Research Article

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Assessment of Intensity of Pain During Ultrasonic Supragingival Calculus Removal at Tertiary Care Dental Hospital

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ABSTRACT

Introduction: Scaling with root planing is one of the most basic and commonly performed procedures in dentistry. Supragingival calculus removal procedures are reported to cause painful sensations in patients which precludes patients from seeking this primary dental treatment.

Objective: To assess the subjective intensity of pain after supragingival scaling using verbal rating scale (VRS).

Methodology: A descriptive cross-sectional study was done from 2022 February to 2022 August in department of Periodontics and Oral Implantology, Kathmandu Medical College among 289 patients intended for supragingival scaling. Data collection was started after institutional ethical approval using convenience sampling. Individuals of both sexes of age ≥18 years were included, while those with subgingival calculus and underlying psychiatric and systemic conditions were excluded. Informed consent was taken. The intensity of pain after scaling was recorded using VRS in various age groups, both sexes, periodontal disease diagnosis, and status of calculus deposits. Data entered in Microsoft Excel were analysed for frequency, percent, mean, standard deviation, and standard error of mean.

Result: Verbal rating scale for pain was calculated to be 0.96±0.713 with most (166, 57.4%) reporting only mild pain with score 1. Under various categories, slightly higher pain scores were observed in female (0.99±0.704), elderly and seniors (1.02±0.701), patients with periodontitis (1.04±0.711), and higher calculus deposits (1.89±0.542).

Conclusion: The pain scores were observed higher in female, elderly, periodontitis diagnosis, and higher calculus deposits. The factors associated with pain should be addressed for better patient compliance with primary dental care such as scaling and root planing.

Keywords: Dental calculus; dental pain; dentinal hypersensitivity; root planing; scaling; verbal rating scale.

INTRODUCTION

Pain is described by the Subcommittee on Taxonomy of the International Association for the Study of Pain (IASP) as “an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage.[1] Scaling and root planing is one of the most commonly performed procedures in a dental clinic. It is associated with anxiety and pain. There are va-

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rious pain management tools in palliative care.[2] It has been suggested that pain and anxiety can be reduced by giving local anaesthesia during subgingival scaling and root planing in pocket of 4-6 mm.[3] Pain during scaling with and without anxiety and fear are important factors that prevent patients from seeking dental care.[1] Supragingival calculus removal procedures are reported to cause painful sensations in the patient.[4]

The ability to deliver dental care with a minimum of patient discomfort should be an essential part of a clinician's skills to avoid a decline of compliance.[5] Hence this study was done with the aim to assess the level of intensity of pain after supragingival scaling using verbal rating scale (VRS).

METHODOLOGY

This descriptive cross-sectional study was done in the department of Periodontics and Oral Implantology among 289 patients visiting Kathmandu Medical College Teaching Hospitals at Duwakot, Bhaktapur and Sinamangal, Kathmandu, Nepal. The study was approved by Institutional Review Committee (IRC) of Kathmandu Medical College (Reference number: 0311202001). Data collection was done from 2022 February to 2022 August after ethical approval using convenience sampling.

The sample size was calculated by using formula: $n = Z^2 pq/e^2$; Where n = sample size; Z = 1.96 at 95% confidence level; p = 0.233 (23.3%, proportion of moderate intensity of pain perceived);[6] q = 1-p; e = 0.05 (5% margin of error). So, $n = (1.96)^2 \text{ X } (0.233\text{X}0.767)/ (0.05)^2 = 274.61 \approx 275$. Adding 5% for non-response and data cleaning, the total sample size calculated as 289 (288.35).

Individuals of both sexes of age 18 years and above, visiting the study sites for periodontal therapy, requiring supragingival scaling only, were explained in detail about the background of the study, its objectives, and their participation in it. They were requested to give their consent and sign an informed consent document prior to their enrolment in the study. Cases with only supragingival calculus were considered. Patients with subgingival calculus; patients under psychiatric consultation or under psychiatric medication; those who exhibited signs of dental wasting diseases such as abrasion, attrition, and erosion; patients with underlying systemic diseases; and patients with orthodontic appliance and removable partial dentures were excluded from the study.

An ultrasonic piezoelectric scaler unit (Woodpecker®) which is available in the department (Figure 1) with power setting at 5-6 was used in the study. Two different inserts, G4, GIT (Figure 2) were used for supragingival scaling in the study. Both scaler tips showed a predominantly linear oscillation pattern with 30 ml/min flow of coolant (water) at room temperature.

Supragingival calculus was recorded following calculus criteria of Oral Hygiene Index as developed by Greene and Vermillion (1960). Only supragingival calculus component were taken into consideration. Scoring criteria: Score 0 = No calculus present; Score 1 = Supragingival calculus covering not more than one-third of exposed tooth surface; Score 2 = Supragingival calculus covering more than one-third but not more than two-thirds of exposed tooth surface; Score 3 = Supragingival calculus covering more than two-thirds of exposed tooth surface.

Supragingival ultrasonic scaling was done in the study participants. After completion of the supragingival scaling of selected sites, patient was requested to fill the VRS sheet. If subgingival calculus was detected during the treatment procedure, the patient was removed from study without pain assessment after the supragingival cleaning.

An evaluation sheet was documented regarding pain after scaling as follows: '0' = no pain or discomfort; '1' = mild pain or discomfort or sensitivity; '2' = moderate pain or discomfort or sensitivity; '3' = severe pain, discomfort or sensitivity which subsided after five minutes of scaling; '4' = severe persistent pain or radiating pain, discomfort or sensitivity after scaling procedure. The data were then entered in Microsoft Excel Sheet 2016 and analysed. Descriptive data have been presented as frequency, percent, mean, standard deviation (SD), and standard error of mean (SEM).

RESULT

Out of total 289 participants, 142 (49.1%) were female and 147 (50.9%) were male. Seventy seven (26.6%) participants were Adolescents (≤25 years), 148 (51.2%) were Adults (26-45 years), and 64 (22.1%) were Elderly and seniors (≥46 years). The patients with diagnosis of gingivitis were 207 (71.6%) participants while 82 (28.4%) had periodontitis.

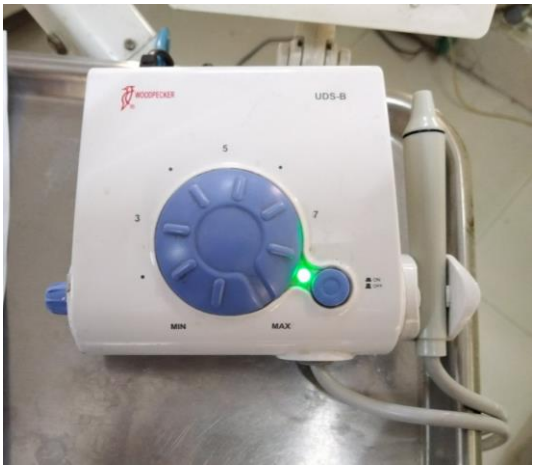

Figure 1: Ultrasonic piezoelectric scaler unit.

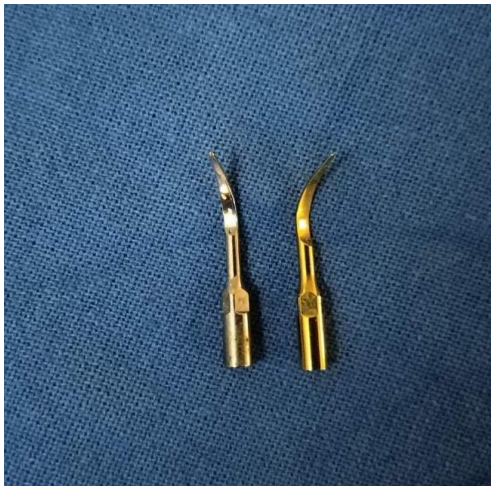

Figure 2: Ultrasonic inserts (golden- GIT, Silver – G4).

Table 1: Pain scale of participants with their age categories, (N = 289).

Category (years)	Total	Verbal rating scale of pain, n (%)				Mean±SD	SEM
		0	1	2	3		
Adolescent (≤25)	77 (100)	20 (26.0)	45 (58.4)	11 (14.3)	1 (1.3)	0.91±0.672	0.077
Adult (26-45)	148 (100)	38 (25.7)	82 (55.4)	23 (15.5)	5 (3.4)	0.97±0.742	0.061
Elderly and senior (≥46)	64 (100)	13 (20.3)	39 (60.9)	10 (15.6)	2 (3.1)	1.02±0.701	0.088
Total	289 (100)	71 (24.6)	166 (57.4)	44 (15.2)	8 (2.8)	0.96±0.713	0.042

Verbal rating scale for pain was calculated to be 0.96±0.713 with minimum 0 to maximum 3 (Table 1). The standard error of mean was 0.042. There was not much difference in pain score between female (0.99±0.704) and male (0.94±0.724) participants (Table 2). However, under disease diagnosis category, periodontitis (1.04±0.711) had slightly higher pain scores than gingivitis (0.93±0.714) and periodontitis (Table 3). Total calculus score was found to be 1.55±0.658, while the highest calculus score was observed in the VRS score 3 (Table 4).

Table 2: Pain scale of participants with their sex and periodontal diagnosis.

Sex	Diagnosis	Total	Verbal rating scale of pain, n (%)				Mean±SD.	S.E.M
			0	1	2	3		
Female	Gingivitis	107 (100)	26 (24.3)	61 (57.0)	18 (16.8)	2 (1.9)	0.96±0.699	0.068
	Periodontitis	35 (100)	7 (20.0)	20 (57.1)	7 (20.0)	1 (2.9)	1.06±0.725	0.123
	Total	142 (100)	33 (23.2)	81 (57.0)	25 (17.6)	3 (2.1)	0.99±0.704	0.059
Male	Gingivitis	100 (100)	28 (28.0)	58 (58.0)	10 (10.0)	4 (4.0)	0.90±0.732	0.073
	Periodontitis	47 (100)	10 (21.3)	27 (57.4)	9 (19.1)	1 (2.1)	1.02±0.707	0.103
	Total	147 (100)	38 (25.9)	85 (57.8)	19 (12.9)	5 (3.4)	0.94±0.724	0.060

Table 3: Pain scale of participants with their diagnosis.

Diagnosis	Total	Verbal rating scale of pain, n (%)				Mean±SD	SEM
		0	1	2	3		
Gingivitis	207 (100)	54 (26.1)	119 (57.5)	28 (13.5)	6 (2.9)	0.93±0.714	0.050
Periodontitis	82 (100)	17 (20.7)	47 (57.3)	16 (19.5)	2 (2.4)	1.04±0.711	0.078

Table 4: Verbal rating scale of participants with the mean of calculus index.

Verbal rating scale	N	Calculus index			
		Minimum	Maximum	Mean±S.D.	SEM
0	71	0	2.6	1.37±0.556	0.066
1	166	0	3	1.61±0.678	0.053
2	44	0	3	1.58±0.706	0.106
3	8	0	2.6	1.89±0.542	0.192
Total	289	0	3	1.55± 0.658	0.039

DISCUSSION

Scaling with root planing is one of the most commonly performed procedures in a dental clinic. It is often associated with anxiety and pain. Supragingival calculus removal procedures are reported to cause painful sensations in the patient.[4,5] Various pain management tools can be utilised in palliative care.[2] Professional supragingival plaque removal lead to diminished counts of both supra- and subgingival species creating a microbial profile comparable to that observed in periodontal health.[7] The VAS results have not shown any difference between the two commonly used instrumentation modalities (sonic and a piezoceramic ultrasonic scaler) suggesting oscillation pattern may not influence the pain experience.[4] The ability to deliver dental care with minimum patient discomfort should be an essential part of clinician's skillset to avoid any decline of patient compliance.[5]

In present study, slightly more pain score was found in female participants. This result may be due to increased anxiety level reported in females.[8] Current study also showed insignificant age and gender differences with regard to pain perception after scaling similar to a previous study.[9] For all periodontal treatments such as scaling and root planing, modified Widman flap, osseous resection, and gingivectomy, VAS scores have been reported to decrease with increasing age.[10] Contrary to that, this study showed a positive correlation of pain scale and age (Table 1).

The observations of current study showed higher values in pain scale with periodontitis (1.04±0.711) than gingivitis (0.93±0.714). This maybe because of dentinal hypersensitivity due to exposure of root surface and cementoenamel junction in periodontitis.

Supragingival calculus removal procedures are reported to cause painful sensations in the patient.[4] Calculus deposits and pain scores were consistent in this study. Highest score of pain was associated with greater calculus index and lowest score of pain was observed with lower calculus index scores (Table 4). Majority of participants had mild pain (score 1) followed by no pain

(score 0), moderate pain (score 2), and severe pain (score 3). This kind of variation is supported by other studies also.[1,4] No participant reported severe persistent pain (score 4).

Use of an experimental calculus disruption solution can be alternative to reduced time needed to remove supragingival calculus while using hand instrumentation.[11] In current study, conventional supragingival tip was used. It has been shown that Using slim-line-styled ultrasonic scaler tips for supragingival calculus removal, painful sensations can be reduced compared with conventional ultrasonic devices.[5] Studies report that the use of both slim-line insert and focus-spray inserts when used at same settings of the scaling unit, show no statistical significant difference in the intensity of pain perceived. The VRS rating scores with slim-line inserts showed a pain intensity of 2 in 43.3%, 1 in 53.3% and 0 in 3.3%, whereas the focus-spray insert showed a pain intensity of 1 in 23.3% and 0 in 76.7%.[6]

Application of eutectic mixture of local anaesthetics (EMLA) reduced both pain intensity and unpleasantness significantly compared to placebo cream.[12] Varying degrees of pain have been found in subjects undergoing scaling and root planing.[13] So it is necessary to deliver treatment care with minimum pain. The total viable counts of bacteria in both deep and shallow pockets were markedly reduced two years after the initiation of the enhanced oral hygiene efforts.[14] Since pain during scaling with and without dental pain, anxiety, and fear are important factors that prevent patients from seeking dental care,[1] efforts should be done towards reducing perceived pain and identifying various factors related to it.

The limitations of this study could be the use of convenience sampling method at only one centre. Thus, the study findings cannot be generalised to all the patients of the country. Significant correlation between VAS and total anxiety scores have been reported. However, the anxiety scale was not evaluated in this study which has been reported to alter the perception of pain.[1] Potential biases include information bias by the patient and selection bias by investigator. The pain levels may also have altered due to room temperature changes that may have taken place during the data collection period.

CONCLUSION

There is variation in pain response ranging from no pain to severe pain after supragingival scaling with majority being mild pain (score 1). The VRS scores were observed to be more in female, elderly, periodontitis, and those with higher calculus deposits.

Further multicentric studies using simple random samplilng method, bigger sample size with minimal limitations and bias is recommended. Anxiety of pain associated with scaling and root planing prevents individuals from seeking professional oral care. Hence, it is also recommended to identify that and address the associated factors.

Conflict of interest: None.

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