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Assessment of sedation need in a group of patients undergoing dental treatment at a tertiary facility in Lagos State

Oyapero A., Enone L.L., Osasuyi A.

ABSTRACT

Aims: The fear of dental treatment and anxiety about dental procedures are prevalent and have an impact on the quality of life of patients and the quality of dental treatment they receive. Sedation can be useful for patients undergoing complex or unpleasant operative procedures but there is no appropriate documentation on the need for sedation for pain and anxiety control in dental clinics in Nigeria. The aim of this study was to assess the need for sedation by a group of patients undergoing dental treatment using the indicator of sedation need (IOSN) assessment tool. Methods: This descriptive study was conducted at the restorative dentistry and oral and maxillofacial surgery clinics of the Lagos State University Teaching Hospital, Ikeja, Lagos. (LASUTH). The ISON questionnaire consisting of the modified dental anxiety scale (MDAS) and the medical and behavioral indicator rank score was used to assess sedation need. Results: Majority of the respondents were female (52.9%); between 21–30 years old (30.5%); had Tertiary education (68.9%); had not had a previous traumatic treatment (60.9%) and required a complex dental treatment (53.0%). Those in the 21–30 years age category, females, secondary school educated and those that had previous traumatic treatment had higher anxiety scores. The female gender (0.024); educational level (0.021); Previous traumatic treatment (0.049); treatment complexity (0.000) and Medical and behavioral rank score (0.000) were significantly associated with a high ISON. Overall 8% of the sample indicated very high dental anxiety (HDA) with total scores above the 19 and above. Conclusion: Using the ISON, 10% of the respondents had a high or very high sedation need. Easy access to conscious sedation in dental offices and knowledge of this access might encourage the fearful among the general population to seek oral care promptly.

Keywords: Index of sedation need, Modified dental anxiety scale, Dental anxiety

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Oyapero A.[1], Enone L.L.[2], Osasuyi A.[3]

Affiliations: [1]Department of Preventive Dentistry, Lagos State University Teaching Hospital, Ikeja, Lagos, Nigeria; [2]Department of Restorative Dentistry, Lagos State University Teaching Hospital, Ikeja, Lagos. Nigeria; [3]Department of Oral and Maxillofacial Surgery, Lagos State University Teaching Hospital, Ikeja, Lagos, Nigeria.

Corresponding Author: Dr. Oyapero A., Department of Preventive Dentistry, Lagos State University Teaching Hospital, Ikeja, Lagos. Nigeria; Email: fola_ba@yahoo.com

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INTRODUCTION

Dental fear and anxiety have been strongly associated with the avoidance or reception of dental treatment in spite of the advances made in pain control in the profession. Fear

of dental treatment and anxiety about dental procedures are prevalent and have an impact on the quality of life of patients and the quality of dental treatment they receive – both in terms of limiting attendance for treatment and in the nature of the dental treatment likely to be performed [1]. Previous dental experiences have also been associated with dental anxiety. Such experiences have been linked to an increased perception of pain and negative cognition about dental treatment [2]. Studies indicate that there is a direct correlation between anxiety associated with dental procedures and the seriousness of oral diseases [3]. Amongst dental procedures, treatments involving different aspects of oral surgery cause the highest level of anxiety [4].

Anxiety often exacerbates pain and can be characterized by restlessness, irritability, muscle tension and easy fatigability. Treating anxiety and providing psychological support has been shown to improve pain and analgesic effectiveness. Multimodal techniques may be required to produce unequivocal pain and anxiety control in dental patients. Sedatives, analgesic, and local anesthetics are all important components of appropriate analgesic regimens for painful procedures. Sedation can be useful for patients undergoing complex or unpleasant operative procedures, for those patients whose medical condition may be exacerbated by stress, for those with involuntary movement disorders, physical or learning difficulties, and for those with strong gag reflexes [5].

Minimal and moderate sedation in dental offices can be performed by practitioners who are not specialists in anesthesiology as long as guidelines for minimizing risks to patients are followed [6]. Although the data are limited on the use of sedation within dentistry, dentists in the United Kingdom are acquainted with the need for sedation services but do not provide it [7, 8]. An audit of secondary care referrals from primary dental practitioners to a UK dental hospital McGoldrick et al. [9] showed a request for sedation in 98% of referrals, but provision of sedation or DGA in only 70% (64% and 6% respectively). Other studies in emergency dental patients [10, 11] and also in the general population, Dionne et al. [12] observed that over half of respondents indicated a strong interest in receiving dental treatment with sedative medication, particularly when anxiety was high. There is however no appropriate documentation on the need for sedation as well as the commensurate use of sedation techniques as an adjunct for pain and anxiety control in dental clinics in Nigeria.

While there are more comprehensive measures which allow for the more specific identification of aspects of the individual's dental anxiety, the modified dental anxiety scale (MDAS) provides a simple, easy-to-use screening tool. It has been found to be acceptable both to patients and the dental team [13, 14]. Similarly, Coulthard et al. [15] developed the indicator of sedation need (IOSN) to assess the need for sedation in adult patients for their dental treatment and also as a health needs assessment tool. The IOSN ranks sedation need by combining information on patient's anxiety, medical history and the complexity of the clinical treatment. The aim of this study was thus to assess the need for sedation by a group of patients undergoing dental treatment under LA using the indicator of sedation need (IOSN) assessment tool.

MATERIALS AND METHODS

This cross-sectional study was conducted at the restorative dentistry and oral and maxillofacial surgery clinics of the Lagos State University Teaching Hospital, Ikeja, Lagos (LASUTH).

Sample selection

The study population consisted of dental patients that were registered for care at the Restorative Dentistry and Oral and Maxillofacial Surgery clinics of LASUTH. A simple random sampling technique using the balloting method was used to determine the study subjects using the attendance register for each clinic day as the sampling frame. Selected subjects were screened for eligibility by set inclusion and exclusion criteria and those that met this criterion and were willing to give their informed consent were included in the study.

Sample size

The sample size was calculated using a formula for cross sectional studies: $N= Z\ pq/d^2$. Using the prevalence of 7.43% for high dental anxiety from a reference study, [16] a sample size of 51 was determined. One hundred and fifty subjects were, however, recruited to increase the power of the study.

Study Setting and location

This study was conducted at the restorative dentistry and oral and maxillofacial surgery clinics of the Lagos State University Teaching Hospital, (LASUTH), Ikeja, Lagos, Nigeria. Lagos State University Teaching Hospital is a tertiary health facility situated in the capital of Lagos State. It is a multi-specialist hospital with a bed complement of 741. The restorative clinic is a specialist clinic that attends to patients with routine and advanced restorative treatment needs while the oral and maxillofacial clinic attends to patients that require minor and major surgical procedures. An average of 25 patients is seen by each clinic on each day.

Inclusion and Exclusion criteria

Subjects included in the study were those that had an appointment for routine or advanced dental treatment without any form of sedation in either clinic. Patients that were excluded from the study were those that would require general anesthesia, that had a known anxiety disorder, that were below 18 years of age and those that refused to give their informed consent.

Data collection

A structured interviewer administered questionnaire was used for data collection. The first part of the questionnaire obtained information on socio-demographic items including sex, age, and level of education, as well as their dental history.

ISON Questionnaire

The ISON questionnaire consisted of the modified dental anxiety scale (MDAS) and the medical and behavioral indicator rank score. All questions were presented in a multiple-choice response format.

A. The MDAS is a five-item self-report measure designed to assess levels of anxiety associated with an upcoming dental visit, the dentist's waiting room, tooth drilling, teeth scaling and local anesthetic injection. Responses are rated with a five-point scale, ranging from *Not Anxious* (score of 1) to *Extremely Anxious* (score of 5) and then summed to produce a total score. Total scores can range from 5 to 25, with an empirically determined cut-off value of 19 and above indicating high dental anxiety.
B. Medical and behavioural indicator rank score were ranked as: No medical or behavioural indicators (1); Systemic disorders that may be exacerbated by treatment (2); Systemic disorders that compromise ability to cooperate (3 or 4).
C. Treatment complexity rank score were ranked as: Routine (1); Intermediate (2); Complex (3) and High complexity (4).
D. The Sedation need was determined by adding the scores in the three sections. The total rank score of sedation need were grouped as: Minimal need (3–4); Moderate (5–6); High need (7–9) and Very high need (10–12)

Data analysis

Data was analyzed using SPSS (Statistical package for social sciences) for Windows (version 18, Chicago, IL) statistical software package. Frequency distribution tables were generated for all variables and measures of central tendency and dispersion were computed for numerical variables. Since the data were normally distributed, descriptive statistics including means, standard deviations, and percentages were used to summarize the demographic variables and health-related behavior of the study sample. The chi-square test was used to determine the level of association between variables. For the comparison of means between groups, the ANOVA (analysis of variance) was used. Differences and associations were considered statistically significant where the associated *p*-values were equal to or less than 0.05.

RESULTS

The demographic and clinical characteristics of the study sample

The demographic and clinical characteristics of the 151 patients in the study sample as well as their MDAS and ISON scores are summarized in Table 1. Majority of the respondents were female (52.9%); between 21–30 years old (30.5%); had tertiary education (68.9%); had not had a previous traumatic treatment (60.9%) and required a complex dental treatment (53.0%). Those in the 21–30 years age category, females, secondary school educated and those that had previous traumatic treatment had higher anxiety scores. The female gender (0.024); educational level (0.021); previous traumatic treatment (0.049); treatment complexity (0.000) and Medical and behavioral rank score (0.000) were significantly associated with a high ISON (Table 1).

Level of Dental Anxiety in the respondents shown by the MDAS

Overall 8% of the sample indicated very high dental anxiety (HDA) with total scores above the 19 and above. Twenty-four percent of the sample had high anxiety while 46% had minimal or no anxiety (Figure 1).

Breakdown of MDAS components

The drilling and local anesthetic injection items attracted the highest anxiety ratings in the study sample, with them selecting very or extremely anxious (22.5% and 23.2% respectively) in both domains. Scaling and polishing elicited the least anxiety response with 9.1% of the respondents selecting very or extremely anxious in this domain (Figure 2).

Sedation Need of the study participants

Figure 3 illustrates the sedation need of the respondents. Using the ISON, 10% of the respondents had a high or very high sedation need. About 52% of the sample, however, had minimal or no need for sedation.

Linear regression analysis using the Index of Sedation Need as the dependent variable

Table 2 gives the regression analysis with the index of sedation need as the dependent variable. The value of the non-standardized β coefficient shows the mean value of ISON over the total sample. Negative values in independent variables such as previous traumatic treatment and age category were associated with a higher sedation need. Following adjustment for confounding variables, there was a significant association between the age and the gender of the respondents and a high sedation need.

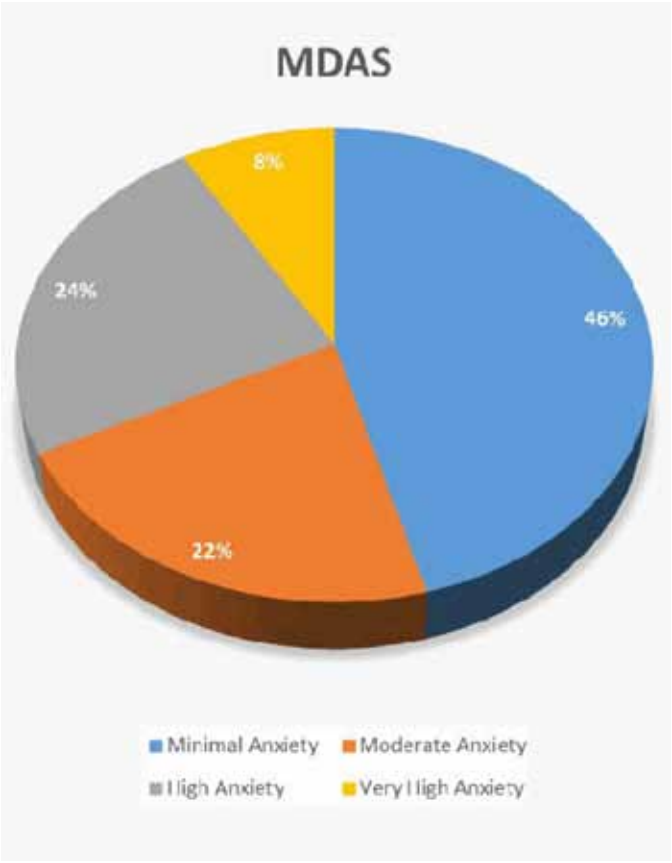

Figure 1: Level of dental anxiety in the respondents shown by the MDAS.

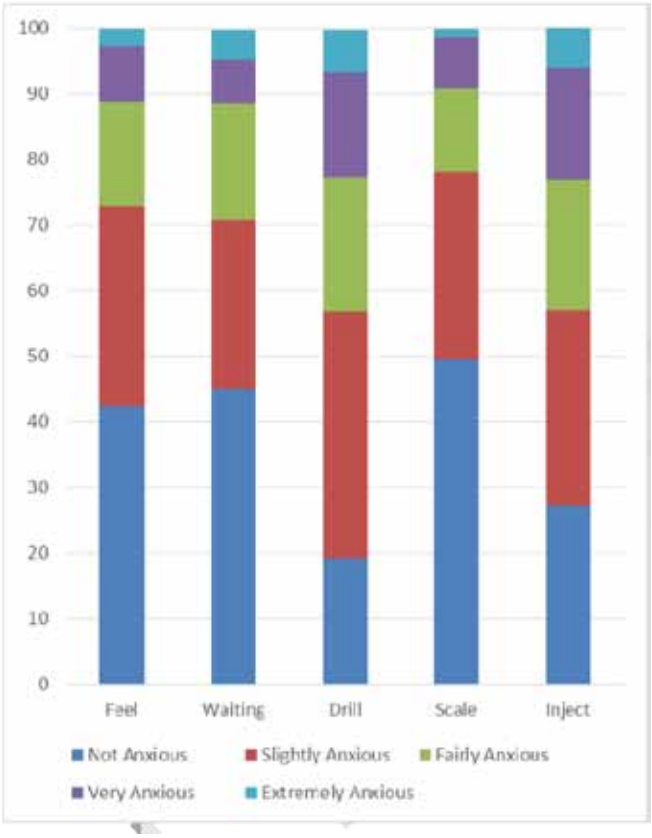

Figure 2: Breakdown of MDAS components.

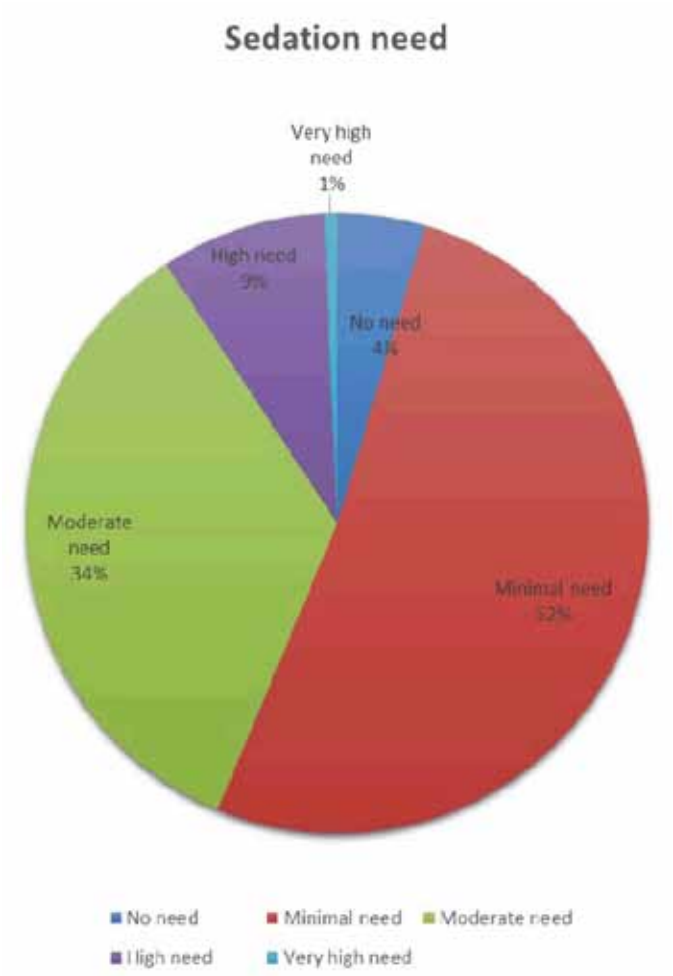

Figure 3: Sedation need of the study participants.

Linear regression analysis using the Modified Dental Anxiety Scale as the dependent variable

Table 3 shows the regression analysis with the Modified Dental anxiety scale as the dependent variable. The value of the non-standardized β coefficient shows the mean value of MDAS over the total sample. Negative values in independent variables such as previous traumatic treatment and age category were associated with a higher level of anxiety. Following adjustment for confounding variables, there was a significant association between the gender of the respondents and a high level of anxiety [17–20].

DISCUSSION

The prevalence of high dental anxiety (HDA) with total scores of 19 and above in this sample was 8%. This prevalence value was comparable to that of most researchers in different regions of the world who

Table 1: The demographic and clinical characteristics of the study sample

		Frequency	Percent	MDAS	F/p	IOSN	F/p
Age Category	<20	6	4.0	12.17±4.62	1.46	4.02±0.89	1.13
	21-30	46	30.5	12.11±4.39	p= 0.197	4.59±1.20	p= 0.046*
	31-40	38	25.2	10.71±3.64		4.26±1.60	
	41-50	33	21.9	9.88±4.23		4.45±1.73	
	51-60	20	13.2	10.10±3.24		4.10±1.48	
	>60	8	5.3	10.86±3.23		5.43±1.51	
Gender	Male	71	47.1	10.62±3.34	1.38	4.69±1.52	1.45
	Female	80	52.9	11.32±4.58	p= 0.063	5.27±1.37	p= 0.024*
Education	None	3	2.0	6.33±2.31	1.68	2.67±0.57	3.29
	Primary	7	4.6	9.86±3.53	p= 0.170	5.14±1.07	p= 0.021*
	Secondary	37	24.5	11.59±4.23		4.84±1.52	
	Tertiary	104	68.9	10.96±4.19		4.30±1.46	
Marital Status	Single	73	48.3	11.14±4.18	0.46	4.40±1.47	1.73
	Married	67	44.4	10.76±4.09		4.33±1.38	
	Divorced	4	2.6	9.50±7.14	p=0.760	4.50±4.2.38	p=0.141
	Separated	1	0.7	15.00		6.00	
	Widowed	6	4.0	11.67±3.93		5.83±1.84	
Occupational Classification	Highly skilled	21	13.9	10.33±3.85	1.195	4.38±0.92	0.679
	Skilled	74	49.0	11.20±4.38		4.42±1.63	
	Semiskilled	31	20.5	10.87±4.13	p=0.315	4.71±1.61	p=0.607
	Unskilled	5	3.3	7.60±2.96		3.60±1.52	
	Student	20	13.2	11.80±4.01		4.35±1.18	
Previous Traumatic Treatment	Yes	59	39.1	11.31±4.75	0.606	4.71±1.65	3.364
	No	92	60.9	10.76±3.79	p=0.438	4.26±1.35	p=0.049*
Treatment Complexity Rank Score	Routine	21	13.9	10.56±3.90	0.384	3.66±1.26	2.75
	Intermediate	40	26.5	11.16±4.41	p= 0.764	4.56±1.12	p=0.000*
	Complex	80	53.0	11.54±3.87		5.88±1.54	
	High Complexity	10	6.6	11.10±6.56		6.33±1.53	
Medical and Behavioral Indicator Rank Score	1	132	87.4	10.79±4.23	0.339	4.15±1.21	3.505
	2	12	7.9	12.33±3.05		5.67±1.63	
	3	3	1.9	15.00±4.21	p= 0.143	6.00±1.51	p= 0.000
	4	4	2.65	15.97±4.23		8.67±1.33	
Total (Each Sub-group)		151	100				

* Significant. F= Anova

Table 2: Linear regression analysis using the Index of Sedation Need as the dependent variable

	Model	Unstandardized Coefficients		Standardized Coefficients	T	p
		B	Std. Error	Beta		
1	(Constant)	2.206	1.280		1.724	0.087
	Age Category	-0.139	0.059	-0.121	-2.373	0.019*
	Gender	0.731	0.140	0.247	5.223	0.000*
	Treatment Complexity Rank	1.000	0.137	0.523	7.311	0.000*
	Occupation	-0.025	0.104	-0.020	-0.238	0.812
	Educational Qualification	0.056	0.180	0.026	0.312	0.755
	History of previous Treatment.	0.002	0.288	0.001	0.008	0.993
	Medical and Behavioral Indicator Rank Score	1.560	0.129	0.627	12.129	0.000*
	Previous Traumatic Treatment	-0.178	0.223	-0.059	-0.796	0.427

* Significant.

Table 3: Linear regression analysis using the Modified Dental Anxiety Scale as the dependent variable

	Model	Unstandardized Coefficients		Standardized Coefficients	t	p
		B	Std. Error	Beta		
1	(Constant)	6.549	4.217		1.553	0.123
	Age Category	-0.396	0.290	-0.123	-1.368	0.174
	Gender	3.293	0.660	0.394	4.993	0.000*
	Treatment Complexity Rank	0.352	0.451	0.065	0.781	0.436
	Occupation	0.156	0.341	0.044	0.457	0.648
	Educational Qualification	0.676	0.594	0.109	1.137	0.257
	History of previous Treatment.	0.654	0.949	0.057	0.689	0.492
	Medical and Behavioral Indicator Rank Score	0.741	0.602	0.106	1.231	0.220
	Previous Traumatic Treatment	-0.240	0.735	-0.028	-0.327	0.744

* Significant.

obtained values ranging from 4–12%. Tooth drilling and local anesthetic injection items in the MDAS attracted the highest anxiety ratings in the study sample, with respondents selecting very or extremely anxious (22.5% and 23.2%, respectively) in both domains. The most common stimuli associated with dental anxiety are typically injections, the sound/sight/smell of the drill or hand piece, and pain associated with dental treatment. Individuals who are fearful of specific stimuli can readily identify the aspect(s) of dentistry they find most aversive [20]. A possible explanation for this is that the drill and anesthetic needle are associated with anticipation of pain. Local anesthesia is often identified as the major reason for pain during dental treatment [21].

Bivariate analysis demonstrated that respondents in 21–30 years age category, females, secondary school educated and those that had previous traumatic treatment had higher anxiety scores. Younger people

have generally been found to be more anxious than older people individuals [22]. Epidemiological investigations have also consistently revealed that a greater proportion of females have specific phobias more than males. Some studies have even shown a prevalence of dental anxiety approximately twice as high for females as for males [23–25]. Women have lower pain thresholds and less tolerance for pain and may be more open to expressing fears than men. Some studies have demonstrated that higher levels of dental anxiety are associated with low income and education [26] while others have failed to find such relationships [27, 28]. Armfield et al. [25], however, noted that even though demographic variables such as low income and low education correlate with low to moderate dental anxiety, extreme and debilitating anxiety seem to be connected to a patient's individual personality.

Patients with low levels of dental anxiety may require low level interventions involving enhancing the environment and reducing the degree of uncertainty involved in treatment while those with moderate levels of dental anxiety may require more intensive interventions, such as the provision of information on coping strategies. However, the phobic dental patient requires the complementary use of pharmacological and psychological approaches [29]. Furthermore, in addition to the impact of anxiety, overlying patient factors such as medical conditions or behavioural challenges can render otherwise simple dental treatment difficult or impossible without the use of sedation or general anesthesia [15, 30, 31].

Using the ISON, 10% of the sample had a high or very high sedation need. This sedation need was greater in the female gender, those with low educational level, those that had a previous traumatic treatment and those that had a high treatment complexity or medical and behavioral rank score. After a linear regression analysis, the age and the gender of the respondents was still significantly associated with a high sedation need. In a recent series of studies in Britain, researchers reported the overall need for sedation to be 5% of dental patients, with females 3.8 times more likely to be placed within the high need group when compared to men [31] Thus, there appears to be a relationship between the level of anxiety in females and their sedation need. This is in agreement with previous studies that indicate that interest in sedation increase significantly with the level of fear [30].

This study demonstrates a high level of unmet sedation need in the study population. All the patients seen in this study were scheduled for treatment under local anesthesia without any form of sedation. The reasons given by dentists for not utilizing sedation in their practices include lack of training, patient safety and lack of time or remuneration [12, 15]. Any proposed increase in the use of sedation or anesthesia for dental outpatients would, however, require not only an appropriately trained cadre of clinicians but also professional consensus to identify drugs and their combinations that provide an adequate balance between patient safety and anxiolytic efficacy [32].

In addition to basic life support (BLS) or health care provider (HCP) certification, the dentist that provides inhalational sedation must have completed a 14-hour course in nitrous oxide/oxygen sedation technique, including clinical competency. The use of enteral and/or combined enteral/nitrous oxide/oxygen sedation requires an additional 16 hours of didactic instructions including clinically oriented experience [33]. The ISON can be used to screen prospective dental patients scheduled for dental treatment to determine their sedation need and hence provide them with appropriate pharmacologic interventions.

CONCLUSION

About 8% of the study population had high dental anxiety which was particularly associated with tooth drilling and local anesthetic injection. This association was significant in respondents that were in the 21–30 years age category, females, secondary school educated and those that had previous traumatic treatment. About 10% of the sample also had a high or very high sedation need even though they were scheduled for treatment with only local anesthesia. The Nigerian dental curriculum should improve on didactic teaching and hands-on training in inhalational and oral sedation to fill this gap. Easy access to conscious sedation in dental offices and knowledge of this access might encourage the fearful among the general population to seek oral care promptly.

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Author Contributions

Oyapero A. – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Enone L.L. – Analysis and interpretation of data, Revising it critically for important intellectual content, Final approval of the version to be published

Osasuyi A. – Analysis and interpretation of data, Revising it critically for important intellectual content, Final approval of the version to be published

Guarantor

The corresponding author is the guarantor of submission.

Conflict of Interest

Authors declare no conflict of interest.

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