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Original Research Paper

Periodontics

TINOSPORA CORDIFOLIA AND LOW DOSE ASPIRIN IN THE TREATMENT OF CHRONIC PERIODONTITIS

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ABSTRACT

Aim: To compare the effectiveness of Tinospora cordifolia and low-dose aspirin in treating chronic periodontitis. **Materials And Methods:** The current study is a double-masked, randomized clinical trial. A total of thirty patients of age 25 to 55 years were assigned randomly into two groups. After phase-I therapy, In Group A, Tinospora cordifolia (TC) (Guduchi- Himalayan company) tablets – 150mg, and in Group B, Low-dose aspirin (Ecospirin 75 – USV private limited)– 75mg was given adjunctively. At baseline and after six months in both groups, gingival index (GI), plaque index (PI), clinical parameters like periodontal probing depth (PPD) and clinical attachment level (CAL), and bone biomarker C- terminal telopeptide (serum β-CTX) were evaluated. **Results:** The results of the current trial showed that all subjects from the two groups had a significant decrease in the GI, PI, and clinical parameters like PPD and CAL compared from baseline to six months. There was a significant reduction in serum β-CTX levels after phase I therapy in chronic periodontitis subjects after host modulation with Tinospora cordifolia and low-dose aspirin. A positive correlation was shown between the clinical parameters and serum c levels in both groups. However, there was a statistically significant decrease in the serum β-CTX levels in Tinospora cordifolia compared with the low-dose aspirin group. **Conclusion:** Tinospora cordifolia and low-dose aspirin both can be used as adjuncts to NSPT. The evaluation of bone resorption biomarker C – terminal telopeptide also helps in assessing the periodontal disease progression.

KEYWORDS : Guduchi, Tinospora cordifolia, HMT, Low–dose aspirin, β-CTX, C – terminal telopeptide, NSPT.

INTRODUCTION

Periodontitis is the most prevalent chronic inflammatory oral disease. Determining that periodontal tissue destruction is primarily because of the host immune responses has directed the research toward altering the human responses to fight against pathogenic bacteria. As a result, numerous host modulatory therapies (HMT) have been developed to inhibit pathways in the conduct of periodontal diseases.[1]

Host modulation therapy in the form of nonsteroidal anti-inflammatory drugs, bisphosphonates, has shown promising results, but they have their side effects; hence, the newer lipid mediators, such as low-dose aspirin, are being used because they could prevent the formation of osteoclast through inhibition of NF-KB pathway and enhance the formation of osteoblast by preventing apoptosis of its progenitor stem cell and stimulating the differentiation of preosteoblasts and reduces the bone loss.[2,3]

Tinospora cordifolia is a large glabrous, succulent, deciduous climbing shrub around the tropical Indian subcontinent, Sri Lanka and China, ascending to an altitude of 300m. T. cordifolia exhibits anti-inflammatory, analgesic, immuno suppressive,[4] antibacterial,[5] and antioxidant actions.[6] Tinospora cordifolia's alcoholic extract has been shown to stimulate the growth of osteoblasts, increasing the differentiation of cells into the osteoblastic lineage and the mineralization of bone-like matrix. Tinospora cordifolia finds its potential application as an anti-osteoporotic agent by influencing bone-like matrix proliferation, differentiation, and mineralization.[7]

Mature cross-links develop by lysyl oxidase on lysine and hydroxylysine residues at the N- and C- terminal regions of collagen fibrils deposited in the ECM to stabilize the fibrils. This crosslinking develops divalent collagen cross-links that, by further condensation, trivalent Pyr and Dpy are formed. During bone resorption, osteoclasts release cross-linked immunoreactive telopeptides.[8] Pyridinoline crosslinks are noble biomarkers of bone resorption. Pyridinoline (hydroxylysl pyridinoline or Pyr), deoxypyridinoline (lysyl pyridinoline or Dpy), N- telopeptides, and C-telopeptides are collagen degradative molecules. Being a bone marker, C- terminal telopeptide (β-CTX) aids in detecting metabolic alterations that occur in the initial phase of periodontal disease. It also helps evaluate bone healing after periodontal therapy.

Hence the study aims to compare the immunomodulatory effect of Tinospora cordifolia and low-dose aspirin by evaluating the serum C- terminal telopeptide levels in treating chronic periodontitis before and after non-surgical therapy.

MATERIALS AND METHODS

This was a double-blinded randomized clinical trial. The study population included thirty chronic periodontitis patients, aged 25–55, from the outpatient section, Department of Periodontics, St. Joseph Dental College, Eluru. Approval of the study was obtained from the Institutional Ethics Committee, and informed consent was taken from all the participants before commencing the study.

Inclusion And Exclusion Criteria

Patients who were willing to participate in the study, patients with more than 16 natural teeth, chronic periodontitis patients with a pocket depth (PD) of ≥5 mm, and patients with no

history of allergies were included. Exclusion criteria were pregnant and lactating women, patients having teeth with endo-perio lesions, patients using tobacco or tobacco-related products, patients on antibiotics within 3 months before the study, patients having systemic diseases and compromised medical conditions, patients who underwent periodontal surgery, restorative procedures, and tooth extraction adjacent to either of the test area in the previous 3 months, long-term therapy with medications within a month before enrollment that could affect the periodontal status or healing, and patient's medical or dental therapy that could have an impact on the subject's ability to complete the study.

The patient's general examination and full-mouth periodontal examination were carried out, followed by the fabrication of acrylic stents for the measurement of PPDs in the test sites during the study. Chronic periodontitis patients were divided into two groups, i.e Group A, Tinospora cordifolia (TC) (Guduchi- Himalayan company, Batch number: 372100669; Mfg. date: 05/2021; expiry: 04/2024) tablets – 150mg- once daily after food at night for 90 days, and in Group B, Low-dose aspirin (Ecospirin 75 – USV private limited, Batch number: 04008848; Mfg. date: 07/2022; expiry: 06/2024)– 75mg- once daily after food at night for 90 days, was given adjunctively after scaling and root planing. The clinical parameters recorded were plaque index (PI), gingival index (GI), probing depth, and clinical attachment level (CAL). Serum samples were collected for evaluation of bone resorption biomarker C terminal telopeptide. All the recordings were taken at baseline at a follow-up of six months.

Statistical Analysis

The means and standard deviations were calculated for all clinical parameters of both groups. Paired t-test has been used to find the significance of study parameters within each group. The data collected were assessed using statistical software.

RESULTS

A total of thirty subjects were included in the study. On the assessment of the clinical parameters, there was a statistically significant reduction in PI, GI, PPD, CAL, and β-CTX values from baseline to 6 months in both groups.

On intergroup comparison, there was no significant change in the periodontal parameters between the two groups. However, there was a significant reduction in the β-CTX values of the Tinospora cordifolia group in comparison with the low-dose aspirin group.(Table 1& 2; Graph I &II)

Table 1: Intragroup comparison of standard deviation and P values of Plaque index (PI), Gingival index (GI), probing pocket depth (PPD), Clinical attachment level (CAL), serum-β C-terminal telopeptide (β-ctx) at baseline and 6 months

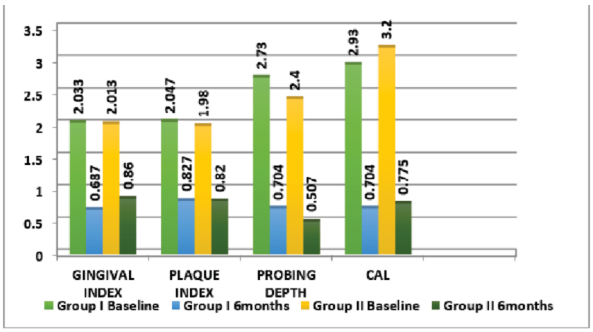
Clinical parameters	Mean+/-SD baseline		Mean+/-SD 6months		P value	
GROUP	TC	LDA	TC	LDA	TC	LDA
PI	0.16	0.24	0.2	0.21	0.001	0.001
GI	0.2	0.3	0.3	0.18	0.001	0.001
PPD	0.48	0.48	0.7	0.5	0.001	0.001
CAL	1.01	0.94	0.7	0.77	0.001	0.001
β-CTX	173.3	173.6	153	127.3	0.001	0.001

SD- standard deviation, TC- Tinospora cordifolia, LDA- low dose aspirin

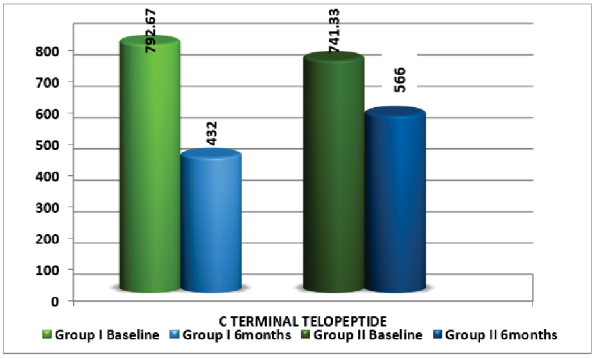
Table 2: Intergroup comparison of standard deviation and P values of Plaque index (PI), Gingival index (GI), probing pocket depth (PPD), Clinical attachment level (CAL), serum-β C-terminal telopeptide (β-ctx) at baseline and 6 months

Clinical parameters	Mean+/-SD 6 months		P value
GROUP	TC	LDA	
PI	0.2052	0.2145	0.931
GI	0.3091	0.1882	0.74
PPD	0.704	0.507	0.148
CAL	0.704	0.775	0.332
B-CTX	153.002	127.324	0.001

SD-standard deviation, TC- Tinospora cordifolia, LDA- low dose aspirin



Graph I: Intergroup and timeline comparison of Plaque index (PI), Gingival index (GI), probing pocket depth (PPD), Clinical attachment level (CAL),



Graph II: Intergroup and timeline comparison of c terminal telopeptide

DISCUSSION

Local factors are majorly responsible for the pathogenesis of periodontitis. In the present study, there was a significant reduction in GI & PI values in both groups, 6 months after SRP, which could be attributed to constant reinforcement of oral hygiene practices.

Mechanical debridement plays a pivotal role in reducing microbial load and hampers the progressions of periodontal disease to an extent, so adjunctive treatments are also necessary. The methanolic extracts of Tinospora cordifolia exhibited an anti-bacterial effect.[5] The adjunctive prescription of systemic drugs Tinospora cordifolia after SRP significantly reduced probing depths and clinical attachment levels. These results were correlated to the trials performed by using Guduchi.[9,10]

The adjunctive prescription of systemic drugs Low-dose aspirin after SRP significantly reduced probing depths and clinical attachment levels. Low-dose aspirin reduces leukocyte trafficking by triggering novel lipid metabolites that directly elicit pro-resolution effects and even aid in the production of lipoxins and resolvins.[11] Aspirin-triggered eicosanoids may play a crucial role in the resolution of inflammation and the prevention of neutrophil-mediated tissue injury in inflammatory diseases such as periodontitis. Contradictory to the presented trial outcomes, there is a study that didn't find an association between aspirin intake and CAL assessment on long-term evaluation.[12]

In the literature, pyridinoline cross-linked carboxyterminal telopeptide of type I collagen (ICTP) and β-CTX were reported to be more specific for bone resorption and considered

promising tools for assessing metabolic bone diseases. There are only a few studies about β-CTX in periodontal diseases. Earlier there were clinical trials that analyzed the salivary and GCF bone biomarkers of periodontal disease.[13,14] They hypothesized that during active resorption of bone, β-CTX is released into the various tissues, unlike the saliva and GCF in this study, serum evaluation of β-CTX was conducted. This present trial showed a statistically significant decrease of the serum β-CTX levels for patients on HMT with Tinospora cordifolia compared with low-dose aspirin. The reduction in serum β-CTX levels in the TC group was because of β – ecdysone, a non-estrogenic bone protective compound present in TC with anti-osteoporotic action and pro-stimulatory effects on osteoblasts to increase deposition of collagen in bone matrix and enhanced expression of genes responsible for osteogenesis.[15]

There is also a significant reduction of serum β-CTX levels after HMT with low-dose aspirin. Low-dose aspirin irreversibly inhibits cyclooxygenase (COX), most notably PGE2 production, in response to inflammatory stimuli. In addition to the inhibition of proinflammatory eicosanoids, aspirin has also been found to trigger the biosynthesis of potentially anti-inflammatory compounds, such as aspirin-triggered 15-epi-lipoxin A4, which has been found to bind lipoxin A4 receptors and downregulate leukotriene formation.[16]

CONCLUSION

A positive correlation was shown between the clinical parameters and serum -CTX levels in both groups. However, there was a statistically significant decrease in the serum -CTX levels in Tinospora cordifolia compared with the low-dose aspirin group. The study's limitations were the small sample size and the short period between observations in both study groups.

Within the study's limitations, it can be concluded that Tinospora cordifolia is a better host modulatory agent when compared to low-dose aspirin. Serum -CTX might also be potentially helpful in distinguishing health from disease and monitoring periodontal disease activity. Future longitudinal studies with larger sample sizes are needed to validate the use of Tinospora cordifolia and low-dose aspirin for chronic periodontitis.

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