



Conscious sedation in dentistry: knowledge and practice among dental professionals in Tanzania

Nicco Sales¹, Karpal Singh Sohal^{1,2}, Jeremiah Robert Moshy², Sira Stanslaus Owibingire², David K Deoglas², Paulo J Laizer²

¹Department of Dental Services, Muhimbili National Hospital. Dar es Salaam, Tanzania

²Department of Oral and Maxillofacial Surgery, Muhimbili University of Health and Allied Sciences. Dar es Salaam, Tanzania

Background: Conscious sedation is a useful adjunct in the treatment of patients in dentistry; however, a lack of knowledge among the dental profession regarding sedation is a restricting factor in the practice of dental sedation. Therefore, this study was conducted to assess the knowledge and practice of sedation in dentistry among dental professionals in Tanzania.

Methods: This was a cross-sectional study conducted for five months targeting all practicing dental professionals in Tanzania. A modified questionnaire contained 14 questions regarding knowledge about sedative agents and a section on the practice of sedation. The data obtained from this study were coded and entered into a computer program and analyzed using SPSS software version 23.0. The data are presented as frequencies and percentages in tables and charts. Statistical significance was set at $P < 0.05$.

Results: The age range of participants was between 24 and 63 years (mean 36.6 ± 7.7 years). There were 107 men (78.1%), and the male-to-female ratio was 3.6:1. The majority (76.6%) of participants only had an undergraduate dental degree. Thirty-one percent of participants only worked in publicly owned health facilities. Slightly more than half (59.9%) of participants had satisfactory knowledge regarding sedation in dentistry. There was no statistically significant association between the level of sedation-related knowledge and the demographic characteristics of the participants. Only 21.9% reported using sedation in their practice, and the most commonly used sedative drug was diazepam. The reasons for not using dental sedation in clinical practice included a perceived lack of knowledge on sedation, lack of equipment, and cost.

Conclusion: Most dental professionals in Tanzania have basic knowledge of sedation in dentistry, although knowledge regarding sedative agents is generally low. The practice of sedation in dentistry in Tanzania is very low compared to that in middle- and high-income countries. Inadequate knowledge, lack of equipment, and the cost of practicing sedation are the main reasons for not practicing sedation.

Keywords: Dental Professionals; Knowledge; Sedation; Tanzania.



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INTRODUCTION

Since dental treatment is perceived as a painful experience, anxiety, fear, and pain remain significant barriers to care for many dental patients [1,2]. To alleviate

anxiety in dental patients (both children and adults) so they can receive dental treatment, conscious sedation is practiced [2,3]. Therefore, one of the major reasons for providing conscious sedation in dental treatment is severe anxiety [4].

Conscious sedation is a state of relaxation or minimally

Received: August 19, 2021 • Revised: October 11, 2021 • Accepted: October 18, 2021

Corresponding Author: Karpal Singh Sohal, Department of Oral and Maxillofacial surgery, Muhimbili University of Health and Allied Sciences, P.O. Box 65014 Dar es Salaam, Tanzania

Tel: +255 712 723 917 E-mail: karpal@live.com

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depressed level of consciousness induced by pharmacological agents, whereby a patient retains the ability to maintain a patent airway independently and respond appropriately to physical stimulation and verbal commands [5,6]. Nitrous oxide/oxygen inhalational sedation and intravenous sedation with midazolam are the most widely used sedative agents in dental practice [6].

Conscious sedation is becoming a popular practice and a useful adjunct for the treatment of patients in dentistry due to advances in anesthetic safety, changing patient views, and increasing treatment needs [3]. However, a lack of knowledge among dental professionals regarding sedation appears to be a factor influencing the practice of dental sedation [6].

In the United Kingdom, it was reported that only approximately 27% of dentists sedated their patients [7], whereas a study from Northern Ireland that involved 50 dentists found that fewer than a quarter of them provided sedation [8]. Monisha et al. [9] found that as few as 10% of dentists in Chennai, India provided sedation. The low level of use of sedation in dentistry has been largely attributed to a lack of proper training and proper sedation facilities and equipment, and the additional cost of purchasing equipment [8,10,11].

Even though conscious sedation has become a standard part of dental practice worldwide, it is rarely used during dental procedures in Tanzania. A paucity of information regarding the level of knowledge and practice of conscious sedation among dental professionals in Tanzania renders it difficult to ascertain the exact reasons for its limited use. Therefore, this study was conducted to assess the knowledge and practice of sedation in dentistry among dental professionals in Tanzania.

METHODS

This was a cross-sectional study conducted between October 2019 and March 2020, targeting all practicing dental professionals in all 31 regions of Tanzania. The East African nation has a population of approximately

57 million people with approximately 260 dental professionals.

The inclusion criteria included all dental professionals currently working in Tanzania. Participants were required to have at least an undergraduate degree in dentistry at the time of the study. Dental professionals who had not been actively participating in clinical practice for more than two years were excluded from the study.

The sample size was estimated using the population adjustment formula for single proportion estimation [12] based on a 95% confidence level, a precision of 7%, and power of 0.8, with an expected proportion of 50%, yielding a total sample of 196 participants. A modified questionnaire was adopted from a study by Fanning and Vanderbilt [3,13]. A pilot study that included 10% of the anticipated participants was conducted, following which the questionnaires were sent to all participants who met the criteria to participate in the study. Questionnaires were provided to the participants via e-mail and physical printed versions to some participants who reside in the city of Dar-es-Salaam. All participants were required to submit completed questionnaires before January 31, 2020.

The questionnaire captured information regarding the sociodemographic characteristics of participants, their sector of employment (private and/or public), and region/district of practice. It also had questions regarding knowledge of commonly used sedative agents and a section on the practice of sedation. There were 14 knowledge questions, each allocated 1 point.

The data obtained from this study were coded and entered into a computer program and analyzed using SPSS software, version 23.0. Data are presented as the mean for continuous variables and percentages for categorical variables.

The age of the participants was dichotomized into ≤ 35 years and >35 years. Working experience was divided into ≤ 10 years and > 10 years. Level of education was divided into undergraduate dental degree (e.g., BDS, DDS, DMD) only and any additional degree/qualification (e.g., MSc, MDent, PhD). The regions in which the participants worked were grouped into cities (Arusha, Dar

es Salaam, Dodoma, Mbeya, Mwanza, and Tanga) and non-city regions (remaining regions). Each correct answer for the 14 knowledge questions was allocated 1 point; responses were summated to produce a total score ranging from 0 to 14. A cut-off of > 7 points was used to identify individuals with satisfactory knowledge on sedation; scores of ≤ 7 were considered to reflect an unsatisfactory level of knowledge.

The data were presented using frequencies and percentages in the form of tables. A one-way analysis of variance (ANOVA) was used to assess the differences in the level of knowledge and practice of sedation for selected factors. Statistical significance was set at $P < 0.05$.

Ethical clearance for the study was obtained from the MUHAS Institution Review Board (Ref. No. DA.25/111/01). An informed consent form that had clear details about the nature and purpose of the study was attached to the questionnaire that was sent to participants. Participation in the study was entirely voluntary, and the participants had the right to withdraw from the study at any time they wished to do so. For confidentiality reasons, all respondents were registered in the study using serial numbers rather than names.

RESULTS

1. Sociodemographic characteristics of dental professionals working in Tanzania

A total of 137 out of 196 returned the questionnaire, giving a response rate of 69.9%. The age of participants ranged from 24 to 63 years, with a mean of 36.6 ± 7.7 years. There were 107 men (78.1%), and the male-to-female ratio was 3.6:1. The working experience of participants as dental professionals ranged between 1 and 34 years, with a mean of 9.0 ± 6.6 years.

One hundred and twenty-three (89.8%) participants obtained an undergraduate dental degree in Tanzania. The majority (105, 76.6%) of participants only had an undergraduate dental degree. Of the 32 who had a second

Table 1. Social demographic characteristics of dental professionals working in Tanzania

Sociodemographic characteristics of the participants	Frequency (n)	Percentage (%)
Age		
≤ 35 years	69	50.4
> 35 years	68	49.6
Sex		
Male	107	78.1
Female	30	21.9
Duration in practice (years)		
≤ 10 years	91	66.4
> 10 years	46	33.6
Level of dental education		
Undergraduate	105	76.6
Specialist	32	23.4
Country of undergraduate training		
Tanzania	123	89.8
Abroad	14	10.2
Country of speciality training		
Tanzania	21	65.6
Abroad	11	34.4
Region of practice		
City regions	70	51.1
Non city regions	67	48.9
Sector in which the participant practices		
Private sector	32	23.4
Public sector	62	45.3
Both (public and private)	43	31.4

degree, most (21, 65.6%) were obtained in Tanzania. Slightly more than half (70, 51.1%) of participants worked within the six major cities of Tanzania, and most (62, 31.4%) participants worked in publicly owned health facilities only (Table 1).

2. Knowledge of dental professionals working in Tanzania on sedation as used in dentistry

Fourteen questions were asked to assess participants' knowledge regarding sedation in dentistry. The majority (126, 96%) knew that sedation could be used to reduce anxiety in dental patients. Only a few participants knew that diazepam had less amnestic effect than midazolam (40, 29.2%), and the duration of action of midazolam was shorter than that of diazepam (46, 33.6%) (Table 2).

The overall score of participants on knowledge questions ranged from 2 to 14, with a mean of 8.66 ± 2.81 . Slightly more than half (82, 59.9%) participants had satisfactory knowledge regarding sedation in dentistry.

Table 2. Percentage of participants who answered questions testing their knowledge of sedation in dentistry accurately

Questions to test knowledge on sedation in dentistry	Number of participants who gave a correct response (n)	Percentage of participants who gave a correct response (%)
Q1: Can sedation reduce patient’s anxiety?	126	96%
Q2: Can a sedative drug be used to replace a local anaesthetic agent?	89	65%
Q3: Is midazolam a sedative agent?	81	59.1%
Q4: Is lidocaine a sedative agent?	103	75.2%
Q5: Is propofol a sedative agent?	45	32.8%
Q6: Is articaine a sedative agent?	94	68.6%
Q7: Is Nitrous Oxide a sedative agent?	124	90.5%
Q8: Is diclofenac a sedative agent?	110	80.3%
Q9: Can diazepam be administered by nasal spray?	46	33.6%
Q10: Is Nitrous Oxide administered only as inhalation gas?	131	95.6%
Q11: Does midazolam affects neuromuscular transmission?	70	51.1%
Q12: Does diazepam have a greater amnesic effect than midazolam?	40	29.2%
Q13: Does midazolam has longer duration of action than diazepam?	46	33.6%
Q14: Is it true that propofol is both an analgesic and a sedative that is administered through intravenous route?	81	59.1%

Table 3. Level of knowledge of sedation in dentistry according to sociodemographic characteristics of the participants

Sociodemographic characteristics of the participants	Level of knowledge on sedation		P-value
	Unsatisfactory knowledge	Satisfactory knowledge	
Age			
≤ 35 years	25 (36.2%)	44 (63.8%)	0.386
> 35 years	30 (44.1%)	38 (55.9%)	
Sex			
Male	43 (40.2%)	64 (59.8%)	0.985
Female	12 (40.0%)	18 (60.0%)	
Duration in practice (years)			
≤ 10 years	33 (36.3%)	58 (63.7%)	0.202
> 10 years	22 (47.8%)	24 (52.2%)	
Level of dental education			
Undergraduate	46 (43.8%)	59 (56.2%)	0.150
Specialist	9 (28.1%)	23 (71.9%)	
Country of undergraduate training			
Tanzania	46 (37.4%)	77 (62.6%)	0.082
Abroad	9 (64.3%)	5 (35.7%)	
Country of speciality training			
Tanzania	4 (19.0%)	17 (81.0%)	0.213
Abroad	5 (45.5%)	6 (54.5%)	
Region of practice			
City regions	23 (32.9%)	47 (67.1%)	0.084
Non city regions	32 (47.8%)	35 (52.2%)	
Sector in which the participant practices			
Private sector	14 (43.8%)	18 (56.3%)	0.136
Public sector	29 (46.8%)	33 (53.2%)	
Both (public and private)	12 (27.9%)	31 (72.1%)	

There was no statistically significant association between the level of knowledge of sedation and the demographic characteristics of participants (Table 3). Only 16 (11.7%)

participants underwent formal sedation training. There was no statistically significant association between the level of knowledge of the participants and previous

Table 4. Practice of sedation in dentistry according to sociodemographic characteristics and knowledge level of participants

Sociodemographic characteristics and knowledge level of the participants	Practice sedation		P-value
	Yes	No	
Age			
≤ 35 years	12 (17.4%)	57 (82.6%)	0.221
> 35 years	18 (26.5%)	50 (73.5%)	
Sex			
Male	25 (23.4%)	82 (76.6%)	0.681
Female	5 (16.7%)	25 (83.3%)	
Duration in practice (years)			
≤ 10 years	17 (18.7%)	74 (81.3%)	0.274
> 10 years	13 (28.3%)	33 (71.7%)	
Level of dental education			
Undergraduate	20 (19%)	85 (81%)	0.151
Specialist	10 (31.2%)	22 (68.8%)	
Country of undergraduate training			
Tanzania	29 (23.6%)	94 (76.4%)	0.303
Abroad	1 (7.1%)	13 (92.9%)	
Region of practice			
City regions	18 (25.7%)	52 (74.3%)	0.306
Non city regions	12 (17.9%)	55 (82.1%)	
Sector in which the participant practices			
Private sector	10 (31.2%)	22 (68.8%)	0.319
Public sector	11 (17.7%)	51 (82.3%)	
Both (public and private)	9 (20.9%)	34 (79.1%)	
Knowledge on sedation			
Unsatisfactory	9 (16.4%)	46 (83.6%)	0.215
Satisfactory	21 (25.6%)	61 (74.4%)	

sedation training ($P = 0.053$).

3. Sedation practice in dentistry by dental professionals in Tanzania

Of the 137 participants who participated in this study, only 30 (21.9%) reported using sedation in their practice. Of those who used sedation in their practice, only nine (30%) used sedation at least once per month. Most participants used sedation for surgical procedures, followed by restorative work in pediatric patients. The most commonly used sedative drugs were diazepam (17, 56.7%), ketamine (14, 46.7%), and nitrous oxide (5, 16.7%).

Regarding the factors that influence the practice of sedation, neither the sociodemographic characteristics of the participants nor their level of knowledge on sedation had a statistically significant association with the practice

of sedation (Table 4).

The reasons given by 107 (78.1%) participants for not practicing dental sedation in clinical practice included perceived inadequate practical knowledge of sedation (85, 79.4%), lack of equipment (65, 60.7%), cost (34, 31.8%), fear of complications associated with sedation (25, 23.4%), and negative attitude toward sedation (21, 19.6%).

DISCUSSION

In Tanzania, there are approximately 260 dental professionals who have an undergraduate degree in dentistry. With 137 respondents completing the survey for this study, we postulate that this is a representative sample of dental professionals in the country. Thus, the

results of this study provide a clear picture of the level of knowledge and practice of conscious sedation among dental professionals in Tanzania.

The results of the current study show that the majority of practicing dental professionals were male. These findings are similar to some previous studies [14,15] but are contrary to findings from other studies that reported a preponderance of women [16–18]. The observed lower proportion of female dental professionals in Tanzania may be attributed to the sociocultural challenges women face in acquiring education, in addition to the lower likelihood of female students opting for scientific subjects.

From this study, it was evident that the majority of dental professionals were trained within the country, similar to findings from other studies [15,18]. This indicates that, as in other countries, Tanzania, despite having only one dental school, is capable of training and utilizing its locally trained generation of professionals in the health field. As such, these professionals are well equipped with knowledge and challenges regarding the management of common conditions within the locality. This study found that slightly more than half of dental professionals practiced in the six city regions of the country, and the remaining dental professionals practiced in the other twenty-five non-city regions. This disproportionate distribution of dentists reflects the imbalance in the distribution of healthcare workers, which may be attributed to the choice of dental professionals to stay in cities because of the larger patient population and more advanced dental facilities.

Although most dental professionals have satisfactory knowledge of sedation in dentistry, only approximately one in ten reported to have had formal training on sedation. During their undergraduate training in Tanzania, students are equipped with some basic knowledge regarding dental sedation while studying pain management in dentistry. The students perform clinical observations sessions throughout training while rotating in the oral and maxillofacial surgery unit. For postgraduates, only residents training to become oral and

maxillofacial surgery are required to know and practice sedation as part of their training in anesthesia. The lack of formal training in sedation may explain the finding that the majority of the participants in this study had little information regarding sedative agents, such as midazolam and propofol. For instance, most participants did not know that midazolam, which affects neuromuscular transmission, has a greater amnestic effect and shorter duration of action than diazepam.

In the current study, there was no statistically significant association between the level of knowledge on sedation and factors such as the demographic characteristics of the participants and previous training on sedation. This may be attributed to the fact that during their training, from the undergraduate stage, dental professionals are taught and thus expected to provide safe and pain-free dental care [3]; consequently, they are given some knowledge on sedation as a means of pain control. Therefore, regardless of proper training in sedation, every dental professional had some awareness of sedation.

Similar to reports from Jordan [1] and India [9], fewer than a quarter of participants in this study reported using sedation in their practice; of these, only a few practiced sedation frequently. In the current study, most participants provided sedation using diazepam. This is contrary to reports in the literature that state that midazolam is the most frequently used sedative agent [19–21]. Midazolam is the preferred sedative agent because many researchers have reported it provides better anxiolytic and amnestic effects, in addition to its rapid onset of action and absorption [20,21]. One reason why dental professionals in Tanzania opt for diazepam is its wide availability and low cost. The low cost of diazepam has also been reported elsewhere [22].

Reasons for not providing dental sedation in clinical practice include the perception of inadequate knowledge on sedation, lack of equipment, and cost. It has also been reported that lack of knowledge on sedation among the dental influences the provision and practice of dental sedation [6]. Although most participants had a satisfactory level of knowledge on sedation, most

perceived that their knowledge on sedation in dentistry was inadequate; hence, they did not practice it. These findings may indicate that dental professionals in the country have theoretical knowledge rather than actual practical knowledge regarding sedation; as such, they lack confidence in practicing sedation.

Lack of equipment and the cost of practicing sedation were further reasons for not practicing sedation. This may be attributed to the notion that most dental professionals have that when one speaks of sedation, then it refers to the use of nitrous oxide. This reason may be further augmented by the findings of the current study, where the majority of the participants lacked knowledge on other sedative agents that can be used in dentistry. Since most professionals think sedation in dentistry must be performed using nitrous oxide, which requires expensive equipment and installation [23], the cost and lack of equipment becomes a challenge.

The limitation of this study may be that it did not include dental professionals who did not actively practice in clinics due to administrative work. As such, this might have led to selection bias, limiting the generalizability of our findings. However, if consideration is given to clinical practice, then this study provides an actual picture of the knowledge and practice of sedation in the field of dentistry in Tanzania.

In conclusion, this study shows that despite most dental professionals having basic knowledge on sedation in dentistry, very few have formal training in sedation. Knowledge about sedative agents is generally low. The practice of sedation in dentistry in Tanzania is very low compared to that in middle- and high-income countries, as only a few dental professionals practice it regularly and mainly in surgical procedures. Inadequate practical knowledge, lack of equipment, and the cost of practicing sedation are the main reasons for not practicing sedation. It is thus recommended that to overcome this ignorance of sedation in dentistry, continuing professional education programs for dental professionals should be organized by the appropriate authorities.

AUTHOR ORCIDiS

Nicco Sales: <https://orcid.org/0000-0002-1593-184X>

Karpal Singh Sohal: <https://orcid.org/0000-0001-9456-981X>

Jeremiah Robert Moshly: <https://orcid.org/0000-0001-8912-1332>

Sira Stanslaus Owibingire: <https://orcid.org/0000-0002-0608-0318>

David K Deoglas: <https://orcid.org/0000-0002-1337-2853>

Paulo J Laizer: <https://orcid.org/0000-0001-8561-4359>

AUTHOR CONTRIBUTIONS

Nicco Sales: Conceptualization, Data curation, Methodology, Writing - original draft

Karpal Singh Sohal: Conceptualization, Formal analysis, Methodology, Software, Supervision, Writing - original draft, Writing - review & editing

Jeremiah Robert Moshly: Formal analysis, Supervision, Writing - original draft, Writing - review & editing

Sira Stanslaus Owibingire: Formal analysis, Methodology, Supervision, Writing - original draft, Writing - review & editing

David K Deoglas: Data curation, Writing - original draft, Writing - review & editing

Paulo J Laizer: Data curation, Writing - original draft, Writing - review & editing

CONFLICT OF INTEREST: The authors declare that they have no conflicts of interest in relation to this article

ACKNOWLEDGMENTS: We are most grateful to the participants for providing all the necessary information that was required for the study.

FUNDING: None.

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