INTRODUCTION

Periodontitis is an inflammatory change of bacterial origin that affects the support tissues of the teeth. The disease is characterized by bleeding, increased probing depth, attachment loss, and bone loss. Tooth mobility, gingival recession, furcation involvement, and halitosis are also clinical features frequently identified among individuals with periodontitis.

The aggression caused by the presence of pathogenic bacteria in the biofilm induces a local inflammatory response. However, the host defense is the main cause of the damage observed in individuals with periodontitis, such as loss of attachment and bone loss.

The evolution of inflammation of periodontal tissues due to the lack of treatment or the unsatisfactory response of the patient to appropriate therapy may lead to tooth loss.

In Brazil, nearly 30% of the adult population is affected by periodontitis and such an outcome is the major cause of tooth loss.

Knowledge on the role of biofilm in the etiopathogenesis of periodontitis has guided practitioners during the provision of periodontal therapy. The main aim of the periodontitis treatment is to remove the subgingival biofilm and to prevent the recurrence of biofilm accumulation. Nonsurgical periodontal therapy comprises the first phase of periodontitis treatment. In this phase, guidance procedures for biofilm control and scaling and root planing are performed. Nonsurgical periodontal therapy is a consolidated and extremely effective procedure in periodontics. However, the procedure of scaling and root planing may be associated with posttreatment pain. There has been much controversy on the information regarding discomfort after periodontal intervention, and few studies have evaluated the experience of pain associated with periodontal therapy.
The aim of this cross-sectional study was to assess the analgesic consumption and the frequency and intensity of pain after nonsurgical periodontal therapy, as well as to associate these factors with the extent and severity of periodontitis and with the degree of anxiety before the procedure.

**MATERIALS AND METHODS**

This cross-sectional study was conducted in the outpatient clinic of the faculty of dentistry between March 2019 and October 2019. The sample consisted of 51 individuals diagnosed with periodontitis submitted to subgingival scaling with curettes under local anesthesia. Individuals older than 18 years and with at least 12 teeth were included. Individuals undergoing periodontal treatment, individuals who were undergoing therapy with antibiotics within the last 3 months, smokers, pregnant or lactating women, individuals who had reported acute or chronic pain before the procedure, individuals who were using analgesics, anti-inflammatory drugs, and/or muscle relaxants, and those who had a contraindication to undergo the periodontal clinical examination were excluded. The ethics committee of the university approved the study (CAAE 03669718.4.0000.5149). Individuals who agreed to participate signed a statement of informed consent.

Data on biological, social, and behavioral characteristics were collected from each participant by means of a structured questionnaire, in the form of an interview, before the periodontal intervention. This questionnaire allowed one to collect the data on participants’ age, sex, schooling, and family income. The consumption of analgesics after periodontal therapy was recorded 7 days after periodontal intervention.

In addition, the degree of anxiety before treatment was assessed. To assess anxiety, the dental anxiety scale (DAS) questionnaire was used. The DAS is a scale with four self-reported items for anxiety evaluation proposed by Corah (Corah et al. 1969).[9]

In addition, the degree of anxiety before treatment was assessed. To assess anxiety, the dental anxiety scale (DAS) questionnaire was used. The DAS is a scale with four self-reported items for anxiety evaluation proposed by Corah. In this study, the short version of the validated instrument was used for the evaluation of anxiety in individuals undergoing periodontal treatment with scaling and root planing.[9,11] The questionnaire is composed of four questions directly related to dental anxiety: (1) “If you had to go to the dentist tomorrow, how would you feel?” (2) “While you wait in the office, how do you feel?” (3) “While you are in the dentist’s chair waiting for him/her to pick up the drill to start working on your tooth, how do you feel?” and (4) “You are in the dentist’s chair for cleaning. How do you feel while the dentist picks up the instruments to clean your tooth?” Each question has five answer options. For the first question, the answer options are as follows: (a) “I would like to think of this as a reasonably pleasant experience” (b) “I wouldn’t mind”; (c) “I would be a little apprehensive”; (d) “I would be afraid that it would be unpleasant and painful”; (e) “I would be very afraid of what the dentist could do.” For the other questions, the answer options are as follows: (a) “relaxed;” (b) “a little uncomfortable;” (c) “tense;” (d) “anxious;” (e) “so anxious that I sometimes start to sweat or feel almost physically ill.” The overall score varies between 4 and 20. The higher the score, the higher the anxiety of the participant.

Periodontal clinical examination was performed to evaluate the bleeding on probing, probing depth, and clinical attachment level (CAL) parameters. This examination was performed with circumferential probing and the recording of four sites (distal, vestibular, mesial, and palatal/lingual) per tooth present using a millimeter-periodontal probe and a clinical mirror. The periodontal clinical examination was carried out by undergraduate students under the supervision of a clinical lecturer in periodontics. The criterion used for the classification of periodontitis was attachment loss detected in two or more mesial or distal sites or attachment loss of 3 mm or more in the buccal or lingual/palatal sites in at least two nonadjacent teeth. Periodontitis was classified according to the stage and the extension of the disease. The stages of periodontitis were primarily defined by the CAL. For all stages, the extension could also be classified as follows: localized (up to 30% of the affected teeth) and generalized (30% of the teeth or more). The stages were defined as follows: Stage 1 (1–2 mm of loss of interproximal CAL at the worst site), Stage 2 (3–4 mm of loss of interproximal CAL at the worst site), and Stage 3 (5 mm or more of loss of interproximal CAL at the worst site).[12]

The number of teeth and which teeth underwent nonsurgical periodontal therapy in the evaluated session were also recorded. In the present study, data of each participant were included only once, regardless of the number of scaling sessions to which he/she had been submitted.

The visual analog scale (VAS) was used to measure pain. This scale represents a simplified and validated tool for this purpose.[9,11,13,14] The VAS consists of a horizontal continuous line of 10 mm with two end points (0–10 mm), on which the individual indicates his/her level of pain. Instructions clarifying that zero denoted no pain and discomfort and 10 denoted very intense pain and discomfort were provided to the participants. The participants were advised to record the pain intensity at 2, 4, 8, 24, and 48 h after subgingival scaling. The following cutoff points were adopted for VAS: No pain = 0; mild pain = 0.1–3.9; moderate pain = 4.0–6.9; severe pain = 7.0–10.[15] In addition, the sample was divided into two groups according to the presence or absence of pain at 2 h after nonsurgical periodontal therapy.

The Statistical Package for the Social Sciences (SPSS, version 23.0, IBM, Armonk, USA) was employed. Initially, a descriptive analysis of the total sample was performed. The analysis of pain considering VAS was simplified at the four cutoff points of the scale: absence of pain, mild, moderate, and severe pain. Assessment of differences in pain intensity between periods after nonsurgical periodontal therapy was performed using the Anova test. The significance level was set at 5% (P < 0.05).

**RESULTS**

Table 1 presents biological, social, and behavioral data of the total sample and of the groups in relation to the intensity
of pain considering the mean of VAS. The mean age of the participants was 49.8 years. There was no relevant difference between groups in all variables assessed in the study.

The periodontal data of the total sample and of the groups in relation to the intensity of pain considering the mean of VAS are presented in Table 2. There was no difference in relation to the periodontal parameters evaluated, neither with respect to the stage nor regarding the extent of periodontitis.

Table 3 presents the periodontal data of the total sample and of groups on the teeth submitted to scaling in relation to the pain intensity, considering the mean of VAS. There was no difference for the number and type of tooth submitted to scaling and for

**Table 1: Characteristics of the sample with respect to the variables of interest**

| Variables          | Total sample | Absent pain | Mild pain | Moderate pain | Severe pain | P    |
|--------------------|--------------|-------------|-----------|---------------|-------------|------|
| n (%)              | 51 (100.0)   | 19 (32.3)   | 28 (5.7)  | 03 (5.9)      | 01 (2.0)    | 0.730*|
| Age (years) (SD)   | 49.76 (13.50)| 48.11 (10.80)| 51.11 (14.60)| 48.67 (24.00)| 46.00 (0.00)| 0.815†|
| Sex                |              |             |           |               |             |      |
| Female             | 28           | 9           | 16        | 2             | 1           | 0.000 (0.00) |
| Male               | 23           | 10          | 12        | 1             | 0           |      |
| Schooling (years)  |              |             |           |               |             |      |
| <8                 | 16           | 7           | 8         | 1             | 0           | 0.402‡|
| 8 a 12             | 28           | 11          | 15        | 2             | 0           |      |
| >12                | 7            | 1           | 5         | 0             | 1           |      |
| Family income (MW) |              |             |           |               |             |      |
| <5 SM              | 47           | 18          | 26        | 2             | 1           | 0.384†|
| >5 SM              | 4            | 1           | 2         | 1             | 0           |      |

n – Number; SD – Standard deviation; MW – Minimum wages; *ANOVA test for independent samples, †Chi-Square test, ‡P ≤ 0.05

**Table 2: Periodontal data of the total sample and of the groups in relation to the intensity of pain**

| Variables                      | Total sample | Absent pain | Mild pain | Moderate pain | Severe pain | P    |
|--------------------------------|--------------|-------------|-----------|---------------|-------------|------|
| Number of teeth present, average (SD) | 24.74 (4.17) | 24.15 (4.23) | 25.03 (4.20) | 25.66 (5.50) | 25.00 (0.00) | 0.858*|
| Percentage sites with PD=4 mm and CAL ≥3 mm (total), average (SD) | 7.50 (6.48) | 7.75 (6.97) | 7.80 (6.56) | 4.23 (2.60) | 4.00 (0.00) | 0.877*|
| Percentage sites with PD=5 or 6 mm and CAL ≥3 mm (total), average (SD) | 9.01 (10.04) | 10.88 (13.29) | 8.27 (7.92) | 4.10 (2.13) | 9.00 (0.00) | 0.654*|
| Percentage sites with PD ≥7 and CAL ≥3 mm (total), average (SD) | 3.30 (4.54) | 4.97 (5.88) | 2.23 (3.11) | 3.86 (5.05) | 0.00 (0.00) | 0.149*|
| Percentage sites with BOP (total), average (SD) | 47.51 (25.05) | 54.41 (28.03) | 45.47 (22.49) | 31.10 (36.30) | 23.00 (0.00) | 0.291*|
| Periodontitis (stage) |              |             |           |               |             |      |
| 1                          | 5            | 3           | 2         | 0             | 0           | 0.621†|
| 2                          | 13           | 4           | 7         | 1             | 1           |      |
| 3                          | 33           | 12          | 19        | 2             | 0           |      |
| Periodontitis (extension)  |              |             |           |               |             |      |
| 0                          | 8            | 4           | 4         | 0             | 0           | 0.850†|
| 1                          | 43           | 15          | 24        | 3             | 1           |      |

*ANOVA test for independent samples, †Chi-square test, CAL – Clinical attachment level, PD – Probing depth; BOP – Bleeding on probing; SD – Standard deviation; mm – Millimeter; P < 0.05

**Table 3: Periodontal data of the teeth involved in the scraping of the total sample and of the groups in relation to the pain intensity**

| Variables                      | Total sample | Absent pain | Mild pain | Moderate pain | Severe pain | P    |
|--------------------------------|--------------|-------------|-----------|---------------|-------------|------|
| Number of teeth in scraping    | 9.94 (5.31)  | 10.36 (4.47) | 9.96 (6.10) | 7.00 (2.64) | 10.00 (0.00) | 0.718*|
| Type of tooth in scraping      |              |             |           |               |             |      |
| Multi-rooted                   | 9            | 2           | 6         | 1             | 0           | 0.790†|
| Single-rooted                  | 1            | 0           | 1         | 0             | 0           |      |
| Both                           | 41           | 17          | 21        | 2             | 1           |      |
| Percentage sites with PD=4 mm and CAL ≥3 mm (SRP) | 14.42 (13.01) | 13.29 (11.39) | 15.82 (14.70) | 13.33 (1.44) | 0.00 (0.00) | 0.619*|
| Percentage sites with PD=5 or 6 mm and CAL ≥3 mm (SRP) | 20.12 (12.32) | 16.14 (14.93) | 22.12 (10.57) | 23.33 (2.88) | 30.00 (0.00) | 0.135*|
| Percentage sites with PD ≥7 mm and CAL ≥3 mm (SRP) | 10.33 (13.81) | 13.57 (13.90) | 7.64 (13.81) | 18.33 (10.10) | 0.00 (0.00) | 0.116*|
| Percentage sites with BOP (SRP) | 58.03 (28.58) | 60.51 (29.13) | 57.76 (28.60) | 59.16 (27.42) | 15.00 (0.00) | 0.489*|
| Mean PD (SRP)                  | 3.67 (0.84)  | 3.66 (0.96)  | 3.65 (0.82) | 4.06 (0.25)  | 3.30 (0.00)  | 0.619*|
| Analgesic use                  |              |             |           |               |             |      |
| Yes                            | 4            | 0           | 2         | 1             | 1           | 0.020 14|
| No                             | 47           | 19          | 26        | 2             | 0           |      |
| Total DAS                      | 8.35 (3.25)  | 8.94 (3.23)  | 8.10 (3.37) | 7.33 (3.21)  | 7.00 (0.00)  | 0.683*|
| Mean VAS                       | 1.25 (1.89)  | 0.02 (0.09)  | 1.35 (0.89) | 5.26 (1.41)  | 10.00 (0.00) | <0.001 13|

*ANOVA test for independent samples, †Chi-square test, ‡P ≤ 0.05. CAL – Clinical attachment level, PD – Probing depth; BOP – Bleeding on probing; SD – Standard deviation; DAS – Dental anxiety scale, VAS – Visual analog scale, mm – Millimeter, SRP – Scaling and root planing; P < 0.05

Journal of Indian Society of Periodontology - Volume 25, Issue 3, May-June 2021 239
the periodontal parameters evaluated. The use of analgesics was significantly more frequent among individuals who had reported higher levels of pain. The degree of anxiety before treatment was similar among groups.

The distribution of responses to each question in the DAS questionnaire is summarized in Table 4.

The distribution of the reports of pain (VAS) recorded at different times of assessment is presented in Table 5. Most individuals reported the absence of pain or mild pain at 2, 4, 8, 24, and 48 h after the appointment for nonsurgical periodontal therapy.

**DISCUSSION**

Usually, patients associate dental visits with pain and discomfort, which impacts the oral health of individuals. In periodontics, the possibility of a painful experience resulting from subgingival procedures can negatively affect the treatment of periodontitis, making it difficult for the patient to effectively control the biofilm and limiting his/her capacity to adhere to treatment. However, few studies have evaluated the relationship between periodontal interventions and pain. It is essential to improve knowledge about this relationship, allowing one to identify the degree of pain for each dental procedure and the elaboration of specific protocols to minimize discomfort. Most participants in this study reported the absence of pain or mild pain after subgingival scaling. In addition, the need of analgesics after the procedure was extremely low.

The study of van Steenberghe et al. demonstrated similar results regarding pain in the periodontal treatment. Approximately 83% of the individuals reported no pain or mild pain after probing and scaling procedure. However, other studies show divergent results in relation to pain reported after scaling.

In the present study, the groups of individuals with no pain and different pain intensities were similar in terms of age and sex. Leung et al. and Schirmer et al. demonstrated that age and sex had no impact on the experience of pain during dental treatment. Conversely, Canakci and Canakci observed that older individuals have a higher pain threshold than younger individuals. As for sex, evidence suggests that women have higher levels of pain and are more likely to develop chronic pain.

The severity of the periodontal condition is an aspect that has been evaluated as a mediator of the relationship between periodontal therapy and pain. Schirmer et al. demonstrated that individuals with more advanced periodontal inflammation have higher levels of pain, emphasizing the impact of disease severity on pain. Herein, there was no difference regarding the periodontal condition between groups. Therefore, the periodontal condition had no influence on pain associated with subgingival procedures, showing that even the treatment of advanced periodontal conditions is well tolerated by patients. Other studies also did not demonstrate the impact of the periodontal condition on pain.

The time of subgingival instrumentation may be directly associated with the level of pain after the intervention and consequently with the need to use analgesic medication. In this sense, it is essential to consider the type of tooth treated (single-rooted or multi-rooted) and the evaluation of the relationship between periodontal therapy and pain. Subgingival scaling of multi-rooted teeth requires a long chair time than procedures for single-rooted teeth. In our study, we considered the type of tooth submitted to subgingival scaling, whether single-rooted, multi-rooted, or both. The number of single- and multi-rooted teeth submitted to scaling was similar between groups, demonstrating no impact of the type of tooth on the report of pain intensity. However, the lack of registration of the duration of the appointment was a limitation of the study. In addition to the time spent for subgingival scaling, another factor that must be considered is the practitioner experience. The most skilled clinician will perform the intervention with less trauma and in a shorter time, impacting postoperative pain. In this study, periodontal treatment of all included individuals was performed by undergraduate students enrolled in the course of periodontics, and the report of absence of pain or mild pain was prevalent, as well as the low consumption of analgesics after therapy. Therefore, for more skilled providers, better results with respect to the reporting of pain and need for analgesics after nonsurgical periodontal therapy are expected.

**Table 4: Distribution of responses to each question in the dental anxiety scale questionnaire**

| DAS    | Total sample | Absent pain | Mild pain | Moderate pain | Severe pain |
|--------|--------------|-------------|-----------|---------------|-------------|
| DAS 1  | 2.52 (1.04)  | 2.68 (0.82) | 2.50 (1.23)| 2.00 (0.00)   | 2.00 (0.00) |
| DAS 2  | 1.94 (1.17)  | 2.15 (1.16) | 1.85 (1.20)| 1.66 (1.15)   | 1.00 (0.00) |
| DAS 3  | 2.00 (1.05)  | 2.10 (1.10) | 2.00 (1.05)| 1.66 (1.15)   | 1.00 (0.00) |
| DAS 4  | 1.88 (0.93)  | 2.00 (0.94) | 1.75 (0.92)| 2.00 (1.00)   | 3.00 (0.00) |

SD – Standard deviation; DAS – Dental anxiety scale

**Table 5: Distribution of responses to each question in the dental anxiety scale questionnaire**

| VAS    | Total sample | Absent pain (%) | Mild pain (%) | Moderate pain (%) | Severe pain (%) | P   |
|--------|--------------|-----------------|--------------|-------------------|----------------|-----|
| VAS 2  | 1.60 (2.09)  | 24 (47.0)       | 19 (37.3)    | 7 (13.7)          | 1 (2.0)        | <0.001*  |
| VAS 4  | 1.43 (1.94)  | 22 (43.1)       | 23 (45.1)    | 5 (9.8)           | 1 (2.0)        | <0.001*  |
| VAS 8  | 1.27 (2.14)  | 27 (52.9)       | 17 (33.3)    | 5 (9.8)           | 2 (4.0)        | <0.001*  |
| VAS 24 | 0.90 (2.00)  | 35 (68.6)       | 11 (21.6)    | 3 (5.9)           | 2 (3.9)        | <0.001*  |
| VAS 48 | 0.76 (2.06)  | 40 (78.4)       | 7 (13.8)     | 2 (3.9)           | 2 (3.9)        | 0.005‡  |

*ANOVA test for independent samples, †Chi-square test, ‡P≤0.05. SD – Standard deviation, VAS – Visual analog scale, P<0.05
There is evidence that anxiety has a significant impact on the report of pain associated with dental treatment.[6,10] Therefore, studies assessing the level of pain reported by the patient should also evaluate anxiety before the procedure. The degree of anxiety identified in the sample studied did not differ among individuals with no pain and reports of different levels of pain. This fact shows the absence of the interference of anxiety, an important confounding factor in the results. However, it should be noted that different instruments for the assessment of anxiety may drive us to different conclusions.[11]

In the present study, most individuals who had reported the presence of some degree of pain stated that pain was set in place for a short period after the end of nonsurgical periodontal therapy. In general, we observed that pain intensity was low or absent. Therefore, protocols with mandatory prescription of painkillers for a long period of time after scaling and root planing are not justified. If the prescription is necessary, nonopioid analgesics may be sufficient.

Nonsurgical periodontal therapy is associated with low pain or absent pain. These results collaborate significantly to demystify the fact that periodontal intervention is associated with pain, which is an important factor that impacts patient motivation, adherence to the treatment, and the success of periodontal therapy.

Financial support and sponsorship
The study had support by PRPq-UFMG.

Conflicts of interest
There are no conflicts of interest.

REFERENCES

1. Albandar JM. Global risk factors and risk indicators for periodontal diseases. Periodontol 2000 2002;29:177-206.
2. Kinane DF. Causation and pathogenesis of periodontal disease. Periodontol 2000 2001;25:8-20.
3. Page RC, Offenbacher S, Schroeder HE, Seymour GJ, Kornman KS. Advances in the pathogenesis of periodontitis: Summary of developments, clinical implication and future directions. Periodontol 2000 1997;14:216-48.
4. Oppermann RV, Haas AN, Rüssing CK, Susin C. Epidemiology of periodontal diseases in adults from Latin America. Periodontol 2000 2015;67:13-33.
5. Meseli SE, Kuru B, Kuru L. Relationships between initial probing depth and changes in the clinical parameters following non-surgical periodontal treatment in chronic periodontitis. J Istanb Univ Fac Dent 2017;51:11-7.
6. Leung WK, Duan YY, Dong XX, Yeung KW, Zhou SY, Corbet EF, et al. Perception of non-surgical periodontal treatment in individuals receiving or not receiving local anaesthesia. Oral Health Prev Dent 2016;14:165-75.
7. Schirmer C, Dos Santos GO, Rost JF, Ferreira MB, Weidlich P. Factors associated with pain and analgesic consumption following non-surgical periodontal therapy under local anaesthesia and carried out by dental students. J Clin Periodontol 2018;45:68-77.
8. Corah NL. Development of a dental anxiety scale. J Dent Res 1969;48:396.
9. Karadottir H, Lenoir L, Barbierato B, Bogle M, Riggs M, Sigurdsdottir T, et al. Pain experienced by patients during periodontal maintenance treatment. J Periodontol 2002;73:536-42.
10. Chung DT, Bogle G, Bernardini M, Stephens D, Riggs ML, Egberg JH. Pain experienced by patients during periodontal maintenance treatment. J Periodontol 2003;74:1293-301.
11. Guzeldemir E, Toypar HI, Cilasun U. Pain perception and anxiety during scaling in periodontally healthy patients. J Periodontol 2008;79:2247-2255.
12. Tonetti MS, Greenwell H, Kornman KS. Staging and grading of periodontitis: Framework and proposal of a new classification and case definition. J Periodontol 2018;89:S159-S172.
13. Hassan MA, Bogle G, Quishenbery M, Stephens D, Riggs M, Egberg J. Pain experienced by patients during periodontal recall examination using thinner versus thicker probes. J Periodontol 2005;76:980-4.
14. Canakci V, Canakci CF. Pain levels in patients during periodontal probing and mechanical non-surgical therapy. Clin Oral Investig 2007;11:377-83.
15. Collins SL, Moore RA, McQuay HJ. The visual analogue pain intensity scale: What is moderate pain in millimetres? Pain 1997;72:95-7.
16. van Steenbergh DE, Garmyn P, Geers L, Hendrickx E, Marechal M, Huizar K, et al. Patients’ experience of pain and discomfort during instrumentation in the diagnosis and non-surgical treatment of periodontitis. J Periodontol 2004;75:1465-70.
17. Polycarpou N, Ng YL, Canavan D, Moles DR, Gulabivala K. Prevalence of persistent pain after endodontic treatment and factors affecting its occurrence in cases with complete radiographic healing. Int Endod J 2005;38:169-78.
18. Kocher T, Plagmann HC. The Diamond-coated sonic scaler tip. Part I: Oscillation pattern of different sonic scaler inserts. Int J Periodontics Restorative Dent 1999;17:393-9.
19. Sanikop S, Agrawal P, Patil S. Relationship between dental anxiety and pain perception during scaling. J Oral Sci 2011;53:341-8.