

Knowledge, Attitude, Awareness about Nitrous Oxide Inhalation Sedation among Dental Practitioners

Abstract:

Background: This cross-sectional study investigates the knowledge, attitude, awareness about nitrous oxide inhalation sedation among dental practitioners. Given the importance of efficient dental care in fearful & uncooperative dental patients of any age, knowledge and incorporation of chair side nitrous oxide inhalation sedation is essential for optimising outcomes of oral health care.

Material and Methods: A cross-sectional study with 150 dental practitioners as participants was conducted. A structured questionnaire assessing awareness, utilization and factors influencing the incorporation of nitrous oxide inhalation sedation in practice and the attitude for future learning was used for data collection. Demographic information was also collected.

Results: Demographic analysis reveals diverse sample in terms of age, gender and educational qualification. 79.3% of practitioners demonstrated awareness, 97.3% of practitioners do not practice inhalation sedation. 44% of practitioners do not opt for the dental treatment in uncooperative paediatric patients. 88% showed willingness of learning and practicing inhalation sedation.

Conclusion: This original research provides valuable insights into the awareness and utilization of inhalation sedation along with willingness to incorporate it in dental practice among practitioners. Further research exploring the challenges faced by practitioners is advised along with developing learning methods among the graduates and post graduates.

Key-words: Nitrous oxide inhalation sedation, dental practitioners, uncooperative paediatric patients, knowledge, awareness

Introduction:

Fear, anxiety, and pain have long been associated with dental practice. It is being stated that anxiety and pain remain significant barriers to dental care for many dental patients.[1]

Nitrous oxide/oxygen inhalation has been recognised as a safe and effective technique of sedation for reducing anxiety and producing analgesia by the American Academy of Paediatric Dentistry (AAPD).[2] Nitrous oxide sedation offers the clinician predictable outcomes and has a long history of safe use in dentistry.[3]

An awareness of the perceptions of people potentially involved in dentistry about sedation was useful in identifying inherent misapprehensions and questions in the subject which will be useful as a guide to futuristic research and publications.[4]

Up until recently, many dental colleges in India gave little attention to sedation education as part of their dentistry curriculum. As a result the knowledge, awareness and the extent, to which nitrous oxide inhalation sedation is utilised in dental practice, remain an area of in-depth investigation.

¹MANISHI TIWARI, ²NIDHI GUPTA,
³SANDEEP KUMAR SWARNKAR ,
⁴UPMA DHAKAD, ⁵SUJATA MALIK

¹⁻⁵Department of Pedodontics and Preventive Dentistry
Maharana Pratap College of Dentistry and Research
Centre, Gwalior

Address for Correspondence: Dr. Nidhi Gupta
Professor & HOD

Maharana Pratap College of Dentistry & Research Centre,
Gwalior, Madhya Pradesh
Email : drnidhigupta06@gmail.com

Received : 11 July, 2024, **Published :** 30 Sept., 2024

Access this article online

Website:
www.ujds.in

DOI:
<https://doi.org/10.21276/ujds.2024.10.3.3>

Quick Response Code



How to cite this article: Nidhi, Manishi Tiwari, Sandeep Swarnkar, Upma Dhakad, & Sujata Malik. (2024). Knowledge, Attitude, Awareness about Nitrous Oxide Inhalation Sedation among Dental Practitioners. UNIVERSITY JOURNAL OF DENTAL SCIENCES, 10(3).

Inhalation sedation nowadays is considered a preferred technique for the pharmacological management of anxious dental patients in the dental office.⁵

The aim and objective of this research was to assess and investigate the knowledge, attitude and awareness about inhalation sedation among dental practitioners.

Materials And Methods:

Study Design: This cross-sectional study was conducted utilizing a web based questionnaire consisting of 10 questions.

Sampling: A sample size is of 150 dental practitioners actively engaged in dental practice. Sampling was based on precision of estimates, statistical power and feasibility, ensuring representation from various demographic characteristics and practice settings.

Inclusion Criteria: Licensed dental practitioners actively practicing and willing to participate in the study.

Exclusion criteria: Practitioners not having active dental practice and unwilling to participate.

Data collection: To collect data a structured questionnaire was developed, incorporating 10 questions about awareness, knowledge and attitude regarding inhalation sedation.

A pilot testing of the questionnaire was conducted with a subset of dental practitioners (excluded from main sample) to assess appropriateness, clarity and relevance of questions to the subject studied. A written informed consent was received from all participants prior to study. Variables related to demographic information, educational qualification (BDS MDS) of participants, awareness, utilisation, importance, barriers and facilitators for incorporation of inhalation sedation in dental practices were incorporated in questionnaire.

Data Analysis: Data were entered into the Excel sheet. Data were analysed using the SPSS (Statistical Package for Social Sciences) 25.0 version. Descriptive statistics were performed. Data were described as number and percentage. Intergroup comparison of categorical variables was done using the Chi-square test. P-value <.05 was considered statistically significant.

Results:

Table 1 is showing demographic characteristics of participating dental practitioners (n=150). The majority of the participants belonged to the age group of 31-40 years (55.7%) followed by 41-50 years age group (24.2%). The number of female participants was greater than the number of male participants [54.0% vs. 46.0%]. There were more BDS dentists compared to the MDS dentists [53.0% vs. 47.0%].

The distribution of study participants based on responses to various questions has been presented in the Table 2 and a comparison of response between BDS and MDS participants has been presented in Table 3.

Awareness about nitrous oxide inhalation sedation in dental practice was significantly more among MDS compared to BDS (p-value <.05) which is reflected in their practice, the number of MDS practicing inhalation sedation was significantly greater than number of BDS [5.7% vs. 0.0%] (p-value >.05). There was no significant difference in the number if MDS and BDS who have observed patient being treated under inhalational sedation (p-value >.05). A significantly greater number of MDS dentists were aware of other dentists practicing nitrous oxide inhalation sedation (p-value <.05) and so the rate of referral to other dentist was also significantly greater among MDS compared to BDS dentists (p-value <.05). Overall, majority of the participants told that they use physical restraints (27.3%) to manage uncooperative patients. The use of conscious sedation for uncooperative patients was non-significantly different between MDS and BDS participants (p-value >.05). Sixty-four percent of the participants believed that nitrous oxide inhalation sedation can be effective in managing uncooperative paediatric patients and there was no significant difference in the perception of BDS and MDS dentists (p-value >.05). Most of the dentists (51.3%) felt that there is lack of knowledge and awareness about nitrous oxide inhalation sedation in dental practice. A large percentage (75.3%) of dentists said that getting trained in the use of nitrous oxide inhalation sedation will be beneficial in handling paediatric and uncooperative, fearful dental patients and 88.0% of the participants showed a willingness to incorporate nitrous oxide inhalation sedation for such dental patients, the perception of BDS and MDS dentists was similar.

Table 1: Demographic Characteristics of Dental Practitioners

Demographic Characteristics	Number of subjects (n=150)	Percentage (%)
Age Range		
≤30 years	2	1.3
31-40 years	83	55.7
41-50 years	36	24.2
51-60 years	24	16.0
>60years	5	3.4
Gender		
Male	69	46.0
Female	81	54.0
Educational qualification		
BDS	80	53
MDS	70	47

Table 2. Distribution of study subjects based on response to various questions.

Question	Response	Number of subjects [N=150]	Percentage (%)
Q.1. Are you aware of the use of nitrous oxide inhalation sedation in dental practice?	Yes	119	79.3
	No	31	20.7
Q.2 Do you practice nitrous oxide inhalation sedation?	Yes	4	2.7
	No	146	97.3
Q.3 Are you aware of any dental practitioner using nitrous oxide inhalation sedation or any other form of sedation?	Yes	95	63.3
	No	55	36.7
Q.4 Have you observed any patient being treated under nitrous oxide inhalation sedation?	Yes	73	48.7
	No	77	51.3
Q.5 Have you ever referred a patient to a specialist in nitrous oxide inhalation sedation kind of intervention?	Yes	59	39.3
	No	91	60.7
Q.6 How do you manage uncooperative paediatric patients in dental practice?	Conscious sedation	4	2.7
	Any other forms of sedation	26	17.3
	Physical restraints	54	36.0
	Do not opt for the treatment	66	44.0
Q.7 Do you believe nitrous oxide inhalation sedation can be an effective mode of treatment in managing uncooperative paediatric patients?	Yes	96	64.0
	No	6	4.0
Q.8 Do you feel there is enough Knowledge and awareness among Dentist regarding use of nitrous oxide inhalation sedation in clinical practice?	May be	48	32.0
	Yes	25	16.7
	No	77	51.3
	May be	48	32.0
Q.9 Do you believe getting trained in the use of nitrous oxide inhalation sedation will be beneficial in handling paediatric dental patients?	Yes	113	75.3
	No	9	6.0
Q.10 If you do not practice nitrous oxide inhalation sedation procedure, are you willing to incorporate the procedure in future in your dental practice?	May be	28	18.7
	Yes	132	88.0
	No	15	10.0
	Not sure	3	2.0

Table 3. Comparison of responses to various questions between BDS and MDS study subjects

S.No.	BDS		MDS		Total		P Value	Chi Square Test	
Q.1	Yes N (%)	No N (%)	Yes N (%)	No N (%)	Yes N (%)	No N (%)	0.003	9.108	
	56 (70.0)	24 (30)	63 (90)	7 (10)	119 (79.3)	31 (27)			
Q.2	Yes N (%)	No N (%)	Yes N (%)	No N (%)	Yes N (%)	No N (%)	0.30	4.697	
	0 (0.0)	80 (100)	4 (6.79)	66 (94.3)	4 (2.7)	146 (97.3)			
Q.3	Yes N (%)	No N (%)	Yes N (%)	No N (%)	Yes N (%)	No N (%)	0.001	10.778	
	41 (51.2)	39 (98.8)	54 (77.1)	16 (22.9)	95 (63.3)	55 (36.7)			
Q.4	Yes N (%)	No N (%)	Yes N (%)	No N (%)	Yes N (%)	No N (%)	0.002	3.775	
	33 (41.3)	47 (58.8)	40 (57.1)	30 (42.9)	73 (48.7)	77 (51.3)			
Q.5	Yes N (%)	No N (%)	Yes N (%)	No N (%)	Yes N (%)	No N (%)	0.030	4.694	
	25 (31.3)	55 (68.8)	34 (48.6)	36 (51.4)	59 (39.3)	91 (60.7)			
Q.6	CS N (%)	Other N (%)	No tit N (%)	CS N (%)	PRN N (%)	No tit N (%)	Other N (%)	0.127	5.604
	0 (0.0)	12 (15.0)	30 (37.5)	4 (5.7)	14 (20.0)	24 (34.3)	4 (2.7)		
Q.7	Yes N (%)	No N (%)	Yes N (%)	No N (%)	Yes N (%)	No N (%)	0.107	4.478	
	31 (38.8)	4 (5.0)	57 (72.9)	2 (2.9)	17 (24.3)	96 (64)			
Q.8	Yes N (%)	No N (%)	Yes N (%)	No N (%)	Yes N (%)	No N (%)	0.795	4.458	
	14 (17.5)	39 (48.8)	11 (15.7)	38 (54.3)	21 (30.0)	25 (16.7)			
Q.9	Yes N (%)	No N (%)	Yes N (%)	No N (%)	Yes N (%)	No N (%)	0.858	0.305	
	15 (18.8)	4 (5.0)	52 (74.3)	5 (7.1)	13 (18.6)	113 (75.3)			
Q.10	Yes N (%)	No N (%)	Yes N (%)	No N (%)	Yes N (%)	No N (%)	0.243	2.831	
	73 (91.3)	5 (6.3)	59 (84.3)	10 (14.3)	1 (1.4)	132 (88)			

Intergroup comparison of categorical variables was done using the Chi-square test. P-value <.05 was considered statistically significant.

Discussion:

Interpretation of study results and in-depth analysis provides broader implications of knowledge and awareness of practitioners for inhalation sedation. The diverse

demographic profile of study practitioners provides understanding of influence of different characteristics of practitioners on awareness and utilization of inhalation sedation.

The study demonstrated that 79.3% of practitioners were aware about the usage of inhalation sedation in dentistry. The awareness is more among MDS as compared to BDS. This could be due to training programmes or the knowledge they acquired during post graduation dental curriculum as compared to the UG curriculum. The percentage of aware practitioners is in substantial proportion, aligning the need of its incorporation into undergraduate and postgraduate studies. It is an important field for both clinicians and patients but with limited scientific literature.⁶

The potential gap between the awareness (79.3%) and utilization (2.7%) is needed to be addressed at higher level. Lack of knowledge on sedation among the dental practitioners influences the provision and practice of dental sedation.⁷

It has been observed that a higher percentage of uncooperative paediatric patients needing dental care (44%) are left without treatment due to the barriers and limitations of education and knowledge among the practitioners. Managing uncooperative children is a crucial part of any paediatric dentistry practice. Therefore, dentists opt for inhalation sedation as behaviour management technique to accomplish treatment successfully.^[8]

Irrespective of theoretical knowledge, 48.7% (57.1% MDS) have observed patients getting treated under inhalation sedation. This indicates their awareness about ease of use, practicality and feasibility of inhalation sedation in dental practice with a positive attitude. Therefore, this study also uncovers the discrepancies present between high awareness level and its utilization in routine practice. Dental practitioners could possess the necessary skills to provide effective and safe paediatric sedation and analgesia.^[9]

Theoretical knowledge and observation is not sufficient, formal training with hands-on and proper equipment handling is the only way to make it happen for pain free dentistry. Inhalation sedation is an efficient treatment method, provided doctors and dentists have undertaken appropriate postgraduate training and the staffs involved is suitably skilled and have the appropriate equipment, drugs and premises as well as the ability to deal effectively with any emergencies.^[10]

Clinical knowledge is better retained after direct clinical experience and not just theoretical knowledge, which all dental colleges cannot provide due to the huge number of dental students.^[11]

The potential barriers may be certain factors like resistance, financial considerations, lack of training, lack of incorporation of subject in the curriculum and perceived ineffectiveness. Inhalation Sedation is not commonly used by the dental practitioners because of the possibility of potential complications, inadequate knowledge and training provided to and acquired by the dental practitioners.[12]

A significant difference is also observed in referring the needed patients to the inhalation sedation practitioners are also worrisome. Constraints are observed in believing the effectiveness of nitrous oxide inhalation sedation which may be due to the lack of efficient knowledge. Nitrous oxide has the highest safety margin of any anxiolysis or sedation modality in dentistry and has a long history of efficacy, its use by dental practitioners may improve access to dental care and the patient experience.[13]

A significant number of practitioners showed willingness to learn and practice nitrous oxide inhalation in their routine dental practices. The practitioner who utilizes N₂O inhalation sedation for a paediatric dental patient shall possess appropriate training and skills and have availability of the proper facilities, personnel, and equipment to manage any reasonably foreseeable emergency.[14]

The present study helped in understanding the reasons for the low utilization irrespective of willingness to learn and use inhalation sedation in dental practices. Inhalation sedation can be considered safe, effective, and practical both for paediatric very young and fearful patients with low pain tolerance and for patients with intellectual disability.[15]

Further targeted interventions encouraging widespread incorporation of evidence based continuing sedation education and resources availability along with focussed efforts is suggested.

Conclusion:

It can be concluded that the practice of nitrous oxide inhalation sedation is not so much among the clinicians. A nationwide survey with a larger sample size must be undertaken to determine the thoughts and perceptions of practitioners regarding the use of nitrous oxide inhalation sedation in dental practice for managing uncooperative and paediatric dental patients.

References:

1. Choudhary V, Vijay S, Kapoor A, Soangra R, Mathur N, Jain. Assessing the need for anaesthesia and sedation services in general practice. Choudhary V et al. Anesthesia and Sedation Services in Dental Practice. International Journal of Research in Health and Allied Sciences 2018;4(4)
2. Chawla et al.; JPRI, 33(50B): 302-308, 2021
3. V. Boka, K. Arapostathis, N. Vretos, N. Kotsanos. Parental acceptance of Pediatric dentistry behaviour management techniques. European Academy of Paediatric Dentistry 2014
4. Perceptions of dentists, dentistry undergraduate students, and the lay public about dental sedation. *J Appl Oral Sci* 2004; 12(3): 182-8
5. Lawrence SM, McTigue DJ, Wilson S, Odom JG, Waggoner WF, Fields HW Jr., et al. Parental attitudes toward behaviour. *Pediatric Dentistry* 1991;13(3)
6. Rossit M, Manich VG, Uribe JMR. Success rate of nitrous oxide-oxygen procedural sedation in dental patients: systematic review and meta-analysis. *J Dent Anesth Pain Med* 2021;21(6):527-545
7. Sales N, Sohal KS, Moshy JR, Owibingire SS, Deoglas DK, Laizer PJ. Conscious sedation in dentistry: knowledge and practice among dental professionals in Tanzania. *J Dent Anesth Pain Med* 2021;21(6):557-564
8. Eaton JJ, McTigue DJ, Fields HW Jr., Beck M. Attitudes of contemporary parents toward behaviour management techniques used in Pediatric dentistry. *Pediatr Dent* 2005;27:107-13.
9. Rodriguez E, Jordan R. Contemporary trends in Pediatric sedation and analgesia. *Emerg Med Clin North Amer.* 2002;20(1):199-202.
10. L. Donaldson, Holden C, J Lowry, Bolton, Renshaw J, Shaw L, Smith G, J Beal, V Day, R Heesterman, W Maxwell, H Robinson, D Busby, Cooper. A conscious decision: A review of the use of general anaesthesia and conscious sedation in primary care. Report of an Expert Group Chaired by the Chief Medical and Dental Officer. SAAD digest 2000;17(3):13-4.
11. Daher A, Hanna RPL, Costa LR, Leles CR. Practices and opinions on nitrous oxide/oxygen sedation from dentists licensed to perform relative analgesia in Brazil. *Daher et al. BMC Oral Health* 2012, 12:21
12. Bhardwaj S, Anand A, K David, Kathuria A. Evaluation of knowledge, attitude and practice of inhalation sedation in children amongst pedodontists and general dental practitioners in Mangalore, India Volume - 11 | Issue - 10 | October - 2021 | PRINT ISSN No 2249 - 555X | DOI : 10.36106
13. Alkandari et al. Dentists' and Parents' Attitude Toward Nitrous Oxide Use in Kuwait. *Anesth Prog* 63:8-16 2016.
14. Guideline on Use of Nitrous Oxide for Pediatric Dental Patients; AAPD Reference Manual. 2009;32:163-5.
15. Angela G, Bernardin G, Annelyse, D'Antò, Vincenzo, Ferrazzano, Fabrizio G, Tina G Valeria, Cassabgi, Giorgio, Cantile, Tiziana, Inhalation Conscious Sedation with Nitrous Oxide and Oxygen as Alternative to General Anesthesia in Precooperative, Fearful, and Disabled Pediatric Dental Patients: A Large Survey on 688 Working Sessions, *BioMed Research International* 2016;2016:7289310.