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Knowledge, Attitude, and Awareness about Nitrous Oxide Inhalation Sedation among Dental Practitioners of Gujarat, India

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Introduction: Conscious sedation is a safe and effective method of anxiolysis. However, the use of conscious sedation in pediatric dental patients is a controversial topic as it involves the intersection of dentistry and medicine. Among the many questions that could be asked, it is necessary to find out what dental practitioners think about the use of sedatives in their routine pediatric dental practice. Therefore, the above survey was conducted aiming to evaluate the perceptions of dentists on the use of Conscious Sedation in pediatric dental practice in Vadodara city, Gujarat.
Methods: Questionnaires were sent electronically to Indian Dental Association (IDA) members of Vadodara at the time of the study. The contact details of these dental practitioners were obtained from the IDA members list. Details on personal status, use of, and training in, conscious sedation

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techniques were sought via the questionnaires to find the knowledge, attitude, and awareness towards the use of Conscious Sedation in pediatric dental practice.
Results: The questionnaire was sent to IDA members in Vadodara city, Gujarat. 64.37% (150 dentists) responded to the questionnaire. 48% were female practitioners and 52% were male practitioners. 78.5% were in favor of using conscious sedation as a behavior management technique in pediatric dental practice, irrespective of their qualification or years of experience. Maximum knowledge about conscious sedation was obtained through the curriculum.
Conclusion: It can be concluded that the dentists of Vadodara city, Gujarat state developed a positive attitude towards the use of conscious sedation, however, complained of a lack of training to the subject.

Keywords: Nitrous oxide inhalation sedation (NOIS); children; nitrous; oxide; dentists; behavior management; laughing; nitrogen; gas.

1. INTRODUCTION

Fear, anxiety, and pain have been associated with the practice of dentistry for a very long. Anxiety was believed to be one of the reasons for not seeking dental treatment. It is related to the anticipation of pain by children [1]. It is explained that anxiety and pain remain significant barriers to care for many dental patients. Pain is an unlikeable emotional experience that usually develops by a noxious stimulus, mediated over a specialized neural network of cortical and subcortical centers[2].

There are two methods to treat anxiety related to dental treatment: Non-Pharmacological, Pharmacological. Non-Pharmacological methods such as tell show do technique, desensitization, and pharmacological methods such as conscious sedation techniques using inhalation sedation (nitrous oxide/oxygen mixture), oral or intranasal sedation (midazolam), intravenous sedation (midazolam), and general anesthesia. Conscious sedation is not a replacement of behavior shaping techniques, and it serves only as an adjunct by alleviating fear and anxiety to facilitate treatment.

A state of depression of the central nervous system is produced by the use of drugs or drugs in the sedation method which enables the treatment to be done, it also allows verbal contact with the patient throughout the treatment period [3]. Fear and anxiety are reduced by the sedation method in dentistry. It also facilitates the dental procedure. The sedation can be administered by many routes such as inhalation, oral, intravenous, and intramuscular [4].

The American Academy of Pediatric Dentistry (AAPD) recognizes nitrous oxide/oxygen inhalation as a safe and effective technique of sedation for reducing anxiety and producing analgesia.

Nitrous oxide is an effective sedative that is mixed with oxygen and inhaled through a small mask that fits over your nose to help you relax nitrous oxide is a safe and effective sedative that is mixed with oxygen and inhaled through a small mask that fits over your nose to help you relax. Patients who have fear from the dental procedure and are anxious patients with special health care needs, a patient who has gag reflex problem, patients for whom profound local anesthesia cannot be obtained, a cooperative child undergoing a lengthy dental procedure are included in the indications to use nitrous oxide/oxygen analgesia/anxiolysis [5].

The popularity and acceptance by the practitioner of oral conscious sedation compared to other methods of behaviour guidance has been seen in many studies. The least acceptable methods passive restraint, oral sedation, and general anaesthesia were found by Murphy et al[6] and also the same results were seen by Lawrence et al[7].

The contributing factors to the increase in acceptability can be increased exposure to surgical general anaesthesia on television, along with an increased familiarity with outpatient general anaesthesia which was proposed by many authors[8]. The purposes of this study is to find the opinion, attitude, beliefs, and existing knowledge of dental practitioner about conscious sedation and to know the effect of education of dental practitioner and prior sedation experience of a child on knowledge of dental practitioner about conscious sedation.

2. METHODS

This study was a cross-sectional survey conducted among the Dental practitioners of Vadodara, Gujarat, India. A quantitative research methodology was used to collect information regarding demography, existing Knowledge, Attitude, and Awareness towards Nitrous Oxide Inhalation Sedation. The participants included only registered members of the Indian Dental Association (IDA) from the Vadodara branch. The participants who refused to give consent, who could not be contacted and those who did not fill the questionnaire form completely were excluded from the study.

A self-prepared questionnaire comprising of 13 validated questions was provided to 233 dental practitioners through mail and WhatsApp by priorly calling them, meeting them, and informing them about the study. The Questionnaire was validated by subject experts and the necessary suggested changes were incorporated to finalize the same. Only complete filled questionnaires were utilized for statistical analysis.

Data is to be entered into a spreadsheet and statistics were generated using SPSS 21.0 for MAC (SPSS Inc. Chicago, IL.USA). Percentage statistics were generated for all categorical variables. Cross tabulations and independent student t-test statistics were used to examine relationships between categorical variables in the questionnaire. $P < 0.05$ was considered statistically significant.

3. RESULTS

An overall response rate of 64.37% (150/233) was obtained. Out of which 48% (n=72) were female dental practitioner and 52% (n=78) were male dental practitioner, furthermore from this 63% (n=95) were Graduates (BDS) and 37% (n=55) were Post Graduate (MDS) by qualification (Table no 1).

3.1 Question Wise Obtained Results: (Table no 2)

- 98% (n=147) of participants were aware of the use of nitrous oxide inhalation sedation (NOIS) in dental practice among which 21% (n=32) participants use nitrous oxide inhalation sedation (NOIS) in their dental practice.
- 67% (n=101) were got the knowledge of the use of nitrous oxide inhalation sedation (NOIS) in dental practice through books, 22% (n=36) were got the knowledge of the use of nitrous oxide inhalation sedation (NOIS) in dental practice through social media.
- Among 150 participants only 21% (n=32) of participants practice NOIS type of procedure and all the participants use the nasal route for the sedation.
- While treating the child patient 64% (n=96) of participants felt the need to use sedatives still there are 52% (n=86) never referred a patient to a specialist in NOIS kind of intervention.
- Also, the 65% (n=104) participants believed risks when sedation is carried out.
- According to the less knowledge and practice 81% (n=122) wished to attend and want knowledge about NOIS.

4. DISCUSSION

Dental fear and anxiety have always remained a major limitation amongst young children posing behavior management problems and thereby preventing children to undergo a dental procedure successfully. Despite the long history of use of Conscious Sedation (CS) especially nitrous oxide inhalational sedation (NOIS), it is underused in most parts of the world, particularly in India. Nitrous oxide is a safe and effective sedative agent that is mixed with oxygen and inhaled through a small mask that fits over your nose to help you relax. Nitrous oxide sometimes called “laughing gas” is one option your dentist may offer to help make you more comfortable during certain procedures.

The present survey was an online survey. In a survey conducted by Hohwü L et al., [9], they affirmed through a traditional paper-based questionnaire has been the epidemiological model of choice for collecting survey data so far; however, with the escalating use of the Internet, Web-based questionnaires may be an understandable option. The rapid growth in access to the Internet has decreased the coverage differential between paper and Web-based questionnaires.

The practitioners included both graduates and postgraduates, as membership to IDA is inclusive to all registered dentists. However, the present study observed a higher number of graduate BDS (Bachelor of Dental Surgery) participants (63%) as opposed to postgraduates MDS (Master of Dental Surgery) (37%). The specialty of the postgraduates was not evaluated.

Table 1. Demographic data of the participants

Gender		Qualification		Years of Practice		
Total = 150		Total = 150		Total = 150		
Male (n)	Female (n)	BDS (n)	MDS (n)	< 5 years (n)	5-15 years (n)	> 15 years (n)
78	72	95	55	46	84	20

Table 2. Participants question wise responses

Category		Qualification								Years of Experience											
		BDS n = 95				MDS n = 55				< 5 n = 46				5-15 n = 84				>15 n = 20			
QUESTIONS	RESPONCES (n)(total=150)	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Are you aware of the use of nitrous oxide inhalation sedation (NOIS) in dental practice?		93	2	-	-	54	1	-	-	46	0	-	-	83	1	-	-	18	2	-	-
How did you acquire knowledge regarding NOIS?		63	25	7	-	38	11	6		36	6	4		54	26	4		11	4	5	
Do you practice the NOIS type of procedure?		17	78	-	-	15	40	-	-	9	37	-	-	21	63	-	-	2	18	-	-
According to you which age group can be treated under NOIS?		46	3	44	2	26	0	29	0	16	1	29	0	46	0	36	2	10	2	8	0
What according to you are the advantage of treating a patient using NOIS?		36	6	3	56	14	2	0	39	12	0	0	34	26	5	3	50	6	3	0	11
What route do you utilize for NOIS?		93	2	-	-	55	0	-	-	45	1	-	-	84	0	-	-	19	1	-	-
Have you ever observed an adverse event while performing NOIS?		19	76	-	-	8	47	-	-	1	45	-	-	22	62	-	-	4	16	-	-
If you do not practice the NOIS type of procedure, have you ever felt the need to use sedatives?		59	36	-	-	37	18	-	-	30	16	-	-	53	31	-	-	13	7	-	-
Have you ever referred a patient to a specialist in NOIS kind of intervention?		46	49	-	-	18	37	-	-	20	26	-	-	32	52	-	-	12	8	-	-
Do you believe there are risks when NOIS is carried out?		68	27	-	-	36	19	-	-	30	16	-	-	59	25	-	-	15	5	-	-
Do you wish to attend any training regarding NOIS?		80	15	-	-	42	13	-	-	36	10	-	-	72	12	-	-	14	6	-	-

The study included 52% male practitioners and 48% female practitioners (Table 1). There was no difference in gender-wise responses of the practitioners. The current study reported a good response of 74.25%.

The three factors that could be attributed to the high response are as follows:

- As described earlier, with the rapid growth of the internet and the digitalization of technology, it is easier to respond to surveys or polls with a click of a finger. This process is not only easier but a quick, systematic, hassle-free, paper-saving, and cost-effective method.
- Secondly, the majority of the respondents were between 31 to 40 years of age (29.6%), followed by 41 to 50 years (27.9%) and 25 to 30 years (18.5%). Thus, the maximum response elicited was in practitioners between 25 to 50 years of the age group who appear to be more active and responsive when compared to the older age group (51 years and above) which could be due to lack of time, minimal use of tech-savvy gadgets or lack of interest, etc among the older group.
- Thirdly, the increased response could be due to the inquisitiveness towards the field of conscious sedation in children. Conscious sedation is gaining tremendous support in recent years due to its safety margin and the fact that it can reduce the use of general anesthesia. Hence practitioners may incline towards the use of minimally invasive procedures such as conscious sedation especially when dealing with the Pediatric population.

The study shows that 98% of dental practitioners including both BDS and MDS who were aware of Nitrous Oxide sedation and the knowledge was acquired through books by the maximum dental practitioner. Moreover, it also showed that only 21.3% practiced nitrous oxide sedation though being aware of the technique and also having knowledge regarding the same. Although Nitrous oxide sedation enhances the effectiveness of anesthetic. There are no needles used in this and it is considered safer than IV sedation & general anesthesia, with low incidence & severity of adverse reactions. It also decreases gagging. Still, there was 64% of dental practitioners believed that there was a risk when nitrous oxide sedation was carried out. And in addition to this 42% of dental practitioners referred a patient to a specialist in NOIS kind of intervention.

In this regard, we concur with Ranali[10], who highlighted the following concerns for consideration: Dentist education, the dangers of utilizing insufficient equipment, and the engagement of teaching institutes with competent employees and proper infrastructure. However, we believe that a commitment by dental professional organizations to protect dentists, responsible practices is absolutely necessary.

There are many advantages of nitrous oxide sedation over any other sedation and from this study, we can conclude the maximum advantages offered by nitrous oxide sedation which was believed by 63.3% of dental practitioners were: Reduce anxiety, decreasing operating time, helps in instilling a positive attitude in children. On the other hand, Dionne, et al.[11], Nearly 30% of Americans are afraid of going to the dentist, according to a survey of 400 people conducted over the phone. These authors also observed that the majority of fearful patients would seek dental care more frequently if conscious sedation or general anesthesia were regularly made available. Cesar, et al.[12], on the other hand, observed that 62.8% of their sample had declared that they had not “gone to the dentist” in the previous twelve months, but that “fear of the dentist” was the reason for only 3.2%.

And when it was asked about the best route for nitrous oxide sedation administration 98.6% of dental practitioners trusted that the nasal route was the best and 1.3% trusted the oral route for nitrous oxide administration. The indications for sedative use in dentistry are controversial[13]. Contraindications, which can be described as cooperative individuals with a low need for therapy and pre-existing medical illnesses that would rule out sedation, such as pregnancy, specific syndromes, obstructive respiratory difficulties, and so on, must also be considered. Considering adult patients, the routine use of sedatives is limited to impacted third molar surgery, though Yagiela [14] reminds us that many other dental procedures are stressful for the patient: implants, apicectomies, complex periodontal operations, etc. Wilson, et al.[13], In a study of clinical and academic experiences in pediatric dentistry training programs at American dental schools, it was discovered that 1% to 20% of the patients treated in these programs required sedation.

Although knowing nitrous oxide 18% of dental practitioners observed an adverse event while performing NOIS and felt that the knowledge was not enough to perform the nitrous oxide sedation and at present, it is known that UNICAMP covers inhalator nitrous oxide sedation in its undergraduate course and that some institutions offer training for dentists in line with the recommendations of the American Dental Association[15]. The Pediatric Dentistry Sedation Study Group (NESO) at the Federal University of Goins has been in existence since 1998, due to a collaboration between the dental and medical schools. While physical restraint is cited by some dentists as an alternative to sedation, it is regarded as an advanced child behavior control strategy in the dental office, as is the use of sedatives in Brazil. The usage of nitrous oxide is classified as a fundamental approach[16]. This classification of physical restraint is likely due to legal concerns about child abuse, which are a top focus in the United States.

Lastly after getting aware of nitrous oxide sedation and the simplicity by which it can be performed there were 81.3% of dental practitioners who were ready to be a part of workshops and learn more about nitrous oxide sedation technique.

5. CONCLUSION

The present survey was conducted to establish baseline data regarding the perceptions of dentists regarding the use of CS in children of Vadodara city, Gujarat, India. Within the limitation of the survey, it can be concluded that Dentists of Vadodara prefer the use of conscious sedation techniques in their routine pediatric practice, although several Dentists had not received sedation training as part of their curriculum, these individuals had generally received training from other sources. However, attention needs to be given to the subject at the undergraduate level with more hands-on experience under supervised well-trained professionals along with the implementation of short certified courses as a part of continuing dental education thus enabling the dentists to acquire, learn and practice the techniques with confidence. Additional research should be carried out to identify barriers to using conscious sedation among children in India.

6. LIMITATIONS

- The current study was limited to only one city in Gujarat.
- A nationwide survey with a larger sample should be undertaken to determine the thoughts and perceptions of practitioners nationwide regarding the use of conscious sedation for children.
- This study targeted the practitioners in general and was not exclusive to Pediatric dentists. Studies focusing on pediatric dentists of India would elicit the perceptions and status of the actual use of conscious sedation among children.

7. RECOMMENDATIONS

- Education of dentists for the use of conscious sedation is undertaken at both undergraduate and postgraduate levels. However postgraduate training is mandatory in some countries to practice sedation. The basis for postgraduate sedation education and training begins at the undergraduate level. Thus, implementing new protocols and reforming the current curriculum pattern regarding the use of conscious sedation in dental colleges of India will prove fruitful and beneficial.
- Appropriate referral of Pediatric cases to the specialist should be encouraged among practitioners who are not very confident in managing the Pediatric population.
- Especially in India, the deliberations continue whether conscious sedation can be practiced in a dental office setting and whether general anesthesia is safe. There are no official guidelines by either the Indian Dental Association or the Indian Society of Pedodontics and Preventive Dentistry (ISPPD) on the argument. Fear of adverse reactions and the skill required to manage medical emergencies associated with the use of conscious sedation can be improved by reinforcing protocols or guidelines that mandate the specialized training and courses for basic and advanced life support for all practitioners who desire to practice conscious sedation.

DISCLAIMER

The products used for this research are commonly and predominantly used products in our area of research and country. There is no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by the personal efforts of the authors.

CONSENT

As per international standard or university standard, respondents' written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

This study was approved by the institutional committee for ethical considerations for research work (SVIEC/ON/DENT/SRP/20016).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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