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Ambulatory Sedation in Pediatric Dentistry "Knowledge and Practice of Dental Graduates of Karachi" A Cross Sectional Study

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ABSTRACT

Ambulatory sedation in pediatric dentistry is crucial for managing anxiety and pain, ensuring effective treatment. Assessing the knowledge and practice of dental graduates regarding this technique is essential for improving pediatric dental care. **Objective:** To evaluate the knowledge and practice of dental graduates in Karachi regarding ambulatory sedation in pediatric dentistry. **Methods:** A cross-sectional survey was conducted from July 2023 to December 2023 among dental graduates in Karachi using a simple random sampling technique. Data were collected through a structured, self-administered questionnaire, which included 5 demographic questions, 14 knowledge questions, and 3 practice questions. The knowledge questions were scored, with each correct answer allocated 1 point, and the total score categorized into poor (0-4), good (5-9), and excellent (10-14) knowledge levels. Data were analyzed using SPSS version 25.0, with descriptive statistics and Chi-square tests employed for analysis. **Results:** Out of 200 respondents, 45% demonstrated excellent knowledge, 40% had good knowledge, and 15% had poor knowledge regarding ambulatory sedation in pediatric dentistry. The practice assessment revealed that 60% of the graduates regularly used ambulatory sedation techniques, while 40% reported occasional use. Significant associations were found between knowledge levels and years of practice ($p<0.05$). **Conclusions:** The study indicates that while a substantial proportion of dental graduates in Karachi have excellent knowledge of ambulatory sedation, there is a need for continued education and training to ensure consistent practice. Enhancing knowledge and practice through targeted programs can improve pediatric dental care outcomes.

INTRODUCTION

Children can be difficult during dental work due to the fear and anxiety that comes with it [1]. There are several unique challenges to pediatric dentistry. This fear and anxiety often results in incomplete procedures being done or the parents refusing to let their kids receive necessary treatments which they need [2]. In light of this problem, dental professionals have come up with different methods for dealing with young patients. One of these methods involves giving them drugs that make them sleepy but not unconscious known as ambulatory sedation. The dentist administers medications which depress the central nervous system while still being able to talk with the child. Through experience it has been shown that this method creates an environment where the kid is more comfortable and willing to corporate thus making the treatment process smoother [3, 4]. Common medications used by dentists to aid sedation in children who are visiting the dental office for serious procedures are midazolam and Propofol. They prefer these because they work well and are safe if given by someone who knows what they're doing [5]. The American Academy of Pediatric Dentistry (AAPD) and other top medical organizations support the use of sedation therapy during office-based treatment where children have their teeth looked at, noting advantages like affordability, simplicity, and early care access among others [6]. Even with these developments, there is still a great deal of unknown about the proper use of sedation by dentists in pediatric dentistry, especially in areas such as Karachi. With the goal of improving chair side efficiency, lowering visit frequency, and improving patient comfort, this study

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examines outpatient sedation practices and advancements in pediatric dentistry settings. The goal of the study is to enhance juvenile dental care procedures by addressing these important factors. Level of knowledge and practice of ambulatory sedation among dental professionals in Tanzania, Majority of dentist have enough knowledge of sedation in dentistry, it's been reported that only one in ten have had proper training on sedation [7]. The requirement of sedation for dental treatments is more in preschool patients in the city of Cuenca. Ambulatory sedation plays a vital role in situations where it is impossible to use operating rooms. This study concluded that the knowledge is inadequate about the procedure and conditions of giving sedatives [2]. Individual adjustments should be made to the appropriate amount of sedation in order to properly balance the demands of the patient, the operator, and the procedure's safety. The amount of time spent on surgery is crucial for the recovery stages, and it may be significantly impacted by the patient's cooperation or interruptions of the surgeon [8]. Oral sedatives have historically been the primary source of pediatric dental sedation; however, new developments have led to the introduction of innovative drugs and techniques that are producing outstanding outcomes [9]. Experts in sedation must anticipate the negative consequences of sedation, which is why carefully chosen patients under precise therapeutic guidelines are needed to prevent the as-yet-undetermined potential neurological repercussions. The prevalence of pediatric dental diseases makes it likely that sedation will be required in the near future. By utilizing the right medications and delivery methods and fine-tuning the behavioral evaluation criteria, this scenario will improve the effectiveness of sedation [10]. Following dental treatment under GA, a number of the children experienced relapses; 24–59% acquired new caries lesions and 6.5–87% needed further restorative dental care. Dental practitioners should put more of an emphasis on prevention rather than the conventional strategy of treating the symptoms of oral disorder [11]. The use of general anesthesia and sedation in dentistry offices is not well documented throughout Latin America. During the COVID-19 confinement period in Ecuador, mobile anesthesia became essential as it was nearly difficult for children to receive dental care in a hospital setting [12]. Children's anatomical, pharmacokinetic, and psychological characteristics are always changing; thus, sedation attempts to preserve safety, relieve pain, lessen anxiety, and regulate behavior so that the intended intervention may be carried out. Since deep sedation or general anesthesia are necessary to safely develop dental treatment due to factors like the child's extensive treatment needs, age, acute situational anxiety, limited cognitive functioning, long intervention times, physical disability, or medical conditions, minimal pharmacological or non-pharmacological interventions are frequently insufficient to achieve adequate comprehensive care in pediatric dentistry [13]. Ambulatory sedation is used to relieve anxiety, pain and discomfort in a broad spectrum of patients during many types of diagnostic or therapeutic procedures. Number of students who have obtained a recognized qualification in dentistry in a given years are dental graduates. Among those are Fresh Graduates, Post Graduates and Dental practitioners. No previous study has been conducted so far in Karachi to Assess the Knowledge and Practice about the Ambulatory Sedation in Pediatric Patients. This study will help to lessen the feeling of pain during dental treatments, which will contribute to the development of trust and a positive relationship between the pediatric patient and the dentist, as well as the elimination of fear and anxiety and the promotion of a positive patient attitude towards dental care.

METHODS

The Cross-sectional design was used in this study. The study settings were dental OPDs of dental colleges and clinics in Karachi. Study duration was 6 months (July 2023 to December 2023) after approval of synopsis from IRB Ref. No. IRB/D-000070/23. Study population was Dental house officers, FCPS/MCPS/ MDS trainees, Post Graduates and Clinical faculty members and sample size was calculated using online software. Inclusion criteria was dental graduates and post graduates, practicing dentist, male / female dentist, age above 20 years. Exclusion criteria was dental graduates who have not practiced in the last year, dental graduates who are currently not residing in Karachi; dental graduates who did not consent to participate in the study. A simple random sampling technique was used to ensure that every dental graduate in Karachi had an equal chance of being included in the study, minimizing bias and ensuring a representative sample. A structured, self-administered questionnaire was developed for data collection. The questionnaire was pre-tested on a small group of dental graduates to ensure clarity and validity. It consisted of three main sections: Demographic Information: 5 questions assessing the demographic characteristics of the dental graduates. Knowledge Assessment: 14 questions, each correct answer allocated 1 point, assessing the knowledge regarding ambulatory sedation in pediatric dentistry. The questions were developed and validated based on previous studies by Sales N *et al.*, and Li SF *et al.*, [3, 14]. Practice Assessment: 3 questions assessing the practice of dental graduates regarding ambulatory sedation. The total score for the knowledge assessment ranged from 0 to 14. Based on the scores, the knowledge levels were categorized as follows: poor knowledge: 0-4 points, good knowledge: 5-9 points and excellent knowledge: 10-14 points. Data were analyzed using SPSS software version 25.0. Descriptive statistics, including frequencies and percentages, were used to

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summarize the demographic characteristics and knowledge levels of the respondents. Inferential statistics were used to identify associations between demographic variables and knowledge levels. Specifically: The Chi-square test was used to assess associations between categorical variables. Mann-Whitney U test was used to compare knowledge scores between two independent groups when the data did not follow a normal distribution. However, this test was not used in the results section, indicating a need for reconsideration of its application. A p-value of <0.05 was considered statistically significant.

RESULTS

Results revealed that the majority of participants were aged between 25-35 years, with a relatively equal distribution of male and female participants. Most respondents were dental graduates practicing in private settings, with more than five years of experience (Table 1).

Table 1: Sociodemographic Characteristics of study Participants

Category	Frequency (%)
Age	
25-35 Years	150 (61%)
36-45 Years	80 (32.5%)
>45 Years	16 (6.5%)
Gender	
Male	130 (52.8%)
Female	116 (47.2%)
Level of Dental Education	
Graduates	200 (81.3%)
Post Graduates	46 (18.7%)
Settings	
Private	180 (73.2%)
Government	66 (26.8%)
Years of Experience	
<5 Years	90 (36.6%)
>5 Years	156 (63.4%)

A significant proportion of participants believed that sedation can reduce patient anxiety. Many participants correctly identified midazolam as a sedative agent, while recognizing that local anesthetic agents like lidocaine and articaine are not sedatives. Participants were aware that propofol is a sedative administered intravenously, and nitrous oxide is used as an inhalation gas sedative. A considerable number of respondents correctly answered questions related to the pharmacological effects of sedative agents, such as midazolam's impact on neuromuscular transmission and the comparative properties of diazepam and midazolam (Table 2).

Table 2: Knowledge Assessment among study participants

Questions	Yes N (%)	No N (%)
Can Sedation Reduce Patient's Anxiety?	210 (85.4%)	36 (14.6%)
Can a Sedative Drug Be Used To Replace A Local Anesthetic Agent?	186 (75.6%)	60 (24.4%)
Is Midazolam A Sedative Agent?	230 (93.5%)	16 (6.5%)
Is Lidocaine A Sedative Agent?	26 (10.6%)	220 (89.4%)
Is Propofol A Sedative Agent?	198 (80.5%)	48 (19.5%)
Is Articaine A Sedative Agent?	20 (8.1%)	226 (91.9%)
Is Nitrous Oxide A Sedative Agent?	202 (82.1%)	44 (17.9%)
Is Diclofenac A Sedative Agent?	16 (6.5%)	230 (93.5%)
Can Diazepam Be Administered By Nasal Spray?	140 (56.9%)	106 (43.1%)
Is Nitrous Oxide Administered Only As Inhalation Gas?	178 (72.4%)	68 (27.6%)
Does Midazolam Affect Neuromuscular Transmission?	162 (65.9%)	84 (34.1%)
Does Diazepam Have A Greater Amnesic Effect Than Midazolam?	126 (51.2%)	120 (48.8%)
Does Midazolam Have A Longer Duration Of Action Than Diazepam?	186 (75.6%)	60 (24.4%)
Is It True That Propofol Is Both An Analgesic And A Sedative That Is Administered Through Intravenous Route?	214 (87.0%)	32 (13.0%)

Out of 200 respondents, 45% demonstrated excellent knowledge, 40% had good knowledge, and 15% had poor knowledge regarding ambulatory sedation in pediatric dentistry (Figure 1).

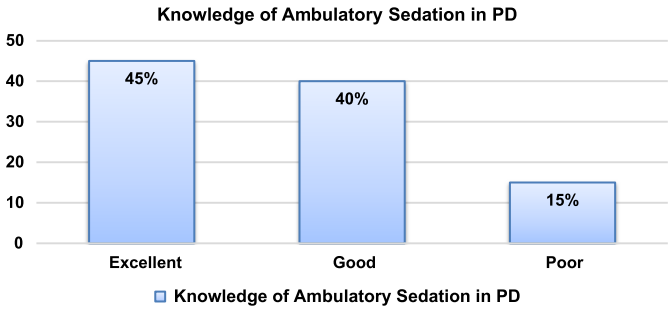

Figure 1: Distribution of Knowledge Levels among Respondents

A notable percentage of participants reported practicing sedation in children. Reasons for not practicing sedation included a lack of training, cost concerns, and perceived patient (Table 3).

Table 3: Practice of Sedation among study participants

Practice of sedation	Yes (%)	No (%)
Are you practicing sedation in children?	(19%)	(81%)
The reason for not practicing sedation		
Due to lack of training	(67%)	(33%)
Due to cost	(23%)	(77%)
Due to risk factors of patients	(10%)	(90%)
Recommendation of sedative dose in a child		
Pain	(45.5%)	(54.5%)
Anxiety	(60.2%)	(39.8%)
Other	(30.9%)	(69.1%)

DISCUSSION

The outcomes of this cross-sectional study shed light on dental practitioners' knowledge and practices regarding ambulatory sedation in pediatric dentistry in Karachi. The

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research examined a number of topics, including sedative use, expertise evaluation, and sociodemographic traits. The sample size for the study was 246 people, including postgraduates and graduates in dentistry. The majority of participants were dental graduates with over five years of experience, which shows that they have some knowledge and expertise with pediatric dental operations [1=7]. The study's knowledge evaluation component found important facts about dental practitioners' understanding of ambulatory sedation. The majority of participants correctly recognized sedation's ability to lower patient anxiety as a significant benefit of pediatric dental treatment. In a similar vein, many individuals seem to have a good grasp of the pharmacological elements of sedation as they know that sedatives may be employed in place of local anaesthetics [14]. Also, the volunteers clearly knew their way around the various sedatives, including propofol and midazolam, and how to administer them. There were significant knowledge gaps on certain drugs, such lidocaine and articaine, which are local anaesthetics and not sedatives. The need for more knowledge and training in differentiating between anesthetics used in dental treatments is highlighted by this [2]. Sedation has been found to be a promising trend in pediatric patients. Many respondents indicated that they often gave children drugs for sedation and this could mean a willingness to use drug-induced sleep more frequently for the benefit of the patient. However, others said that they did not use sedation because they were not trained on it, considered it as expensive or feared that the patient would be at risk. By using these obstacles as targets for interventions and teaching campaigns, dentists can increase their utilization of these methods. In keeping with established principles of pediatric dental sedation, most comments revolved around the best time to administer relaxants in order to alleviate pain and fear in children. The results of the survey showed that these surveyed practitioners are aware that thorough pain and anxiety assessments should be performed so as to make dental visits positive experiences for both child [4]. According to recent research by Wiener RC *et al.*, in 2022, dental practitioners today have a better grasp of sedation procedures than they had in the past. This has led to improved support for sedation treatments and an awareness of the hazards connected with them. It was shown that less anxious patients had more frequent dental checkups and improved overall dental health [15]. According to a study of 2024, ambulatory sedation is a substantial substitute for general anesthesia in pediatric dentistry treatment cases when research shows it to be more beneficial [16]. The technique should be selected with the patient's unique qualities in mind. For juvenile patients, both ambulatory and general anesthesia have advantages, but they shouldn't be used as the main tools for behavior control. It is important that dentists have a thorough grasp of various sedation methods in order to provide the best possible dental treatment [17,18]. In Kuwait, parents and dentists' knowledge and use of nitrous gas sedation were assessed in 2024 by Alkandari SA *et al.*, despite their willingness to use it based on their dentist's prescription, the majority of parents still know very little about nitrous oxide sedation as a Behavior Management Strategy (BMT). The study does, however, also show that a sizable percentage of these dentists are devoid of the knowledge and tools required to properly provide sedation. This emphasizes how important it is for dentists to have greater access to the right instruments and improved training programs in order to administer nitrous gas sedation to children [19]. Li SF *et al.*, in 2013 conducted an examination of dental practitioners' knowledge, attitude, and practice regarding conscious sedation in children. The findings indicated that although the majority of dental professionals were aware of the practice, they frequently lacked practical experience in administering appropriate dosages. According to their survey, 15% of dental practitioners did not employ the oral route of sedative administration, whereas 85% liked it [14]. In their evaluation of the elements needed to create an efficient sedative, Hazara R emphasized the need of blending many medicines into a single formulation. The technique of choice, the patient's characteristics, and the expectations of healthcare practitioners and patients all have a role in the selection of sedative medications. As a result, there is still no clear answer in the literature on the best drug to take in a given situation [20].

CONCLUSIONS

The study concludes by identifying dental practitioners in Karachi who are presently engaged in ambulatory sedation and areas where they need improvements most. Findings revealed that the respondents knew what sedation need to be given to patients thus making them more comfortable, and they could mention some of the various drugs which can be used as sedatives and how to give them properly. This indicates that there is a need for an improved and expanded pharmacological education as there exists a significant knowledge gap between sedatives and local analgesics. However, despite these gaps, several participants reported routinely administering sedation to pediatric patients suggesting a positive attitude towards utilizing sedative techniques to enhance patient care. Strengthening the quality of pediatric dentistry care can be achieved in future through standardization of sedation protocols, continuous education and training programs, comprehensive training courses among others. For safe and effective operations involving sedations it is necessary for dental organizations, educational institutions, and regulatory bodies work together. This will lead to better outcomes and experiences for patients in pediatric dentistry. Dental professionals' sedation knowledge and

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practices can be improved through future research that focuses on long-term impacts of sedation methods and treatments.

Authors Contribution

Conceptualization: IA
Methodology: M, RK
Formal analysis: M, AH
Writing, review and editing: RK, AF, UZ, AF, TA

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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