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ORIGINAL RESEARCH

Parental Acceptance of Moderate Sedation and Associated Techniques for Behavior Management in Saudi Arabia: A Cross-Sectional Study

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Video abstract

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Purpose: This study aimed to evaluate the acceptance of moderate sedation (MS) as a behavior guidance technique (BGT) method among Saudi parents, and also assess their acceptance of other BGTs, including parental separation, papoose board (PB), and nitrous oxide (N_2O), used in conjunction with MS.

Patients and Methods: This cross-sectional study was conducted at the Dental University Hospital, King Saud University, Riyadh, Saudi Arabia. It involved Saudi parents of children aged 3–5 years undergoing dental treatment with MS, alongside additional BGTs such as parental separation, PB, and N_2O. Parents completed a questionnaire with demographic details and a post-treatment acceptance survey evaluating their satisfaction with the MS. Descriptive statistics were used for demographic information and parental acceptance. Chi-square and Fisher's exact tests analyzed the association between parental acceptance and background characteristics.

Results: A total of 85 parents were included in the study. Among these parents, 77 (90.59%) accepted MS, reporting minimal distress during dental treatment, and 78 (91.76%) would choose MS again. The PB received strong support from 79 (92.94%) of parents, with 83 (97.65%) finding it useful for child protection. However, 43 (50.59%) of parents felt uncomfortable with parental separation during therapy.

Conclusion: Over 90% of Saudi parents showed high acceptance of MS and PB as BGTs. The study also revealed that 50.59% of parents were uncomfortable with being separated from their children during treatment. These findings highlight the need for strategies that can accommodate family involvement in pediatric dentistry, ultimately improving parental satisfaction.

Keywords: child, dental anxiety, dental care, moderate sedation, parental acceptance, questionnaire

Introduction

The phenomenon of dental fear and anxiety in children presents significant challenges, often leading to disruptive behavior.[1] Notably, children may display varying degrees of fear and anxiety that do not correspond to the actual threat posed by dental procedures. These reactions are common among younger children and are particularly pronounced in females.[2,3] To ensure effective dental treatment and foster a positive dental attitude in young patients, it is essential to use appropriate behavior guidance techniques (BGTs) to manage their emotional responses.[4]

BGTs range from basic non-pharmacological approaches, such as tell-show-do, non-verbal communication, and positive reinforcement, to advanced methods, including protective stabilization, sedation, and general anesthesia (GA).[4] Moderate sedation (MS) is a highly effective strategy for reducing fear and anxiety in children, particularly when basic BGTs are inadequate.[4] MS is defined as "a drug-induced depression of consciousness during which patients respond purposefully to verbal commands or after light tactile stimulation".[5] Recent clinical findings highlight the successful use of MS in pediatric dentistry. A one-year study conducted by Özen et al on 240 children aged 4–6 years reported a 73% overall success rate when midazolam was administered orally or intranasally in conjunction with nitrous oxide (N_2O), with the highest success rate (87%) achieved via intranasal

Received: 7 October 2024
Accepted: 17 January 2025
Published: 24 January 2025

midazolam.[6] Similarly, a multi-institutional randomized, double-blind clinical trial by Marshall et al demonstrated that oral syrup formulation of midazolam (0.25–1.0 mg/kg) provided safe, effective sedation and anxiolysis in over 80% of pediatric patients.[7]

Parental acceptance of various BGTs in pediatric dentistry has been the subject of numerous studies, most of which employed questionnaire after showing parents videotapes of different BGTs.[8–11] These studies found that parents were generally more accepting of basic BGTs such as tell-show-do and positive reinforcement. However, cultural differences might play a significant role of parental acceptance. Almalki's recent examination of Saudi parenting practices highlights how strong religious and sociocultural values, respect for parental authority, and gender-role modeling contributes to a protective, family-centered approach.[12] This orientation may influence Saudi parents' decisions regarding advanced BGTs his orientation may influence Saudi parents' decisions regarding advanced BGTs such as sedation. However, these protective tendencies also influence the acceptance of non-pharmacological methods. For instance, a study conducted in Saudi Arabia by Abushal and Adenubi found that parental separation, physical restraints, hand-over-mouth techniques, and voice control were among the least acceptable BGTs.[13] Similarly, Sabbagh and Sijini noted that many Saudi parents prefer not to be separated from their children during treatment.[14]

Over the decades, parental acceptance of BGTs has evolved, reflecting a shift in preference towards pharmacological methods.[15] In 1984, non-pharmacological techniques such as tell-show-do and positive reinforcement were widely accepted, whereas pharmacological methods such as sedation and GA were not.[16] By 1991, there was a growing acceptance of N_2O, though GA and oral sedation remained less popular.[17] By 2003, Eaton et al noted increased acceptance of N_2O, GA, and oral sedation.[18]

Parental separation, papoose board (PB), and N_2O are often used with MS in some dental institutions to manage uncooperative behavior and ensure safety and effective dental treatments. However, the use of MS alongside these additional BGTs raises questions about parental acceptance, particularly among those whose children have experienced these methods. The assessment of patient-reported outcomes has gained prominence in healthcare, emphasizing the involvement of patients and parents in decision-making processes.[19] Nevertheless, few studies have explored parental acceptance of MS as a BGT in pediatric dentistry.[20–22] For instance, a comparison of several ketofol mixtures used during dental sedation found that one mixture led to faster recovery times, which increased parental satisfaction.[20] Additionally, parental satisfaction remained high when dental treatments were completed, even if sedation did not fully manage the child's behavior.[21] Moreover, high satisfaction rates were reported among parents/guardians when children behaved cooperatively, had no toothaches, and received atraumatic restorative treatments.[22]

Although pediatric dentists may find the outcomes of dental treatment using MS acceptable, it is crucial to consider parents' perspectives when recommending MS for their children. Currently, there is a paucity of studies on parental acceptance of MS as a BGT in Saudi Arabia. Therefore, this study aimed to evaluate the acceptance of MS as a BGT among Saudi parents. Additionally, we evaluated the acceptance of other techniques, such as parental separation, PB, and N_2O, alongside MS, as secondary outcomes.

Material and Methods

Ethical Approval

This research is part of a larger project evaluating the association between parental factors and child's behaviors during MS.[23] The study was reviewed and approved by the Institutional Review Board of King Saud University and complies with the Declaration of Helsinki. The research proposal was registered at the College of Dentistry Research Centre, King Saud University, Riyadh, Saudi Arabia, under registration number PR 0151.

STROBE Compliance

This study was reported in accordance with the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) guidelines.

Study Design and Population

This cross-sectional study involved parents bringing their children for dental treatment under MS between January 2023 and March 2024. The sample size was determined using the G*Power software (version 3.1.9.4), with an effect size of 0.325, a power of 0.90, and a significance level of 0.05. The minimum required sample size was calculated to be at least 83 patients. The inclusion criteria for this study were parents of Saudi children aged 3–5 years who required dental treatment under MS. Children

had no prior experience with GA, MS, or deep sedation and were not on the GA waiting list. Parents needed to speak, read, and write in Arabic and consent to participate in this study. All individuals in this study were also participants in a previous study.[23]

Study Settings

Two visits were conducted: a screening visit and a sedation visit. The screening visit occurred at least one week before the sedation visit, during which the child's overall health was assessed, and demographic information was collected from the parents of the eligible children who consented to participate. During the sedation visit, a comprehensive evaluation was performed, including assessment of the child's overall health, monitoring of vital signs, chest auscultation, and adherence to fasting protocols. Oral midazolam (Hikma Midazolam®, Hikma Farmacêutica, Portugal) was administered at a dose of 0.7 mg/kg, with a maximum of 20 mg. After a 10- to 15-minute waiting period, patients were seated comfortably in a dental chair with a PB used for safety. N_2O was administered at a 50/50 ratio and adjusted by the operator to maintain an optimal level of sedation. Parents were asked to leave the treatment room and wait in the designated area. The children were monitored according to the American Academy of Pediatric Dentistry guidelines for the management of pediatric patients before, during, and after sedation for clinical procedures.[5] All dental treatments were conducted by pediatric dentistry residents under consultant supervision. Before conducting any treatments under MS, all pediatric dentistry residents completed comprehensive training in sedation course as part of their residency program. This training ensured adherence to standardized clinical practices and established a consistent foundation for delivering care during the study. An anesthesia physician was present during each sedation visit to ensure patient safety and to intervene if any complications arose. Following treatment, patients were administered 100% oxygen for 5 minutes before being transferred to a recovery area, where they were closely monitored until discharge. Parents were invited to accompany their children to the recovery room, where they received information about the dental procedure performed and postoperative instructions. After addressing all parental questions and concerns, an acceptance questionnaire was distributed and requested to be completed before discharge.

Parental Acceptance Questionnaire

The parental acceptance questionnaire was modified from previous studies by Sabbagh et al (2020, 2021).[14,24] It underwent back-to-back translation by a translation office to ensure comprehension. Subsequently, a pilot test with 10 parents confirmed the clarity and feasibility of the questionnaire, achieving a kappa value of 0.82, indicating good reliability and reproducibility. The questionnaire comprised eight questions assessing parents' perspectives on MS, their satisfaction with the procedure, and their comfort with PB, N_2O, and separation from their child during treatment. Responses were recorded as either yes or no.

Statistical Analysis

Data were analyzed using SPSS (version 20.0; IBM Corp., Chicago, IL, USA). Descriptive statistics were used to present demographic data and parental acceptance data. The association between parental acceptance and background characteristics was analyzed using the chi-square and Fisher's exact tests. Statistical significance was set at $P < 0.05$.

Results

This study included 85 parents: 45 fathers (52.94%) and 40 mothers (47.06%) (Table 1). Approximately half (48.24%) of the questionnaires were completed by parents aged younger than 36 years. The family income distribution was as follows: 31 (36.47%) earned between 10,001 SR and 15,000 SR, and 32 (37.65%) earned more than 15,000 SR.

The study found that 77 (90.59%) of parents accepted MS as a BGT, and 78 (91.76%) would allow their child to be treated again using this method (Table 2). Most parents 73 (85.88%) reported that their expectations were met during the MS visits. A majority 79 (92.94%) supported the use of PB during treatment, and 83 (97.65%) believed it effectively protected their child. Additionally, 73 (85.88%) of parents felt comfortable with the administration of N_2O during their treatment. However, there was mixed opinion regarding parental separation; 43 (50.59%) felt uncomfortable being separated from their child during treatment, whereas 50 (58.82%) believed that separation would enhance the child's cooperation.

Table 3 illustrates the bivariate association between parental acceptance and background characteristics. None of the background characteristics were significantly associated with the parental acceptance of MS, PB, N_2O, and parental separation ($P > 0.05$).

Table 1 Background Characteristics

Variable	N	%
Questionnaire filled by		
Father	45	52.94
Mother	40	47.06
Parents age who filled out the questionnaire		
<36 years	41	48.24
36–44 years	34	40.00
≥ 45 years	10	11.76
Family income		
≤ 10,000 SR	22	25.88
10001 SR – 15000 SR	31	36.47
> 15,000 SR	32	37.65

Abbreviation: SR, Saudi riyal.

Table 2 Acceptance Questionnaire (1–8)

Variable	Yes N (%)	No N (%)
1-Do you believe that using conscious sedation is an effective way to allow your child to get necessary dental care with minimal trauma?	77 (90.59)	8 (9.41)
2-Would you allow your child to be treated this way again?	78 (91.76)	7 (8.24)
3-Overall, were your expectations were met on this visit?	73 (85.88)	12 (14.12)
4-Do you agree to use a child restraint (papoose board) during dental treatment using moderate sedation?	79 (92.94)	6 (7.06)
5-Did you feel comfortable using Nitrous Oxide gas during dental treatment under moderate sedation?	73 (85.88)	12 (14.12)
6-Did you feel comfortable being separated from your child during dental treatment under moderate sedation?	42 (49.41)	43 (50.59)
7-Do you think using a child restraint (papoose board) will be effective in protecting your child?	83 (97.65)	2 (2.35)
8-Do you think that separating the parents from the child will make them more cooperative?	50 (58.82)	35 (41.18)

Table 3 Bivariate Association

Category	Acceptance of MS[a]		P value*	Acceptance of PB[b]		P value*
	Yes N (%)	No N (%)		Yes N (%)	No N (%)	
Questionnaire filled by						
Father	40 (88.89)	5 (11.11)	0.71	43 (95.56)	2 (4.44)	0.20
Mother	37 (92.50)	3 (7.50)		36 (90.00)	4(10.00)	
Parents age who filled out the questionnaire						
<36 years	39 (95.12)	2 (4.88)	0.12	39 (95.12)	2 (4.88)	0.59
36–44 years	28 (82.35)	6 (17.65)		31(91.18)	3 (8.82)	
≥ 45 years	10 (100.00)	0 (0.00)		9 (90.00)	1 (10.00)	
Family income						
≤ 10,000 SR	21 (95.45)	1 (4.55)	0.45	22 (100.00)	0 (0.00)	0.33
10,001–15,000	29 (93.55)	2 (6.45)		28 (90.32)	3 (9.68)	
> 15,000 SR	27 (84.38)	5 (15.63)		29 (90.63)	3 (9.38)	

(*Continued*)

Table 3 (Continued).

Category	Acceptance of N_2O[c]		P value*	Discomfort with parental separation[d]		P value*
	Yes N (%)	No N (%)		Yes N (%)	No N (%)	
Questionnaire filled by						
Father	41 (91.11)	4 (8.89)	0.21	25 (55.56)	20 (44.44)	0.23
Mother	32 (80.00)	8 (20.00)		17 (42.50)	23 (57.50)	
Parent age who filled out questionnaire						
<36 years	35 (85.37)	6 (14.63)	0.47	22 (53.66)	19 (46.34)	0.50
36–44 years	28 (82.35)	6 (17.65)		14 (41.18)	20 (58.82)	
≥ 45 years	10 (10.00)	0 (0.00		6 (60.00)	4 (40.00)	
Family income						
≤ 10,000 SR	18 (81.82)	4 (18.18)	0.58	10 (45.45)	12 (54.55)	0.74
10,001–15,000	26 (83.87)	5 (16.13)		17 (54.84)	14 (45.16)	
> 15,000 SR	29 (90.63)	3 (9.38)		15 (46.88)	17 (53.13)	

Notes: [a]Acceptance of moderate sedation (Question 1 in the acceptance questionnaire). [b]Acceptance of papoose board (Question 4). [c] Acceptance of nitrous oxide (Question 5). [d]Acceptance of parental separation (Question 6). *Calculated using Pearson's chi-squared test and Fisher's exact test.
Abbreviations: MS, moderate sedation; PB, papoose board; N_2O, nitrous oxide. SR, Saudi riyal.

Discussion

Parental satisfaction is complex, reflecting not only by parents' personalities and past experiences but also by their knowledge, expectations, and competency of healthcare providers.[25,26] Several studies in different countries have assessed parents' acceptance of various BGTs in pediatric dentistry, reporting high acceptance of basic BGTs.[8–11] Similar results were reported by Abushal et al in Saudi Arabia, who identified tell-show-do, positive reinforcement, and distraction as the most widely accepted BGTs.[13] However, no study has specifically evaluated Saudi parental acceptance of children with MS as BGTs. Therefore, this study aimed to evaluate the acceptance of MS among Saudi parents and explore the acceptance of other BGTs, such as parental separation, PB, and N_2O, when used alongside MS.

The high level of acceptance of MS in this study suggests that when basic techniques fail, parents are likely to support sedation in combination with other BGTs, such as PB and N_2O. Over the decades, the acceptance of BGTs has evolved, with a noticeable shift towards pharmacological BGTs.[15] Initially, non-pharmacological techniques such as tell-show-do and positive reinforcement were preferred; however, more recent studies have shown a growing acceptance of pharmacological methods, including N_2O, GA, and oral sedation.[18] The high acceptability of MS can be attributed to its comprehensive approach, including careful patient assessment, the use of midazolam as a sedative agent, and N_2O, all provided in a supportive environment created by pediatric dentistry residents under the supervision of experienced consultants. This high degree of acceptability aligns with the trends reported in previous studies.[18,24] For example, Rodrigues et al (2021) found high parental satisfaction with children undergoing dental treatment under sedation, while Patel et al (2016) found that oral sedation was the most acceptable BGT when parents were presented with a clinical vignette for advanced procedures.[22,27] Medical research has verified that parental acceptance of their children's care is closely related to how they perceive information about the procedures being offered.[28,29] In this study, residents provided parents with a detailed explanation of the rationale behind their children's sedation, as well as the potential risks and benefits. They also discussed the expected behaviors, both positive and negative, that might be observed in sedated children.

This study revealed that most parents support the use of PB to protect their children during dental treatment with MS, contrasting with a previous study by Rodrigues et al which found decreased parental acceptance of protective stabilization under sedation.[22] Moreover, the high acceptance of PB in this study contrasts with several other studies that found a lower preference for PB in regular dental settings.[8,18,24,30,31] This shift in parental attitudes may have been influenced by the specific conditions under which PB was employed in this study, particularly as an adjunct to MS. When viewed on video, these advanced BGTs may have been perceived more negatively. Parental education about PB by residents, who explained

its benefit in ensuring the safety and protection of children treated with MS, could have contributed to this acceptance. In this study, parents observed how PB was used during MS, which facilitated understanding and acceptance of the approach.

Most parents in this study were comfortable with N_2O use, which aligned with results from previous studies.[17,18] Recognition of N_2O as a BGT has evolved, becoming a widely used method over time.[18] In Germany and Jordan, N_2O is the most accepted advanced BGT.[32] Additionally, a study in Kuwait found that two-thirds of parents consented to N_2O sedation if recommended by their dentist.[33] In Saudi Arabia, one study indicated more positive parental attitudes toward N_2O following their children's experience with BGTs during dental treatment.[24] N_2O is preferred for managing children's dental fear and anxiety due to its safety, rapid onset, and short recovery time.[34,35]

This study found that half of the parents felt uncomfortable with parental separation, though they acknowledged its importance for improving child cooperation. This is consistent with a cross-sectional study in Saudi Arabia, which found that 97% of parents preferred to stay with their children during dental treatment, as well as with the report by Sabbagh and Sijini, which found that 76% of parents in Saudi Arabia preferred to accompany their children during dental procedures.[14,36] Additionally, a previous study by White et al (2016) found that the presence of parents/guardians during sedation correlated positively with sedation acceptability.[37] This strong preference for parental presence underscores the psychological reassurance for both parents and children during stressful situations. Balancing dental treatment with parental concerns is essential, as parents often wish to be present to ensure their children's safety, alleviate anxiety, and provide comfort.[37] Several strategies can be implemented to enhance parental comfort and involvement. Although in the current study, parents were present during the initial stages of sedation, further measures can be taken to alleviate discomfort throughout the procedure. For instance, maintaining periodic updates and clear communication between the dental team and parents can help reassure them about their child's progress and well-being. Additionally, allowing parents to observe certain non-invasive parts of the procedure or providing a comfortable and nearby waiting area with real-time communication can bridge the gap caused by separation.Further research is needed to determine the most effective methods for parental separation during dental procedures under MS and to evaluate its impacts on behavior, considering its benefits and drawbacks, given that some dental institutes allow parental presence during MS, whereas others do not.

Cultural attitudes may shape the acceptance of BGTs in pediatric dentistry. In some cultures, restrictive methods like passive restraint are favored, whereas others prefer non-invasive options such as N_2O.[32] In Saudi Arabia, the strong family-centered orientation and protective parenting styles may play a role in shaping parents' perceptions of practices like parental separation.[14,31,36] These cultural values emphasize maintaining close familial bonds and ensuring the safety and comfort of children during medical procedures. Consequently, Saudi parents may be more hesitant to accept techniques that involve separating themselves from their children, preferring instead methods that allow for greater parental involvement. Understanding these cultural preferences is essential for healthcare providers to effectively communicate and implement appropriate BGTs that align with parental expectations and cultural norms.

This study maintained the safety and consistency of sedation procedures through comprehensive health assessments and monitoring protocols during sedation visits. Detailed demographic information was collected to enhance participant understanding and facilitate thorough analysis. Unlike prior studies using hypothetical scenarios with videotapes of various BGTs, this study assessed parental acceptance after children experienced MS, offering a more accurate reflection of satisfaction. Consistency was further ensured by using a standardized midazolam dose, with N_2O as an adjunct, potentially enhancing patient compliance and MS efficacy. Additionally, the parental acceptance questionnaire was modified from previous studies, validated through back-to-back translation, and pilot tested. Recall bias was minimized by administering the acceptance questionnaire immediately in the recovery area, ensuring immediate feedback.

Regarding limitations, the study was conducted at a single dental institute with a sample exclusively of Saudi parents, which may limit the generalizability of the current findings. Additionally, there was no follow-up questionnaire to assess parental acceptance after full recovery, which could provide insights into long-term satisfaction. Furthermore, the study primarily utilized descriptive statistics and did not incorporate qualitative feedback, limiting the understanding of the underlying reasons behind parental acceptance of MS and associated BGTs. Parental acceptance of MS may have been influenced by the sedation protocol, which included adjunctive BGTs such as PB and parental separation. Future research should adopt a multi-institutional approach and include follow-up evaluations to better understand MS acceptance in

pediatric dentistry. Additionally, incorporating qualitative methods, such as open-ended questionnaires or interviews, would provide deeper insights into the factors influencing parental acceptance.

Conclusion

The primary finding of this study was a high level of parental acceptance of MS as a BGTs in pediatric dentistry. However, half of the parents reported discomfort with being separated from their children during treatment. High approval of MS is crucial for the success of dental treatments, highlighting the importance of considering parental opinions to ensure optimal outcomes and satisfaction. These findings highlight the need for strategies that can accommodate family involvement in pediatric dentistry, ultimately improving parent satisfaction.

Abbreviations

SR, Saudi riyal; MS, moderate sedation; PB, papoose board; N_2O, nitrous oxide.

Ethics Approval and Informed Consent

The study was reviewed and approved by the Institutional Review Board of King Saud University. The research proposal was registered at the College of Dentistry Research Centre, King Saud University, Riyadh, Saudi Arabia, under registration number PR 0151. Informed consent was obtained from all participating parents involved in the study.

Acknowledgments

We thank all the participants who completed the questionnaire, as well as the supervisors at the sedation clinic, for their assistance. We appreciate the hard work and commitment of the residents and nurses.

Funding

This research received no external funding.

Disclosure

The author(s) report no conflicts of interest in this work.

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