Experiencing Pain during Scaling and Root Planing: A Clinical Study Using Visual Analogue Scale

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ABSTRACT:

Introduction: Pain is the major criteria modifying patient compliance during scaling and root planing. It has been documented that mild to moderate amount of pain occur during the procedure. Various efforts have been made to quantify this pain. The present study has been an attempt to quantify the pain experienced by the patient during the basic periodontal treatment.

Objective: With the present study an attempt is made to quantify the intensity of pain using Visual Analogue Scale (VAS).

Methodology: A total of eighty (80) patients, including thirty seven males and forty three females, between age groups 16 to 60 years, were included in the study. The patients were randomly selected based on the inclusion and exclusion criteria of the study. The patients were under the advice for ultrasonic scaling and root planning from the outpatient department of Army Dental Centre (Research and Referral) Delhi. Patients were asked to quantify the maximum pain experienced by them during the procedure and mark accordingly on the VAS score chart on the questionnaire provided.

Result: Mild to moderate pain was experienced by the subjects as per their assessment and record on the VAS.

Conclusion: The procedure of scaling and root planing has its goal for achievement of optimum oral health and hygiene with minimum procedural complications. The result of the study confirms varying degree of pain in the subjects. This is a cause of concern to the clinician and the oral healthcare provider. Further feedbacks may help with the development of enhanced quality control measures.

Key words: Oral Prophylaxis, Pain, Visual Analogue Scale (VAS).

INTRODUCTION

Pain, as defined by the International Association for the Study of Pain (IASP) “an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described by the patient in terms of such damage”. Pain can occur if there is ongoing nociception or

inflammation, psychological factors and functional or structural alterations within the central or peripheral nervous system.¹ It is not simply determined by the intensity of nociception stimulation, but by a variety of other factors such as individual perception, stress, disease status and type of injury. Thus pain is an unpleasant emotional

experience usually initiated by noxious stimuli, perceived by special receptors and transmitted over a specialized neural network to the central nervous system where it is interpreted as such.

Rhudy and Meagher evaluated the effect of fear and anxiety on pain reactivity in humans, and emphasized the fact that emotional state modulates human pain reactivity.² Pain is much a cognitive and emotional construct as it is a psychological experience and it depends on multiple factors, such as the emotional and motivational state of the organism.³ Emotion seems to influence pain through a valence by arousal interaction. Dental anxiety is a multidimensional construct that consist of somatic, cognitive, and emotional elements and describes a general state that is not stimulus specific. Anxiety may trigger an abnormal response to even minor non surgical procedures like scaling and root planing.

Successful management of periodontal disease relies on a variety of non surgical and surgical procedures including scaling and root planing, gingivectomies, gingival grafts, various gingival flap procedures, etc. Strategies for pain control and anxiety management in periodontics are tailored to address some of the unique features of these treatments.⁴

Scaling and root planing are the pillars of success as basic modality of periodontal therapy undertaken before any surgical techniques. Visits for periodontal maintenance care include supra and subgingival debridement of areas of deposits or signs of gingival inflammation. At times scaling may be undertaken as the only mode of treatment in mild to moderate cases of gingivitis and also as the most predictable preventive aspect of periodontal therapy. Scaling consists of instrumentation of the crown and root surfaces of the teeth to remove plaque, calculus and stains from these surfaces. Root planing is defined as being a definitive treatment procedure designed to remove necrotic cementum or surface dentin that is rough, impregnated with calculus, or contaminated with toxins or microorganisms.⁵

Recognition of patients who experience pain during maintenance procedures is essential in order to introduce measures to reduce the pain and anxiety in these individuals. Pain experienced during ultrasonic scaling is different from manual to instrumentation. Patients many a times cannot differentiate between actual pain and sensitivity.

The other factors responsible for pain experienced include the variation between different personalities, race, state of mind and also environmental factors including professional expertise. It is quite obvious that pain perceived due to injuries produced in soft tissues during scaling is much more than that caused by confining the procedure onto the hard tissue surfaces only. However the operators should aim at performing the procedure without pain experience.

There has been literature available to correlate the degree of pain experienced by the patients during various periodontal surgical procedures, but minimal studies have been carried out to quantify the pain experience during basic non surgical periodontal treatment such as scaling and root planning.⁶⁻¹² In clinical practice the percentage of pain experienced by Visual Analogue Scale is considered as a measure to quantify pain. The Visual Analogue Scale is a simple and frequently used tool to assess pain in day to day clinical practice.

The purpose of this study is to assess the degree of discomfort namely pain during the normal routine oral prophylaxis, and to determine the relationship of pain to various demographic and periodontal variables using VAS in our setup.

Material and Methods

Study Population

A total of eighty (80) patients, including forty eight males and thirty two females, between age groups 16 to 60 years were randomly selected for oral prophylaxis by an experienced Periodontist from the Outpatient Department of Army Dental Centre (R and R) and were referred to Department of Periodontics. The study period was for one month with effect from 01 July 2013 to 01 August 2013. The ethical clearance was granted by the institutional ethical committee of Army Dental Centre (Research and Referral) Delhi.

Inclusion criteria

1. All selected cases from the OPD referred by a Periodontist, indicated for oral prophylaxis.
2. Age between 16-60 years.
3. Systemically healthy patients.
4. Non smokers.
5. Patients undergoing oral prophylaxis for the first time.

Exclusion criteria

1. Non compliant patients.
2. Physically and mentally handicapped patients.
3. Pregnant ladies.
4. Patients on any medication, including analgesics, anxiolytics, sedatives etc.
5. Patient with debilitating systemic diseases

Each of the patient selected for the study was asked to fill a case history performa in form of a questionnaire. Various demographic variables such as age, sex, and education level of the patients were recorded. Oral and periodontal examinations were done. Probing Depth (PD) and Clinical Attachment Level (CAL) were recorded. The details of the study were explained and written consent was obtained from all the patients. The therapy of all the cases included oral hygiene instructions, scaling and root planing using ultrasonic scalers and subgingival curettes. The procedure for each patient was completed over two sittings by a single clinician. Constant clinical parameters in form of fixed scaler tip design, speed, and water spray settings were assured to rule out any bias.

Assessment of pain

To assess the intensity of pain and discomfort during the procedure, the patients were asked to mark their perception on a pre-calibrated scale provided in the questionnaire. This color coded 100mm **Visual Analogue Scale** (VAS) was divided into 10 equal segregates from 0 to 10, with colors ranging from light blue to bright red (Figure 1). The value 0 depicted no pain and 10 the worst pain patients have ever experienced, with intermediate values corresponding to higher pain with increase in the value number.¹³

Statistical Analysis

A statistical analysis was carried out using "Student's t-test", and significant results were arrived.

Results

A total of eighty (80) patients, including forty eight males and thirty two females with an average age of 37.5 (range 16-60 yrs) were recruited for the study. Majority of the patients were within the age group of 26-40 years constituting 50% of the total patients taken for the study (Table 1). The mean VAS score during the procedures were low with maximum value of 9 in one case, the average score

being 4.5. None of the patients discontinued the study. The majority of the patients seeking treatment were males 60% (Table 2). Table 3 depicts the distribution of patients as per the VAS scores obtained during the oral prophylaxis procedure.

The results revealed that increase in age is positively correlated with higher pain perception. Conversely lower level of education was correlated with higher levels of pain perception. Probing Depth (PD) and Clinical attachment loss were noted to be in direct proportional relation to the levels of pain perception by the patients, giving an indication that acuity of the disease is positively correlated with pain perception. No significant variation was noted in relation to gender of the patient.

Pictograms and frequency charting were used to depict a relative relationship of pain perception with periodontal variables, namely PD and CAL and demographic variables such as age, sex and the level of education (Figure 2; Table 4).

Discussion

Pain is perceived when a nociceptive (injurious) stimulus is received. The stimulus either causes actual damage or is a potentially damaging agent for tissues. It is usually an unpleasant sensation, but on the whole it is beneficial as it makes the individual conscious of presence of the injurious agent, making him react in an appropriate manner so as to get rid of the injurious agent. Pain assessment during oral prophylaxis is of great importance, as it determines the patient compliance as well as helps in modification of the treatment procedures as per the patients needs.

Knowledge of the physiology of pain perception is important for the clinician to appreciate the choice and course of the treatment plan for the patient. The initial pain perception is by nociceptors. These free nerve terminals or pain receptors are simply the branching ends of dendrites of certain sensory neurons. Pain receptors are found practically in every tissue of body. They may be stimulated by any type of stimulus. Excessive stimulation of a sense organ causes pain. Additional stimuli for pain receptors include excessive distension or dilation of a structure, prolonged muscular contractions, muscle spasms, inadequate blood flow to an organ or presence of certain chemical substances. Pain receptors, because of their sensitivity to all stimuli, perform as protective function by identifying changes that may endanger the body.

TABLE 1: AGE DISTRIBUTION OF CASES

Age in Years	Frequency	Percent
16-25	32	40.0
26-40	40	50.0
41-60	08	10.0
Total	80	100

TABLE 2: MALE-FEMALE DISTRIBUTION TABLE

	Frequency	Percent
Female	32	40.0
Male	48	60.0
Total	80	100.0

TABLE 3: DISTRIBUTION OF PATIENTS AS PER VAS SCORE

Severity of Pain (VAS)	No of Patients	Male	Female
0	03	01	02
1	03	01	02
2	12	08	04
3	22	14	08
4	19	15	04
5	09	07	02
6	02	01	01
7	02	01	01
8	07	-	07
9	01	-	01
10	-	-	-
Total	80	48	32

TABLE 4: FREQUENCY CHARTING

Group	VAS 0-3 (p Value)	VAS 4-7 (p Value)	VAS 8-10 (p Value)
Age in yrs	26.25±9.451 (0.001)	39.35±12.594 (0.001)	26.25±14.785 (0.001)
16-25	20	8	4
26-40	20	16	4
40-60	0	8	0
Sex			
Male	24	24	0
Female	16	8	8
Education			
No	0	0	0
Primary	0	8 (0.01)	0
Matric	20	8 (0.01)	8
Graduate	20	16	0
PD	2.2±0.975 (0.001)	5.7±1.689 (0.001)	6.2±2.256 (0.001)
CAL	2.4±1.675 (0.01)	5.95±1.986 (0.001)	6.9±2.453

Fig 1: Visual Analogue Scale - Pain **Fig 2:** VAS - Periodontal Variable Relationship **Fig 3:** VAS - Demographic Variable Relationship

Physiology of pain perception from the orofacial region is the perception of the stimulus by the free nerve terminals and the subsequent uptake by the A delta and C fibres. These fibres carry the afferent pain impulses to the Gasserian ganglion situated in the petrous part of temporal bone, from where sensory root fibres reach the sensory nuclei in the Pons of the brain stem. Cross over transmission of the post synaptic neurons and the final conduction of the pain impulse to the cerebral cortex occurs, where the final pain perception occurs.

Pain perception is a subjective phenomenon which is individual specific and also depends on various demographic and environmental factors such as age, gender, socioeconomic status, education, pre experience, fatigue, anxiety etc. Oral prophylaxis procedure in this study included ultrasonic scaling and noninvasive mechanical curettage in the subgingival region.

To assess the relationship of pain experienced during oral prophylaxis to various demographic and

periodontal variables, a randomized clinical trial was undertaken, where a total of eighty (80) patients, including forty eight males and thirty two females, were recruited for the study in Department of Periodontology in Army Dental Centre (R and R) during a period of one month. Pain during routine oral prophylaxis was assessed using VAS. Procedural variations and operator bias was considered as a possible hindrance factor to the uniformity of the results. Therefore a specific ultrasonic scaler tip design, calibration to a fixed frequency, constant water spray and lone operator were ascertained for each patient.

The study showed that there was no difference between gender in pain perception agreeing with the results of the study by Canakci and Canakci, stating that pain is not gender biased.¹⁴

No statistical significant difference was observed comparing gender. As increase in age was positively correlated to higher pain perception, this is in non agreement with a study carried out by Locker, Liddell, and Burman who reported a higher pain threshold in elderly subjects, which may be attributed to certain tissue changes such as decreased vascularization, fatty degeneration of bone tissue and secondary dentine formation.¹⁵

Lower level of education was correlated with higher levels of pain perception. This might be a factor of increased anxiety on the patient's part, or lack of knowledge about the procedure, no pre experience, or even exposure to a new environment.

Probing Depth (PD) and Clinical attachment level were noted to be in direct proportional relation to the levels of pain perception by the patients. Higher scores of periodontal probing and loss of clinical attachment showed higher individual VAS score. This gives an indication that acuity of the disease is positively correlated with pain perception.

Though the study involved a constant instrumentation and clinician criteria, it may be added that the design of the scaler tip, rate of vibrations, water spray, pressure applied by the clinician may also modify the patient's pain perception.

Conclusion

The procedure of oral prophylaxis has its goal for achievement of optimum oral health and hygiene with minimum procedural complications. Patient comfort during the procedure is of utmost priority

and prime importance. This dictates the patient compliance during the procedure and the future treatment acceptance by the patient. The result of the study confirms varying degree of pain in the subjects. This is a cause of concern to the clinician and the oral healthcare provider. A study carried over a longer period with larger sample size should provide a better statistical analysis about pain perception in relation to various demographic and periodontal variables. Further feedbacks with larger sample size may help with the development of enhanced quality control measures of non surgical periodontal therapy.

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