



Determinants Of Pain Experienced During Scaling Of Teeth By Patients Attending The Dental Clinic Of The Lagos State University College Of Medicine Ikeja, Lagos Nigeria.

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ABSTRACT

INTRODUCTION- The association of pain and dental procedures has been well studied, studies have established this relationship to be more with invasive procedures and less so with non-invasive. While some factors have been implicated in this relationship there is a need to assess the associated determinants in patients undergoing teeth scaling in Nigeria.

AIM- To determine the determinants of pain associated with the Scaling of teeth among patients attending the dental center of the Lagos State University College of Medicine Lagos Nigeria.

METHODOLOGY -The study population was 116, patients aged more than 15 years reporting to the Periodontology Unit of the Dental Centre, Lagos State University Teaching Hospital (LASUTH), Ikeja who had scaling and polishing done. Data collection was done using a self-administered questionnaire to obtain the demographics, the oral hygiene (OH) status, Gingival Index (GI), and Bleeding on probing Index (BOP). Subjects indicated their level of pain on the visual analogue scale (VAS) and completed the questionnaire to assess dental fear score (DFS) and other covariates. A 2-way t-test for the mean values of the VAS and the independent variables which are continuous was tested for a significant difference, their correlation was also determined. Linear regression for repeated data was used to determine the effect of covariates on the perception of pain and to adjust for confounders. Statistical significance was inferred at $p \leq 0.05$.

RESULTS- The male /female ratio is 1.2:1 with a mean of 46.6 ± 17.8 . The largest age group is the 20 - 25 years old 28(24.1%) followed by the 56 -65 years old 26(22.4%). DFS ranged from 3 to 15 with a mean of 6.5 ± 2.7 (Table 1). The mean Visual analogue score was 31.25 ± 21.2 with the majority 71(61%) scoring 5-44. The mean OH index score

was 2.37 ± 1.0 , BOP index, and GI are 47.8 ± 36.7 and 1.41 ± 0.52 respectively. Paired sample t-test showed that all the variables have a significant relationship with the VAS score $p = 0.001$. Paired sample correlation showed that only DFS significantly correlated with the VAS score with $p = 0.002$. Linear regression revealed that only DFS and BOP scores were significantly related to the VAS score with p-values of 0.004 and 0.03 respectively.

Conclusion- Most subjects in this study experienced mild to moderate pain while scaling their teeth. Sociodemographic factors were significantly related to the pain experience, but their subgroups were insignificant. Dental fear and the level of inflammation in the gingiva were the major determinants of the pain experienced by the subjects.

KEYWORDS; Determinants, pain, scaling, visual analogue scale, dental fear, gingival.

I. INTRODUCTION

Pain is associated with several oral and dental treatments which are mostly taken care of by local anesthesia [1,2]. About two-thirds of patients report a level of pain during their dental procedures[2]. Psychological aspects such as patients' anxiety level and emotional status and others such as cognitive, behavioural, sociocultural, genetic, and demographic aspects, oral health status, and previous experiences may influence pain experience and its overestimation [3]. A study has reported that more than 70% of patients experience pain during dental procedures with varying intensity from mild to very severe [4,5]. Procedures, such as dental restorations, tooth extractions, orthodontic procedures, endodontic treatment, and periodontal/surgical procedures were associated with a higher possibility of intraoperative pain[5]. This does not mean that pain is not present in non-



invasive procedures, such as probing, prophylaxis, and removal of supragingival calculus [3,4,5].

Distraction may also decrease pain awareness, as well as positive emotions; while negative emotions, on the other hand, may increase pain awareness [3]. Among psychological aspects, anxiety has been widely studied[1,4,5]. Dental anxiety is an overtly or impairing negative psychosocial experience by dental patients while dental fear is expressed as a negative response to a specific stimulus that is perceived as threatening in the course of a dental procedure [5]. These descriptions are commonly applied interchangeably or singly as, dental fear and anxiety (DFA) [3, 5]. DFA is usually preceded by an eventful past dental treatment and oftentimes starts in the child, however, DFA occurs commonly in all age groups. Prevalence ranged from 5% to 42% in children, and 11–32% in adults [3,4,5].

Periodontal disease involves inflammatory conditions of the periodontium usually beginning as gingivitis which is limited to the marginal gingiva and reversible with improved oral hygiene[6].It is highly prevalent in most populations globally irrespective of age groups with values ranging from 50 to 90% [6]. It may progress to periodontitis where there is loss or destruction of the periodontal attachment apparatus and/or alveolar bone[6,7]. Periodontitis is a major public health problem that may be complicated with bleeding, foetor oris, gingival recession and teeth mobility and loss. It also negatively affects the psychosocial state of the affected person [6,7]. It is the most common chronic inflammatory disease seen in humans, a hospital-based study in Ile Ife Nigeria reported a prevalence of 68.7% [8]. The beneficial breakdown or removal of dental biofilm in the process of Scaling and Polishing is a key component for the prevention of periodontal disease globally[9,10].

Dental scaling and polishing is a routine treatment of the crown and root surfaces of teeth to remove plaque, calculus, debris, and stains [9,10,11]. This procedure is not a periodontal surgical process, it is devoid of adjunctive periodontal treatment such as chemotherapeutic agents or root planing. It is a professional mechanical plaque removal that is the most commonly carried out dental procedure in the world[9,10,] it can also be referred to as dental prophylaxis or periodontal instrumentation¹. Scaling and Polishing can be carried out with the use of hand instruments or electronically with the use of ultrasonic scalers [9-12].

There have been a lot of studies on dental awareness in Nigeria in recent decades [13,14]and the need to have a better understanding of patients'

response to dental procedures is very important. Hence this study aims to identify major determinants of the intensity of pain perceived by patients during the scaling of the teeth in Lagos, Nigeria.

II. METHODOLOGY

This study was carried out at the Periodontology Unit of the Dental Centre of the Lagos State University Teaching Hospital (LASUTH), Ikeja, Lagos, Nigeria. LASUTH is a tertiary health facility located in Ikeja, the capital city of Lagos State, Southwest Nigeria. It is a referral hospital that provides service for inhabitants of Lagos state a metropolitan with a mix of Nigeria's diversity. The Oral diagnosis unit of the Dental Centre receives patients' inflow of more than 500 new patients monthly with more than half of these patients referred to the periodontology unit for varying forms of periodontal assessment and treatment. Most patients who attended the periodontology clinic have their teeth scaled and polished as the preliminary procedure or definitive treatment.

The study population was 116, 63 male and 53 female patients aged more than 15 years reporting to the Periodontology Unit of the Dental Centre, Lagos State University Teaching Hospital (LASUTH), Ikeja who had scaling and polishing done.

Ethical Approval Permission to carry out the research was obtained from the Health Research and Ethics Committee of Lagos State University Teaching Hospital (LASUTH).

Inclusion Criteria include patients who are aged 16 years and above with supragingival calculus on the mandibular anterior teeth. Absence of dentin sensitivity or sulcus depth >4mm. Excluded were patients with restorations on mandibular anterior teeth or orthodontic treatment, medical or psychological disorders that may influence response to pain, and those on pain/anxiety medications. Also excluded were smokers, alcoholics, patients with pulpal and periodontal pain and abscesses.

Data collection was done using a self-administered questionnaire which consisted of both open and close-ended questions to obtain information such as age, sex, occupation, medical history, and dental history. William's periodontal probe to estimate the oral hygiene (OH) status using the Simplified Oral Hygiene index (OHI-S) of Green and Vermillion which is calculated by adding the debris and calculus indices, each of which is scored on a scale of 0 to 3. The OH status was grouped into; good (0.1–1.2), fair (1.3–3.0), and poor (3.1–6.0). Gingival Index (GI) and Bleeding on probing Index were used to assess the gingival health status of the



subjects. The gingiva was scored as healthy when the GI score was 0, 0.1 – 1.0 was mild inflammation, 1.1 – 2.0 was moderate inflammation and 2.1 – 3 was severe inflammation. Bleeding on Probing index of 10% or greater was regarded as gingivitis.

Supra-gingival scaling was performed on the six mandibular anterior teeth of all the participants manually using supragingival scalers of the same size and ultrasonic method using the same handpiece and tips without local anaesthesia. Thereafter, patients were informed of the study protocol to avoid exaggerated responses; and written informed consent was obtained from the patients before participating in the study.

All consented patients were then asked to indicate their level of pain on the VAS and complete the questionnaire to assess dental fear and other covariates. VAS entails a 100-mm horizontal line on which patients pinpoint their level of pain which indicates a distance from the beginning of the line; 0 translates to “no pain and discomfort” while 100 translates to “the worst possible pain and discomfort”.

Dental fear surveyas modified by Kadottir et al [15]was used, it consists of 3 questions that

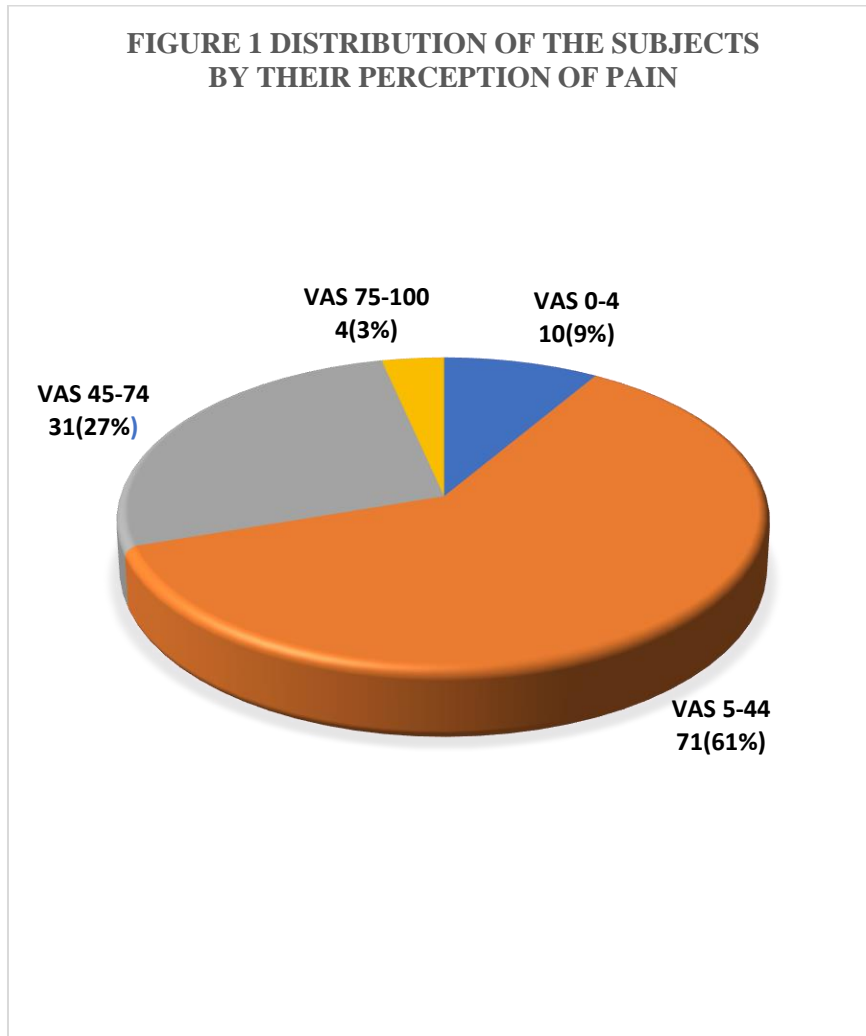
significantly respond to instrumentation. Scaling of the whole mouth was afterwards completed for each patient followed by proper periodontal care and treatment.

Data analysis was carried out using SPSS version 24 (IBM Corporation USA). Descriptive statistics was carried out for socio-demographic variables such as age, sex and occupation. For descriptive variables that are continuous, mean, minimum, and maximum and measures of variability were determined. For descriptive variables that are categorical, simple frequency and percentages were determined. VAS in the subject groups was determined statistically using Pearson’s chi-square. Bivariate analysis was done using a 2-way t-test for the mean values of the VAS and the independent variables which are continuous to test for a significant difference. Correlation between the independent variables which are continuous and VAS was also determined. A multivariate linear regression method for repeated data was used to determine the effect of covariates on the perception of pain and to adjust for confounders. Statistical significance was inferred at $p \leq 0.05$.

III. RESULTS

Table 1: Description of the variables

	N Statistic	Range Statistic	Minimum Statistic	Maximum Statistic	Mean Statistic	Std. Deviation Statistic
Age last birthday(yr)	116	68	17	85	46.63	17.835
DFS score	116	12	3	15	6.53	2.662
Visual Analogue Scale score	116	100	0	100	31.25	21.947
OHI-S score	116	5.66	.34	6.00	2.3657	1.03636
Calculus index for lower anterior teeth	116	2.67	.33	3.00	1.6861	.74187
Bleeding Index score	116	100.00	.00	100.00	47.8159	36.70700
Gingival Index score	116	2.97	.33	3.30	1.4147	.52223
Valid N (listwise)	116					



The total number of subjects in this study is 116, and the male /female ratio is 1.2:1 (Table 1) with a mean of 46.6 ± 17.8 , age ranged between 17 years and 85 years. The largest age group is the 20 – 25 years old 28(24.1%) followed by the 56 -65 years old 26(22.4%) while the least were the 46-55 years old 14(12.1%) (Table 4). Dental fear score DFS ranged from 3 to 15 with mean of

6.5 ± 2.7 (Table 1). The mean Visual analogue score was 31.25 ± 21.2 with the majority 71(61%) scoring 5-44 (mild pain) and the least 4(3%) scoring 75-100 (severe pain) (Figure 1). The mean oral hygiene index score is 2.37 ± 1.0 and likewise mean calculus index for lower canine to canine (6 teeth), bleeding index, and gingival index are 1.6 ± 0.7 , 47.8 ± 36.7 and 1.41 ± 0.52 respectively.

Table 2: T test Bivariate analysis of the continuous variables and Visual analogue scale score Paired Samples Test

		Paired Differences			95% Interval Difference	Confidence of the		t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error		Lower	Upper			
Pair 1	Age birthday(yr) - Visual Analogue Scale score	15.379	28.738	2.668	10.094	20.665	5.764	115	.001*	



Pair 2	DFS score - Visual Analogue Scale score	--24.716	21.351	1.982	-28.642	-20.789	-12.468	115	.001*
Pair 3	OHI-S score - Visual Analogue Scale score	--28.88431	21.94977	2.03798	-32.92117	-24.84745	-14.173	115	.001*
Pair 4	Calculus index for 6 lower anterior teeth - Visual Analogue Scale score	-29.56388	21.88114	2.03161	-33.58811	-25.53964	-14.552	115	.001*
Pair 5	Bleeding Index score - Visual Analogue Scale score	16.56586	39.36929	3.65535	9.32532	23.80640	4.532	115	.001*
Pair 6	Gingival Index score - Visual Analogue Scale score	-29.83526	21.92739	2.03591	-33.86800	-25.80252	-14.655	115	.001*

Paired sample t-test showed that all the variables (Age, DFS, OHI-S, Calculus index of the lower anterior teeth, bleeding index and gingival index) have significant relationship with the VAS score $p = 0.001$ (Table 2). Paired sample correlation

also showed a negative correlation of age to the VAS scores this is not significant $p = 0.722$ (Table 3). All the other variables are positively correlated, but only DFS has a significant correlation with the VAS score with $p = 0.002$.

Table 3: Paired sample correlation of the continuous variables and visual analogue scale (VAS)

		N	Correlation	Sig.
Pair 1	Age last birthday(yr) & Visual Analogue Scale score	116	-.033	.722
Pair 2	DFS score & Visual Analogue Scale score	116	.282	.002*
Pair 3	OHI-S score & Visual Analogue Scale score	116	.021	.821
Pair 4	Calculus index for 6 lower anterior teeth & Visual Analogue Scale score	116	.106	.258
Pair 5	Bleeding Index score & Visual Analogue Scale score	116	.173	.063
Pair 6	Gingival Index score & Visual Analogue Scale score	116	.050	.594

Table 4 shows the bivariate relationship between the categories of the independent variables and the VAS scores of the subjects. The 20-35 years old 28(24.1%) were the predominant age group out of which 18(15.5%) has VAS score of 5-44, the group within which majority of subjects belong. Males 63(54.3%) in which 42(33.7%) is in the VAS 5-44 group has the least number of subjects 2(1.7%) in the VAS 75-100 just like the females. Most of the

subjects 48(41.4%) are of tertiary educational status and are also of the VAS 5-44 group. The predominant oral hygiene status of most 47(40.5%) of the subjects is 1.3- 3, these also are in the VAS 5-44 group. Gingival index of the subjects showed that 43(37.7%) are of moderate 1.2-3 with also VAS score of 5-44 group. However, there is no significant difference among all the categories considered $p > 0.05$.



Table 4: Chi-square crosstabulation of the visual analogue score and the variables

		Intensity of pain				Total	P value
		VAS score 0 - 4 No pain	VAS score 5 - 44 Mild pain	VAS score 45 - 74 Moderate pain	VAS score 75 - 100 Severe pain		
Age group	<20yrs	3(2.6%)	2(1.7%)	2(1.7%)	1(0.6%)	8(6.8%)	.13
	20yrs-35yrs	1(0.6%)	18(15.5%)	9(6.9%)	0	28(24.1%)	
	36yrs-45yrs	3(2.6%)	10(8.6%)	7(6%)	0	20(17.2%)	
	46yrs-55yrs	1(0.6%)	9(6.9%)	3(2.6%)	1(0.6%)	14(12%)	
	56yrs-65yrs	1(0.6%)	16(13.8%)	8(6.8%)	1(0.6%)	26(22.4%)	
	>65yrs	1(0.6%)	16(13.8%)	2(1.7%)	1(0.6%)	20(17.2%)	
Sex	Male	5(4.3%)	42(36.2%)	14(12%)	2(1.7%)	63(54.3%)	.61
	Female	5(4.3%)	29(25%)	17(14.7%)	2(1.7%)	53(45.7%)	
Educational level	None	0	1(0.6%)	2(1.7%)	0	3(2.6%)	.65
	Primary	1(0.6%)	4(3.5%)	2(1.7%)	0	7(6%)	
	Junior secondary	0	5(4.3%)	1(0.6%)	0	6(5.2%)	
	Senior secondary	5(4.3%)	13(11.2%)	8(6.8%)	2(1.7%)	28(24.1%)	
	Tertiary	4(3.5%)	48(41.4%)	18(15.5%)	2(1.7%)	72	
Oral hygiene status	Good (0-1.2)	2(1.7%)	11(9.5%)	4(3.5%)	0	17(14.7%)	.76
	Fair (1.3-3)	6(5.2%)	47(40.5%)	30(25.9%)	3(2.6%)	76	
	Poor (3.1-6)	2(1.7%)	13(11.2%)	7(6%)	1(0.6%)	23(19.8%)	
Gingival index	None (0)	1(0.6%)	0	0	0	1(0.6%)	.61
	Mild (0.1-1)	3(2.6%)	26(22.4%)	13(11.2%)	1(0.6%)	43(37.1%)	
	Moderate (1.2-2)	6(5.2%)	43(37.1%)	16(13.8%)	3(2.6%)	68	
	Severe (2.1-3)	0	2(1.7%)	2(1.7%)	0	4(3.5%)	

Table 5: Linear Regression to assess the association between the variables and the visual analogue scale score

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
	B	Std. Error				Lower Bound	Upper Bound
1 (Constant)	14.539	9.878		1.472	.144	-5.040	34.117
Age last birthday(yr)	.007	.113	.006	.060	.952	-.218	.231
DFS score	2.228	.746	.270	2.985	.004*	.748	3.707
OHI-S score	-1.243	2.406	-.059	-.516	.607	-6.012	3.526
Calculus index for 6 lower anterior teeth	4.025	3.397	.136	1.185	.239	-2.708	10.759
Bleeding Index score	.165	.077	.276	2.156	.033*	.013	.317
Gingival Index score	-6.996	5.865	-.166	-1.193	.236	-18.619	4.628

a. Dependent Variable: Visual Analogue Scale score

Linear regression revealed that only DFS and bleeding index score were significantly related to the



VAS score of the subjects when the confounders were controlled for with p-value of 0.004 and 0.03 respectively (Table 5).

IV. DISCUSSION

The gender ratio in this study is very close, this may well represent a good comparison between the male and the female population. The average age of the subjects also denotes that most of the subjects were adults and the majority were of tertiary educational status; this may be because the study was carried out in a teaching hospital and the metropolitan nature of the study location. The DFS scores averaged 6.5 ± 2.7 following the guidelines set by Kadatri et al., [15] who recommend using only three specific questions from the common set, as these are the most relevant that apply to direct periodontal instrumentation¹⁵. The VAS scores proposed that most of the subjects 71(61% in the study experienced mild pain (5mm-44mm) during the scaling procedure, altogether 102(88%) reported mild to moderate pain(Figure 1) similar to other studies[16,17]. The oral hygiene status of subjects was predominantly fair, the bleeding index score of more than 10% shows that most of the subjects presented with gingivitis while the gingival index shows that it was mostly moderate gingivitis (Table 1). When the different sub-groups of independent variables were analyzed using Chi-square, there was no significant difference in the pain perception in the different groups including sex $p > 0.05$ (Table 4). This is similar to previous studies which found no significant association between sociodemographic factors and pain experienced [18, 19].

Bivariate assessment of the perception of pain by the subjects and the covariates showed that all of them were significantly related with $p = 0.001$ (Table 2), this negates the result of the subgroup assessment of the factors (Table 4). All the independent variables vary positively with the perception of pain by the subjects except age which varies negatively. This means with increasing age there is a decreased intensity of perception of pain during scaling of the teeth which may be a result of a higher level of dental anxiety in the younger age groups [17]. DFS was the only measure that showed a statistically significant relationship ($p = 0.002$) and positive correlation with the intensity of the subjects' pain perception. However, this correlation is weak with a correlation coefficient of 0.28 (Table 3).

When the relationship between the determinants and the perception of pain was assessed while controlling for the confounders using multivariate linear regression, the subjects' dental fear status was significant $p = 0.004$ OR 2.23 (0.75, 3.7) this aligns with previous studies in which dental

fear and anxiety were factors strongly associated with the intensity of pain perception[3,5,17]. The bleeding index which assesses the extent of inflammation was also well related to the perception of pain among the subjects studied $p = 0.03$ OR 0.17 (0.13,0.32). This may be as a result of the subgingival extension of the dental plaque/calculus, the presence of gingivitis which signifies preponderance of inflammation with its attendant increased vascularity, vasodilatation, and exudation in the majority of the subjects as seen in this study and psychologic response to bleeding by the subjects[7,20,21].

V. CONCLUSION-

The majority of the subjects in this study experienced mild to moderate pain while scaling their teeth. While sociodemographic factors were significantly related to the pain experience, the subgroups were insignificant. Dental fear and the level of inflammation in the gingiva were the major determining factors in the pain experienced by the subjects. The implication is that patients need proper and adequate counselling and motivation before any dental treatment whether invasive or non-invasive. Regular dental checkups and meticulous home care by the patients are also necessary to prevent an overwhelming gingival inflammation before professional dental prophylaxis.

Conflict of interest- nil

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