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Perception of dentists regarding the use of Nitrous Oxide-Oxygen Inhalation Sedation and General Anaesthesia in dental treatment

Dr. Vasudha Sodani[1], Dr. Anup Panda[2], Dr. Garima Bhatt[3]

[1]PhD Scholar, Gujarat University, India.
[2]PhD Guide, Gujarat University, India.
[3]Post Graduate, Ahmedabad Dental College & Hospital, India.

Corresponding Author:
Dr. Vasudha Sodani,
Email id: vasudhasodani@gmail.com

ABSTRACT

Introduction: Dental fear and anxiety remain significant barriers to oral health care affecting patients across all age groups. These psychological barriers often result in avoidance or delay of necessary dental treatments ultimately exacerbating oral diseases and complicating treatment needs. The use of pharmacological behavioral management techniques such as Nitrous Oxide-Oxygen Inhalation Sedation (NOIS) and General Anaesthesia (GA) is essential in managing uncooperative, apprehensive and anxious dental patients. This study aims to assess the knowledge, attitudes, preferences and practices of dentists regarding the use of NOIS and GA in dental treatment. **Materials and Methods:** A cross-sectional Google questionnaire-based survey was conducted among practicing dental professionals to evaluate their knowledge, attitudes, experiences and perceived advantages and disadvantages regarding the use of NOIS and GA. The questionnaire was circulated through online social media platform and 223 responses were obtained which were analyzed statistically. **Results:** A total of 223 dentists participated in the survey. 164 (73%) respondents were familiar with NOIS and reported using it in clinical practice. 202 (90%) respondents used NOIS or GA for children upto 12 years age. In contrast, 50% respondents referred patients for GA-based procedures, typically for extensive dental needs or uncooperative patients. NOIS was preferred for managing anxious but cooperative patients while GA was avoided for patients with complex medical conditions. **Conclusion:** The study highlights variability in the perception and utilization of NOIS and GA among dental professionals. Dentists acknowledge the clinical value of both NOIS and GA in behavior management but face barriers in their implementation, particularly related to training and infrastructure. Increasing access to continuing education and clinical training programs may enhance the adoption of sedation techniques, thereby improving patient care and outcomes.

Keywords: Pediatric Dentistry, Nitrous Oxide-Oxygen Sedation, General Anaesthesia, Dental Anxiety.

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INTRODUCTION

Managing patient anxiety and uncooperative behavior is a long-standing challenge in dental practice. Over the years, various behavioral management techniques have been employed, ranging from non-pharmacological methods to advanced pharmacological interventions. Among the latter, Nitrous Oxide-Oxygen Inhalation Sedation (NOIS) and General Anaesthesia (GA) have emerged as reliable options for facilitating safe and effective dental treatment in uncooperative, anxious or medically compromised patients .[1]

Nitrous Oxide-Oxygen Inhalation Sedation has been widely recognized for its rapid onset, minimal side effects and ease of administration. It is often favored for its anxiolytic and analgesic properties, making it particularly useful in managing mild to moderate anxiety in children and adults.[2] In contrast, General Anaesthesia although more invasive and resource-intensive, becomes indispensable for cases involving severe dental phobia, extensive dental needs or when other behavior management techniques fail.[3] It induces a state of reversible unconsciousness offering deep sedation with amnesia, analgesia, muscle relaxation but necessitating airway management and continuous monitoring of vitals until the effect wears off.

Despite the clinical advantages of NOIS and GA, their use remains inconsistent across dental settings. Factors such as availability of equipment, lack of formal training, concerns about safety and institutional policies can influence a dentist's decision to use these modalities. Understanding dentists' perspectives on these techniques is crucial, as their comfort level, knowledge and experience directly impact treatment decisions and patient outcomes.

This study aims to explore dentists' perceptions, knowledge and utilization patterns of NOIS and GA in dental treatment. By identifying existing gaps and barriers, this study aims to contribute insights that can inform training programs and policy development to enhance the accessibility and safe use of these sedation modalities in dental care.

MATERIALS & METHODS:

The present study employs a cross-sectional survey design to assess the perceptions, knowledge, attitudes and practices regarding the use of Nitrous Oxide-Oxygen Inhalation Sedation (NOIS) and General Anaesthesia (GA) among practicing dentists. The survey was carried out over a definite time frame of 3 months from February 2025 to May 2025. The study population included practicing dental professionals across various demographic and clinical settings.

Ethical clearance for the study was obtained from the Institutional Ethics Committee (IECADC/0102/2025). A sample size of 220 participants was determined based on 33% of satisfaction rate regarding patients' satisfaction with 10% of relative precision and 95% confidence and sample selection was done using a convenience sampling method. Participants willing to participate were included in the study, whereas those unwilling or who had previously completed the survey were excluded from the study. The structured questionnaire form consisting of 18 multiple choice questions was prepared using Google forms to qualitatively assess dentists' knowledge, attitudes, preferences and practices regarding the use of NOIS and GA in dental treatment. For selected survey items, respondents were allowed to choose more than one response option. Consequently, the cumulative percentages for these questions exceeded 100%, reflecting the frequency of all responses rather than the proportion of participants. The questionnaire highlighted following information: The exposure and adoption of sedation techniques in clinical practice, identifies which patient populations receive sedation, Primary indications for GA and NOIS, Advantages of NOIS and GA, Primary barriers for NOIS and GA, most accepted sedation technique in clinical practice.

For validation of the questionnaire the created draft survey instrument was provided to 10 faculty members who were randomly chosen to evaluate the validity and readability of the survey instrument. Twenty practicing dentists were randomly chosen to evaluate the survey instrument to ensure its clarity, relevance and acceptance. The reliability of the questionnaire was assessed using the Test-Retest method, yielding a Cohen's Kappa value of 0.89, indicating high consistency.

The questionnaire was distributed to 300 practicing dentists in order to attain the required sample size. A brief introduction to the study was presented at the beginning of the questionnaire and informed consent was obtained through digital signature from all participants. Participation was voluntary, responses were anonymous. Repeated reminders were sent at regular intervals through email and social media platforms which led to a total of 223 responses. The collected data was subjected to statistical analysis.
Statistical analysis:

The statistical package for the social science program (SPSS version 22.0) for Microsoft Windows was used to statistically analyze the data. Using Pearson's Chi-squared test, the inferential statistical comparison of the categorical variables was examined. A 95% confidence level was used in the investigation and p value of

RESULT

A total of 223 practicing dentists across various demographic and clinical settings participated in the study. Out of the total respondents, 168 (75%) were general dental practitioners (75%) while 55 respondents (25%) represented various dental specialities including Pedodontist, Orthodontist, Endodontist and Prosthodontist.

The question regarding the experience revealed that 205 respondents (91%) had the experience of upto 10 years. A total of 164 respondents (75%) reported the use of either Nitrous Oxide–Oxygen Inhalation Sedation (NOIS) or General Anaesthesia (GA) in their clinical practice. Among those who used these techniques, 117 (64%) used inhalation sedation occasionally, 35 (19%) used frequently and 31 (17%) reported rare use.

The most common age group for sedation use was children aged upto 12 years (90%, 202 respondents), followed by adolescents (47%, 105 respondents), adults (26%, 57 respondents) and least common use for geriatric patients (3%, 6 respondents). Since multiple responses were permitted for this question, the total percentage exceeds 100%.

The majortiy of dentists (95%, 230 respondents) reported the most common use of nitrous oxide-oxygen inhalation sedation for restorative and pulp therapy procedures, minor surgical procedures such as extractions (36%, 81 respondents) and prophylactic and preventive treatments (20%, 45 respondents). As multiple responses were permitted for this question, the cumulative percentage exceeds 100%.

The most common indications for the use of GA included extensive dental treatment needs in uncooperative children (117, 52%), children with special health care needs (54, 24%), failure of behavior management under local anaesthesia or sedation (48, 21%) and uncooperative patients with severe dental anxiety or phobia (151, 67%). As multiple selections were allowed, the cumulative responses exceed 100%.

When asked about the most effective method for managing anxious patients, 40% preferred non-pharmacological behavior management techniques, 25% preferred inhalation sedation, 9% favored general anaesthesia. A majority (92.5%, 206 respondents) agreed that inhalation sedation should be the primary method of sedation for most dental procedures.

Advantages of Inhalation Sedation over GA as cited by majority of dentists (191, 86%) were easy administration, faster recovery and lesser complications. Advantages of General Anaesthesia over Inhalation Sedation include more effective for complex procedures, better for patients with extreme anxiety, provides a deeper level of sedation and more control over sedation depth.
The most frequently reported barriers were: For Inhalation Sedation were patient non cooperation (58%), incomplete sedation

(28%), lack of training (11%), high equipment cost (7%) and for General Anaesthesia were higher risk of complication (55%), longer recovery time (20%), inadequate training (13.5%) and higher cost (8%).

Majority of the participants (72%, 161) recommended inhalation sedation for patients with mild to moderate anxiety, while 87% avoided general anaesthesia for patients with complex medical conditions due to increased risk of complications.

DISCUSSIONS

Sedation and general anaesthesia play an integral role in managing anxiety, pain and uncooperative behavior during dental treatment. The present study aims to assess the perceptions and practices of dentists regarding the use of Nitrous Oxide–Oxygen Inhalation Sedation (NOIS) and General Anaesthesia (GA) in diverse clinical settings.

In the present study, the majority of respondents were general dental practitioners with less than ten years of experience. This aligns with the findings of Thakare et al (2018) who reported that early-career dentists tend to show greater interest in learning and applying sedation techniques.[5] The high level of acceptance of NOIS among dentists in the current study may also be attributed to its proven effectiveness in reducing anxiety, improving patient cooperation and allowing completion of dental procedures with minimal distress. Similar conclusions were drawn by Roberts and Rosenbaum (2017), who emphasized the safety and reliability of NOIS for pediatric and adult patients.[7]

Most participants reported using NOIS primarily for restorative and pulp therapy procedures, followed by minor surgical interventions and preventive treatments. This pattern is comparable to the observations of Collado et al (2008) who found that NOIS is most commonly used for short-duration dental procedures and mild to moderate anxiety cases.[8] The current study also revealed that the most frequent indication for GA was the need to manage uncooperative children, patients with extensive treatment needs and those with severe dental anxiety or special health care needs, these findings were consistent with the literature supporting GA as a last-resort option when behavioral and conscious sedation methods fail.[9]

In the present study, lack of patient cooperation and incomplete sedation were cited as key challenges with NOIS, while high cost and limited training opportunities were recognized as additional barriers. These challenges echo those identified in previous surveys, suggesting that although dentists recognize the advantages of NOIS, inadequate exposure during training limits its wider adoption.[6]

The present study also demonstrated that most dentists preferred NOIS as the first-line technique for managing mild to moderate anxiety, whereas GA was reserved for complex cases or patients with severe behavioral problems. This cautious and evidence-based selection of sedation modality reflects the evolving trend towards minimally invasive, patient-centered care in dentistry.[5] Additionally, the majority of participants recognized the advantages of NOIS—such as ease of administration, faster recovery, and fewer complications—over GA. Conversely, GA was perceived to offer better control for complicated or lengthy procedures, consistent with previous studies on sedation decision-making.[9]

The findings highlight a growing preference among practitioners for NOIS over GA owing to its safety, simplicity and shorter recovery time. These results are consistent with previous studies that identified NOIS as the most accepted and frequently employed conscious sedation technique in dental practice.[10]

The overall findings indicate a strong professional inclination toward the rational use of sedation techniques tailored to individual patient needs.

LIMITATIONS

The present study utilizes a self-administered online questionnaire, which may be subject to reporting and selection bias. Additionally, as some questions allowed multiple responses, cumulative percentages exceeded 100%; this approach was necessary to accurately capture the multifactorial application of sedation and anaesthesia in dental practice. Despite these limitations, the study provides valuable insights into current sedation practices and attitudes among dental professionals in India.

CONCLUSION

In the present study, most dentists demonstrated a positive attitude towards the use of Nitrous Oxide–Oxygen Inhalation Sedation and recognized it as a safe, effective and patient-friendly method for managing anxiety during dental procedures. Enhancing professional competence and accessibility can help expand the safe and rational use of sedation in routine dental care, ultimately improving patient comfort, cooperation, and overall treatment outcomes.

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