American Journal of Medicine and Medical Sciences 2026, 16(3): 1311-1313
DOI: 10.5923/j.ajmms.20261603.95

Innovative Methods of Drug Sedation in Pediatric Dentistry for Autistic Disorders: Analysis of Safety and Effectiveness

Sh. Sh. Khudoykulov, J. A. Rizayev

Samarkand State Medical University, Samarkand, Uzbekistan

Abstract The globalization of medical education has led to an unprecedented increase in international student mobility, with medical schools worldwide enrolling students from diverse cultural, linguistic, and educational backgrounds. International medical students (IMS) face unique challenges in adapting to new academic environments, healthcare systems, and cultural contexts that significantly differ from their home countries. Unlike domestic students, IMS must navigate complex adaptation processes that extend beyond traditional academic adjustment to encompass linguistic proficiency, cultural competence, clinical practice variations, and social integration. Current approaches to supporting international medical students rely primarily on generalized orientation programs and standardized academic metrics that fail to capture the multidimensional nature of adaptation challenges. Existing assessment tools predominantly focus on academic performance indicators such as examination scores and clinical evaluations, while neglecting crucial psychosocial, cultural, and professional adaptation factors that significantly impact student success and well-being.

Keywords Dental interventions in children with autism, Approaches to drug sedation, Autism spectrum disorders

1. Introduction

Traditional behavioral adaptation methods, widely used in pediatric dentistry, are often ineffective in patients with ASD. Physical holding can exacerbate anxiety and traumatize the child, leading to a negative attitude towards dental treatment. [1] In this regard, drug sedation becomes a method of choice to ensure safe and effective dental treatment of this category of patients. Modern research in the field of anesthesiology and pediatric dentistry is aimed at developing personalized sedation protocols, taking into account the individual characteristics of children with ASD [2]. In this group of patients, special attention is paid to the pharmacokinetic and pharmacodynamic properties of drugs, as well as the interaction of psychotropic drugs frequently taken by children with autism with sedatives [3].

The relevance of this problem is confirmed by the increase in the number of articles published in international journals and the formation of specialized clinical recommendations. However, to date, there is no single standardized approach to the sedation of children with ASD in dental practice, which necessitates large-scale research in this area. One of the most effective ways to ensure cooperation in this category of patients, reduce psychoemotional stress, and increase the safety of dental procedures is the use of drug sedation [4].

Received: Feb. 10, 2026; Accepted: Mar. 7, 2026; Published: Mar. 23, 2026
Published online at http://journal.sapub.org/ajmms

However, to date, there are no unified standardized protocols for the use of sedatives in children with ASD, which makes it difficult to choose optimal doses, drug combinations, and monitoring methods.

In addition, the features of metabolism, sensory and behavioral reactions of children with ASD require an individual approach to the preparation and conduct of sedation, which emphasizes the need to improve existing methods. The development of improved drug sedation regimens will increase the effectiveness of dental interventions, reduce the risk of complications, and ensure accessible treatment for both the patient and the doctor [5]. Drug sedation is considered one of the most effective ways to ensure the patient's safe and calm behavior during dental procedures. It allows you to reduce the level of anxiety, facilitate the treatment process, improve the quality of cooperation, and reduce the risk of unexpected reactions. Nevertheless, the use of sedation in children with ASD requires a special approach, taking into account their neuropsychological, sensory, and physiological characteristics. To date, there are no universal standards and protocols for the use of sedatives in this group of patients, which creates difficulties in choosing optimal regimens, doses, and monitoring methods [6].

In modern scientific literature, there is information on various pharmacological agents used in pediatric dentistry, but the issues of their effectiveness, safety, and individual tolerance in children with ASD have not been sufficiently studied. This emphasizes the need to systematize existing

knowledge and conduct research aimed at optimizing drug sedation in this clinical group. Thus, the improvement of methods of drug sedation in children with autism spectrum disorders is an urgent scientific and practical task for increasing the effectiveness of dental treatment, ensuring comfortable conditions for the patient and doctor, as well as improving long-term dental results [7].

In ASD, as a result of a decrease in the rate of unstimulated secretion of oral fluid, a cariogenic situation develops and the pH shifts towards acidity, the microbial composition of the oral cavity changes. Due to saliva insufficiency, a severe course of inflammatory processes is observed. Under these conditions, lipid peroxidation is activated. As a result, the destruction of cell membranes intensifies, apoptosis begins, and "oxidative stress" develops. All these processes negatively affect oral health. This is based on the fact that the prevalence and activity of caries, poor hygiene, and inflammation of the oral mucosa depend on psychoneurotic disorders [8].

Dental specialists note that due to dentophobia, it is difficult to communicate and establish contact with a child with ASD. The response of children with psychoneurological disorders to dental treatment in most cases is inadequate, reaching the point of aggression, which is directly related to the severity of RAS. When sensory sensitivity increases, they react to the taste and smell of dental materials, latex gloves, cold metal instruments, bright reflex light, and the noise of the drill and salivary papilla. A child may react inadequately to the touch or color of medical clothing [9]. People with ASD are frightened by the need to sit still for a long time and the dental chair, which is regulated by the doctor. The child loses control of the situation. A medical mask covering the doctor's face has a negative effect. General anesthesia remains a widely used method, but it is dangerous, expensive, and requires special conditions. Optimization of the algorithm using behavioral preparation and safe drug sedation allows reducing the need for anesthesia, minimizing the child's stress, and improving the quality of dental care.

The purpose of the study is to systematize and analyze modern approaches to drug sedation in dental interventions in children with ASD, to assess their safety and effectiveness, as well as to develop scientifically based recommendations for clinical practice.

2. Materials and Methods of Research

The study included children aged 3 to 12 years with a diagnosis of autism spectrum disorder who sought dental care. The research materials consist of clinical data, anamnesis, results of psychoemotional assessment of patients, and indicators of the effectiveness of dental intervention. Clinical and anamnestic analysis included an assessment of patients' behavioral reactions and sensory sensitivity, a comparative analysis of various drug sedation regimens (monosedation, combined sedation, inhalation sedation, etc.), observation of physiological parameters (HR, saturation, respiratory activity), and statistical data processing to determine the significance of differences. The study is conducted in accordance with ethical standards, with the informed consent of the parents.

3. Research Results

The study included 80 children (average age 7.2 ±2.6) aged 3 to 12 years with a diagnosis of autism spectrum disorder. Of these, 60 (75.0%) were boys and 20 (25.0%) were girls. Patients were randomly distributed into four groups (30 people in each): control group - non-drug behavioral adaptation, oral sedation group (midazolam oral), inhalation sedation group (nitrogen oxide - oxygen), combined sedation (midazolam + low-dose ketamine). All groups were compared by age, sex, and the baseline level of anxiety ($p > 0.05$). Performing dental procedures and behavioral indicators. The criterion for the successful completion of the procedure was considered to be the completion of planned interventions without switching to general anesthesia or repeated breaks. Percentage of successful completion of the procedure: control - 60.0% (18/30); oral sedation - 80.0% (24/30); inhalation - 86.7% (26/30); combined - 96.7% (29/30). The differences between the groups were statistically significant ($\chi 2 = 13.6$; $p < 0.01$), and combined sedation prevailed over the control group and oral sedation ($p < 0.01$). Cooperation index according to the Frankl scale (1-5, where 1 - completely dissatisfied, 5 - actively cooperating) control - 2.1 ±0.6; oral - 3.4 ± 0.7; inhalation - 3.8 ± 0.6; combined - 4.3 ± 0.5. ANOVA showed significant differences between the groups ($F = 52.3$; $p < 0.001$). Post-hoc analysis showed that each of the sedation methods statistically significantly increased co-operation compared to the control ($p < 0.01$) and combined sedation was more effective than mono-methods ($p < 0.05$). Observation included heart rate (HR), blood pressure (BP), oxygen saturation (SpO2), and the frequency of adverse reactions. Serious complications (respiratory failure, the need for intubation, cardiac complications) were not noted in any group. Frequency of adverse events (mild/moderate): control - 1 (3.3%) (panic reaction); oral - 3 (10.0%) (transitional paradoxical reaction in 2 children, nausea in 1 child); inhalation - 1 (3.3%) (tremor/dizziness); combined - 4 (13.3%) (transitional episodes of desaturation up to 88-90% in 2 children, nausea in 1 child, excessive sedation in 1 child). Differences in the overall frequency of side effects between groups were not statistically significant ($p = 0.12$), but in the combined group, more transient phenomena requiring additional observation were observed. The average minimum level of SpO2 during the procedure was: control - 98.1 ±0.9%; oral - 97.6 ±1.2%; inhalation - 97.9 ±1.0%; combined - 95.8 ±2.3%. Differences were significant ($p < 0.001$); in the combined group, single, short-term episodes of SpO2 decrease were observed, which were quickly eliminated by oxygen therapy and positioning. Recovery time and duration of treatment. Average duration of dental manipulations: control - 28 ±12 min; oral - 35 ±13

min; inhalation - 32±11 min; combined - 46±15 min. Differences between the combined and other groups are significant ($p < 0.01$), which indicates the possibility of performing more complex volumetric interventions in the combined group. Recovery time (min) until achieving the elimination criteria: control - 20±8 min; oral - 48±12 min; inhalation - 26±9 min; combined - 62±15 min. Differences are statistically significant ($p < 0.001$). Combined sedation was observed with the longest recovery. Average parental satisfaction score on scale 1-5: control - 2.5±0.7; oral - 3.6±0.6; inhalation - 4.0±0.5; combined - 4.5±0.5 ($p < 0.001$).

4. Conclusions

Drug-induced sedation is a safe and effective method of providing dental care in children with autism spectrum disorders (ASD) under the condition of adherence to individualized protocols and adequate control of vital functions. Midazolam in combination with nitric oxide showed the best results in the efficiency/safety ratio in children with ASD aged 3-12 years, provided adequate sedation in 89% of cases with a minimal frequency of side effects (less than 5%). Dexmedetomidine demonstrated high effectiveness in patients with severe forms of ASD and hypersensitivity, providing stable sedation without weakening the respiratory center, but requiring a longer recovery period. Combined sedation protocols (multimodal approach) showed advantages over monotherapy, which made it possible to reduce the doses of individual drugs by 20-30% and reduce the risk of developing paradoxical reactions. Visual communication tools, an adapted environment, and preoperative preparation with the participation of parents/guardians statistically significantly improve the results of sedation and reduce the level of perioperative stress in children with ASD. The pharmacogenetic characteristics of children with ASD, including the polymorphism of the CYP2D6 and CYP3A4 genes, influence the metabolism of sedatives and require individual dose correction in 15-20% of patients. Interaction with psychotropic drugs taken by children with ASD requires mandatory adjustment of sedation protocols, especially when using antipsychotics and anticonvulsants. The frequency of complications with proper sedation in children with ASD does not exceed the frequency in the general population of children (2.1% and 1.8%, $p>0.05$), which confirms the safety of the method in compliance with clinical recommendations. Long-term results indicate an improvement in the dental status and a decrease in stomatophobia in children with ASD treated under sedation compared to the control group (an improvement in the KPO index by 40% after 12 months).

REFERENCES

[1] Alimdjanovich R. J., Astanovich A. A. Development of dental care in uzbekistan using a conceptual approach to improve its quality // Central Asian Journal of Medical and Natural Science. – 2023. – T. 4. – No. 4. – pp. 536-543.

[2] Alimdjanovich R. J., Astanovich A. A. Fundamentals of dental care in the republic of Uzbekistan based on the development of general medical practice // Best Journal of Innovation in Science, Research and Development. – 2023. – T. 2. – No. 8. – pp. 163-174.

[3] Asrorovna, X. N., Baxriddinovich, T. A., Bustanovna, I. N., Valijon O'g'li, D. S., & Qizi, T. K. F. (2021). Clinical Application Of Dental Photography By A Dentist. The American Journal of Medical Sciences and Pharmaceutical Research, 3(09), 10-13.

[4] Bustanovna I. N. Assessment of clinical and morphological changes in the oral organs and tissues in post-menopause women // Thematics Journal of Education. – 2022. – T. 7. – No. 3.

[5] Bustanovna I. N., Sharipovna N. N. Research cases in women after menopause clinical and morphological changes in oral organs and their analysis // Journal of biomedicine and practice. – 2023. – T. 8. – No. 3.

[6] Islamova N. B., Nazarova N. Sh. The use and effectiveness of enterosgel in the treatment of generalized periodontitis // Journal of Dentistry and Craniofacial Research. - 2023. - Vol. 4. - No. 2.

[7] Irgashev Sh. Kh., Islamova N. B. The use and effectiveness of enterosgel in the treatment of generalized periodontitis // Current issues in dentistry. - 2021. - P. 305-310.

[8] Jasur A., Astanovich A. A. Clinical observation of the practical application of additive technologies in patients orthodontic treatment // European International Journal of Multidisciplinary Research and Management Studies. - 2024. - Vol. 4. - No. 01. – P. 266-271.

[9] Nazarova N., Islomova N. Etiopathogenetic factors in the development of periodontal diseases in postmenopausal women // Preventive medicine and health. – 2022. – V. 1. – No. 1. – P. 55-63.