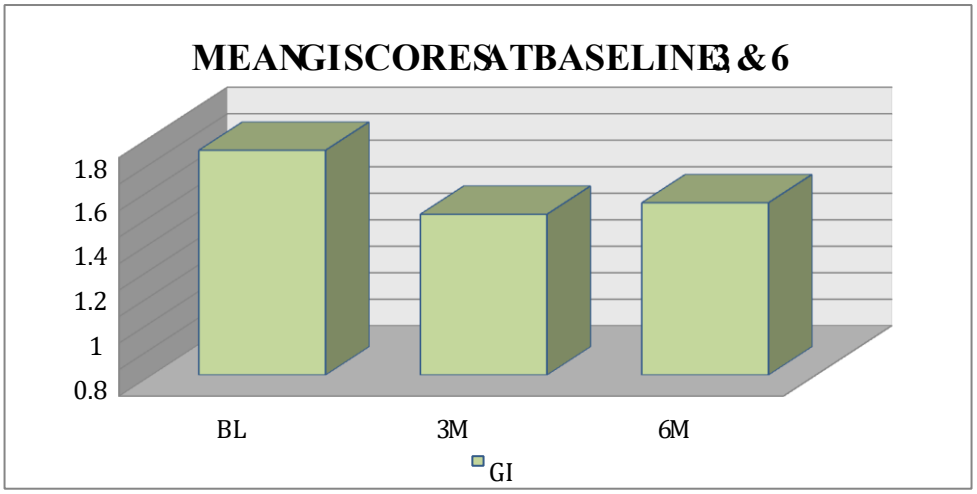
* - Statistically Significant

Note:

Repeated Measures of ANOVA Test

Bonferroni's post hoc Test

Table 3 compares the mean GI Scores between time intervals using the Repeated Measures of ANOVA Test, followed by Bonferroni's post hoc Test. There was a statistically significant reduction in Gingival Index scores from baseline to 3 months and from baseline to 6 months ($p < 0.001$), indicating improved gingival health. However, no significant difference was noted between 3 and 6 months ($p = 0.893$), suggesting maintenance of the gingival condition posttreatment.



GRAPH 4: GRAPH REPRESENTING THE FREQUENCY OF GINGIVAL INDEX

SCORE AT BASELINE, 3 MONTHS AND 6 MONTHS

Graph 4 shows a decline in Gingival Index (PI), from baseline to 3 months and slight increase from 3 months to 6 months.

BLEEDING INDEX

TABLE 4: COMPARISON OF MEAN BI SCORES BETWEEN TIME INTERVALS

Comparison of mean % BOP between time intervals using Repeated Measures of ANOVA Test followed by Bonferroni's post hoc Test

Time	N	Mean	SD	p-value [a]	Sig. Diff	p-value [b]
BL	30	59.873	9.197	<0.001*	BL vs 3M	<0.001*
3M	30	51.250	7.396		BL vs 6M	<0.001*
6M	30	52.026	6.594		3M vs 6M	1.000

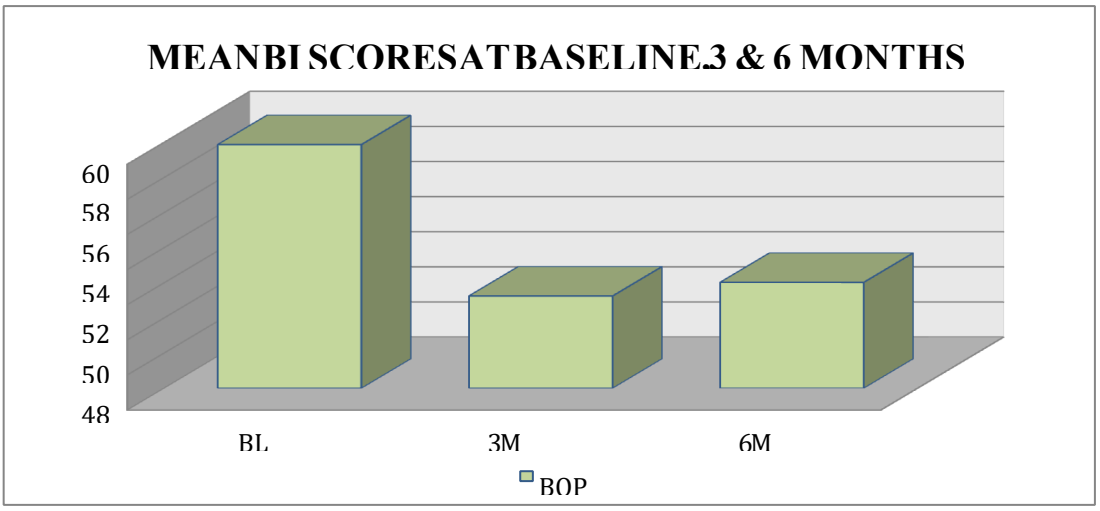
* - Statistically Significant

Note:

Repeated Measures of ANOVA Test

Bonferroni's post hoc Test

Table 4 compares the mean % BOP between time intervals using the Repeated Measures of ANOVA Test, followed by Bonferroni's post hoc Test. There was a statistically significant reduction in Bleeding on Probing (%BOP) from baseline to 3 months and baseline to 6 months ($p < 0.001$), indicating improved gingival health. However, the difference between 3 and 6 months was not significant ($p = 1.000$), suggesting stable bleeding scores after initial improvement.



GRAPH 5: GRAPH REPRESENTING THE FREQUENCY OF BLEEDING INDEX

SCORE AT BASELINE, 3 MONTHS AND 6 MONTHS

Graph 5 shows a decline in Bleeding Index (PI), from baseline to 3 months and slight increase from 3 months to 6 months.

PROBING POCKET DEPTH

TABLE 5: COMPARISON OF MEAN PD LEVELS BETWEEN 3 GROUPS AT DIFFERENT TIME INTERVALS

Comparison of mean PD levels between 3 groups at different time intervals using One-way ANOVA Test followed by Tukey's post hoc Test							
Time	Groups	N	Mean	SD	p-value [a]	Sig. Diff	p-value [b]
BL	Group 1	30	5.266667	0.73968	0.642	G1 vs G2	0.756
	Group 2	30	5.133333	0.730297		G1 vs G3	0.983
	Group 3	30	5.3	0.702213		G2 vs G3	0.647
3M	Group 1	30	4.233333	0.727932	<0.001*	G1 vs G2	0.001*
	Group 2	30	3.533333	0.899553		G1 vs G3	0.553*
	Group 3	30	4.433333	0.568321		G2 vs G3	<0.001*

6M	Group 1	30	3.5	0.682288	<0.001*	G1 vs G2	0.004*
	Group 2	30	2.933333	0.73968		G1 vs G3	0.014*
	Group 3	30	4	0.58722		G2 vs G3	<0.001*

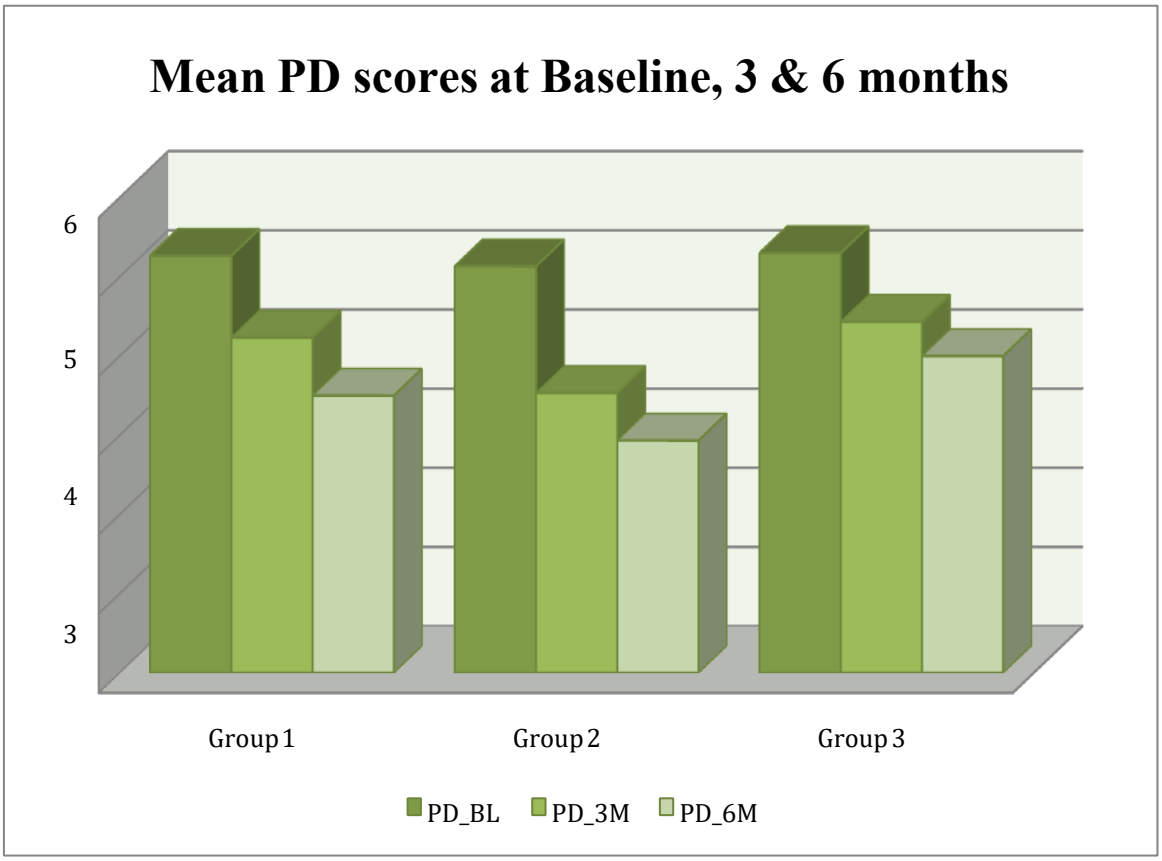
* - Statistically Significant

Note:

Repeated Measures of ANOVA Test

Bonferroni's post hoc Test

Table 5 compares the mean PD levels between the 3 groups at different time intervals using a One-way ANOVA Test followed by Tukey's post hoc Test. At baseline, there was no significant difference in Probing Depth (PD) among the three groups ($p = 0.642$). However, at 3 and 6 months, statistically significant differences were observed ($p < 0.001$). Group 2 showed the greatest reduction in PD, with significant differences noted especially between Group 2 and Group 3 at both intervals, indicating better clinical outcomes in Group 2.



GRAPH 6: GRAPH REPRESENTING THE FREQUENCY OF PROBING DEPTH

INDEX SCORE AT BASELINE, 3 MONTHS AND 6 MONTHS

Graph 6 shows a decline in Probing depth Index (PD), from baseline to 6 months in all the 3 groups.

COLONY FORMING UNIT

The mean CFUs/ml between different groups at Baseline & 3 months period was compared using Kruskal Wallis Test followed by Dunn's Post hoc Test. The mean CFUs/ml for Group 1 at baseline was 5.00 ± 0.45 which reduced to 1.93 ± 0.58 at 3 months and in Group 2 the mean CFUs/ml at baseline was 4.87 ± 0.51 which reduced to 2.10 ± 0.61 at 3 months. At 3 months, there was a statistically significant difference between Group 1 & Group 3 (1.93 ± 0.58 & 2.83 ± 0.59, respectively; p-value<0.001) and between Group 2 & Group 3 (2.10 ± 0.61 & 2.83 ± 0.59, respectively; p-value<0.001) (Table 10). In intra group comparison there was significant decrease in CFUs/ml count in all groups at all time intervals [BL, 3Months, p-value<0.001]

TABLE 6: COMPARISON OF MEAN CFUS/ML (LOG10) VALUES B/W GROUPS AT DIFFERENT TIME INTERVALS USING KRUSKAL WALLIS TEST

Comparison of mean CFUs/ml (Log10) values b/w groups at Baseline & 3 months period using Kruskal Wallis Test followed by Dunn's Post hoc Test							
Time	Groups	N	Mean	SD	p-value [a]	Sig. Diff	p-value [b]
Baseline	Group 1	30	5.00	0.45	0.23	G1 vs G2	..
	Group 2	30	4.87	0.51		G1 vs G3	..
	Group 3	30	4.73	0.78		G2 vs G3	..
3 Months	Group 1	30	1.93	0.58	<0.001*	G1 vs G2	0.55
	Group 2	30	2.10	0.61		G1 vs G3	<0.001*
	Group 3	30	2.83	0.59		G2 vs G3	<0.001*

* - Statistically Significant

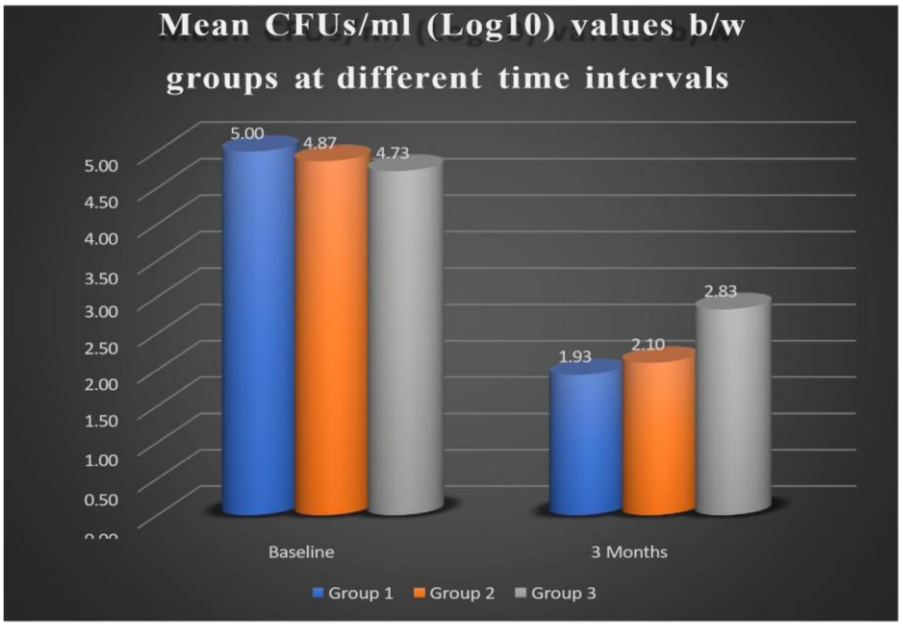
Note: a. Kruskal Wallis Test & b. Dunn's Post hoc Test

TABLE 7: COMPARISON OF MEAN CFUS/ML (LOG10) VALUES B/W GROUPS AT DIFFERENT TIME INTERVALS USING WILCOXON SIGNED RANK POST HOC

TEST

Comparison of mean CFUs/ml [Log10] values b/w Baseline & 3 Months' period in each group using Wilcoxon Signed Rank Post hoc Test						
Groups	Time	N	Mean	SD	p-value [a]	p-value [a]
Group 1	Baseline	30	5.00	0.45	3.07	<0.001*
	3 Months	30	1.93	0.58		
Group 2	Baseline	30	4.87	0.51	2.77	<0.001*
	3 Months	30	2.10	0.61		
Group 3	Baseline	30	4.73	0.78	1.90	<0.001*
	3 Months	30	2.83	0.59		

* - Statistically Significant



GRAPH 7: MEAN CFU/ML VALUES BETWEEN GROUPS AT DIFFERENT TIME INTERVALS

13. DISCUSSION

The management of chronic localized periodontitis, a prevalent inflammatory condition affecting the supporting structures of the teeth, has long relied on mechanical debridement and adjunctive therapies. Local drug delivery agents have gained significant attention for their ability to enhance the therapeutic outcome of periodontal treatment by delivering antimicrobial agents directly to the site of infection, thus ensuring higher drug concentrations and minimizing systemic side effects. Among the various agents explored for local delivery, curcumin and tetracycline have emerged as promising candidates due to their potent antimicrobial and anti-inflammatory properties.

Curcumin, a natural polyphenolic compound derived from the turmeric plant, has demonstrated a wide range of biological activities, including anti-inflammatory, antioxidant, and antimicrobial effects. It exhibits significant antimicrobial activity against periodontal pathogens such as *Porphyromonas gingivalis*, *Fusobacterium nucleatum*, and *Prevotella intermedia*. It also demonstrates anti-inflammatory effects, reducing gingival inflammation and bleeding. [44] It has been shown to modulate the host immune response, making it particularly relevant in the treatment of periodontal disease, where inflammation plays a central role.

Studies have shown improvements in clinical parameters like probing pocket depth (PPD) and clinical attachment level (CAL) when curcumin is used adjunctively with scaling and root planing (SRP). A randomized controlled trial evaluating curcumin gel as a local drug delivery system post-SRP reported significant reductions in PPD and CAL, along with improvements in plaque and gingival indices. No adverse effects were noted, highlighting its safety and efficacy. [45] A comprehensive meta-analysis assessed the efficacy of locally delivered curcumin as an adjunct to SRP. The analysis concluded that curcumin significantly improves clinical outcomes, including CAL and PPD, compared to SRP alone.

Tetracycline, on the other hand, is a well-established antimicrobial agent that has been widely used in periodontal therapy for its ability to inhibit bacterial protein synthesis and control pathogenic microbial growth. The use of 1% tetracycline chips as a local drug delivery system has been extensively studied and proven effective in reducing periodontal pathogens and promoting clinical improvements in patients with periodontitis. However, concerns about antibiotic resistance and potential side effects have prompted the exploration of alternative

agents, such as curcumin, which could offer similar benefits without the same risks. [45]

A meta-analysis of randomized controlled trials demonstrated significant improvements in periodontal parameters such as CAL, PPD, and sulcular bleeding index when tetracycline was used adjunctively with SRP. [5] Research comparing tetracycline fibers to other adjunctive therapies found that tetracycline fibers resulted in better clinical outcomes, including reductions in PPD and improvements in CAL. These findings support the use of tetracycline

fibers as an effective adjunct in periodontal therapy. [45-47] Advancements in tetracycline delivery systems, such as controlled-

release polymer strips, have been developed to enhance the efficacy and duration of antimicrobial action at the site of infection. These systems aim to provide sustained drug release, improving treatment outcomes in periodontal therapy. [48]

The current study aims to compare the clinical effectiveness and outcomes of 1% curcumin chips versus 1% tetracycline chips in treating chronic localized periodontitis through a randomized controlled trial. By evaluating parameters such as probing pocket depth, clinical attachment level, and microbial reduction, this study seeks to provide insight into the potential advantages and limitations of these two local drug delivery systems in the management of chronic periodontal disease.

PLAQUE INDEX (PI), GINGIVAL INDEX (GI), AND BLEEDING ON PROBING (BI):

The Plaque Index measures the thickness of dental plaque at the gingival margin. It is a critical indicator of oral hygiene status and is directly associated with the initiation and progression of periodontal disease. A reduction in PI following treatment reflects improved plaque control and effectiveness of the local drug delivery agents in minimizing microbial load.

The Gingival Index assesses the severity of gingival inflammation based on color, consistency, and bleeding response. It is a reliable measure of the inflammatory status of the gingiva. In the context of this study, comparing changes in GI values helps evaluate the antiinflammatory properties of curcumin and tetracycline when used as local drug delivery systems.

Bleeding on Probing is an important early clinical sign of gingival inflammation and a predictor of periodontal disease activity. It reflects the inflammatory response of the periodontal tissues to mechanical probing. A reduction in BI post-treatment indicates improved gingival health and reduced inflammation, thus serving as a key parameter to assess the therapeutic efficacy of the curcumin and tetracycline chips.

In the current study, all groups exhibited significant reductions in PI, GI, and BI scores from baseline to 3 and 6 months ($p < 0.001$), indicating effective plaque control and gingival health improvement. These results align with a previous study conducted by Muglikar et al. in 2013, highlighting curcumin's anti-inflammatory properties and its efficacy in reducing gingival inflammation and bleeding. [49]

Both curcumin and tetracycline chips serve as effective adjuncts to scaling and root planing in treating chronic periodontitis. While tetracycline demonstrated superior clinical outcomes, curcumin presents a viable natural alternative with anti-inflammatory benefits and minimal side effects, making it suitable for patients seeking herbal treatment options (Suhag et al., 2007). [52]

The present randomized controlled trial highlights the effectiveness of both 1% curcumin and 1% tetracycline chips as local drug delivery agents in the management of chronic localized periodontitis. Both agents, when used adjunctively with scaling and root planing, resulted in significant improvements in clinical parameters such as Plaque Index (PI), Gingival Index (GI), Bleeding on Probing (BI), and Probing Depth (PD). Tetracycline chips demonstrated superior clinical outcomes, particularly in reducing PD, aligning with established literature supporting its strong antimicrobial efficacy. However, curcumin also showed promising results, reflecting its potent anti-inflammatory and antimicrobial properties, along with the added advantage of minimal side effects and natural origin. This makes curcumin a viable alternative, especially for patients preferring herbal or non-antibiotic treatment options.

14. CONCLUSION

All the study subjects demonstrated a statistically significant reduction in the mean PI, GI, PPD, & CFUs. Both the treatment modalities in the test groups resulted in significant improvement in all the clinical parameters i.e., PPD, GI, PI, & CFUs at different time intervals from baseline to 3 months when used as an adjunct in the treatment of chronic periodontitis.

The study demonstrated that local application of 1% Tetracycline chip after scaling and root planing is as effective and as beneficial as application of 1% Curcumin chip with results demonstrating an improvement in all the assessed clinical parameters. Similarly, application of 1% Curcumin chip can be recommended as a treatment option for chronic periodontitis when used as an adjunct to non-surgical periodontal therapy.

Over an observation period of 3 months, significant improvement in clinical parameters were achieved in scaling and root planing along with subgingival placement of 1% Curcumin chip, which was comparable to that of 1% Tetracycline chip after its application.

The clinical improvements in the results of the current study supports the anti- inflammatory and antibacterial efficacy of 1% Curcumin chip when used as an adjunct to scaling and root planing in the treatment of chronic periodontitis patients, which was similar to the clinical improvements found, after the application of 1% Tetracycline chip.

Due to its natural origin and low potential for causing resistance, curcumin is a suitable choice for patients on the lookout for non-antibiotic periodontal treatments.

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