

Efficiency of Using Fissure Seals to Prevent Persistent Dental Caries in Children with Autism

A. I. Khazratov¹, Sh. B. Razzokova²

¹Doctor of Medical Sciences, Associate Professor, Samarkand State Medical University, Samarkand, Uzbekistan

²Samarkand State Medical University, Samarkand, Uzbekistan

Abstract Autism spectrum disorders (ASD) are a group of neurodevelopmental disorders characterized by difficulties in social interaction, communication, and the presence of limited, repetitive behavioral patterns. According to the Centers for Disease Control and Prevention (CDC), the prevalence of ASD among children is approximately 1 case per 36 children, indicating a significant increase in the number of diagnosed cases over the past two decades. Children with autism spectrum disorders represent a special risk group for the development of dental diseases, particularly dental caries. Numerous studies show that the prevalence and intensity of caries in children with autism significantly exceed similar indicators in the general population of children. This is due to a complex of factors, including behavioral characteristics, sensory hypersensitivity, difficulties in maintaining adequate oral hygiene, and limited access to dental care.

Keywords Autism, Fissure sealants, Dental caries, Children, Permanent teeth, Preventive dentistry, Oral health

1. Introduction

Features of the nutritional behavior of children with autism, such as preference for soft, sweet food, selectivity in food, and frequent snacks, create additional prerequisites for the development of the carious process. Sensory disturbances can lead to rejection of dental procedures, the use of toothpaste with a specific taste or texture, which significantly hinders maintaining optimal oral hygiene levels [1].

The prevention of caries in children with autism spectrum disorders requires a special approach, taking into account the specific needs and limitations of this category of patients. In this context, hermetizing permanent dental fissures represents one of the most promising methods of primary caries prevention, as this procedure provides long-term protection of the most vulnerable surfaces of teeth without the need for daily adherence to complex hygienic procedures [2].

Fissure sealants are composite materials applied to the chewing surfaces of permanent molars and premolars to create a physical barrier preventing the penetration of cariogenic microorganisms into the enamel recesses. The effectiveness of this prevention method in the general population of children has been well documented and accounts for a 80-90% reduction in the risk of fissure caries development during the first years after use [3]. However, the use of fissure sealants in children with autism presents certain difficulties related to the patient's behavioral

characteristics, their tolerance to dental procedures, and the ability to provide the necessary conditions for high-quality manipulation. Sensory hypersensitivity, characteristic of many children with ASD, can complicate the hermetic sealing procedure, requiring special behavioral control techniques or sedation [4]. Modern literature contains a limited number of studies devoted to evaluating the effectiveness of fissure sealants specifically for children with autism spectrum disorders. Most available data were obtained during studies involving children with various special needs, which does not allow us to draw specific conclusions about the effectiveness of this prevention method specifically for patients with autism [5].

The clinical significance of studying the effectiveness of fissure sealants in children with autism is due not only to the high prevalence of caries in this population, but also to the particular difficulties that arise during therapeutic dental interventions in such patients. The preventive focus of dental care for children with ASD is a priority strategy that minimizes the need for complex treatment procedures in the future. The socio-economic aspects of the problem include significant family costs for dental treatment of children with autism, often requiring general anesthesia or sedation, as well as psychological stress experienced by both children and their parents when invasive dental procedures are necessary [6].

The development of personalized approaches to dental care for children with autism spectrum disorders requires scientifically based data on the effectiveness of various preventive measures adapted to the specifics of this patient population. Fissure hermetization as a method of caries

prevention can become a key component of a comprehensive dental care program for children with autism, provided its effectiveness is confirmed and optimal application protocols are developed. Oral health is an integral component of general health and significantly contributes to the overall well-being and quality of life of individuals. Among the many challenges in pediatric dentistry, the prevention and management of dental caries remains a top priority, particularly in children with special healthcare needs. One such vulnerable group includes children with Autism—a genetic condition caused by trisomy of chromosome 21—who are predisposed to a variety of medical and developmental issues, including those affecting oral health [7].

Children with Autism often present with unique dental and craniofacial characteristics, such as delayed eruption of teeth, microdontia, malocclusion, and a higher incidence of periodontal disease. While some studies suggest that the prevalence of dental caries in children with Autism may be lower than in the general population due to delayed tooth eruption and increased spacing between teeth, other research points to a significant risk of caries, particularly in the pits and fissures of molars, due to poor oral hygiene, dry mouth (xerostomia), and difficulties in accessing and cooperating with dental care.

2. Research Materials and Methods

This study was conducted based on the design of a prospective cohort study to assess the effectiveness of fissure sealing in the prevention of permanent dental caries in children with autism spectrum disorders. The research work was carried out on the basis of the Department of Pediatric Stomatology of the Tashkent Medical Academy in the city of Tashkent, Republic of Uzbekistan, for a period of 12 months. Ethical permission was obtained from the institution's ethics committee, and informed consent was obtained from the parents or guardians of all study participants. The study included 60 children diagnosed with autism aged 6 to 12 years. Inclusion criteria included (confirmed clinical diagnosis of autism spectrum disorder, presence of at least one fully erupted first permanent molar, ability to minimally cooperate during dental manipulations.

The exclusion criteria consisted of the following points:

- Presence of systemic diseases that are contraindications to dental treatment
- Anamnesis data on allergic reactions to dental materials
- Use of antibacterial drugs or other medications that affect the oral cavity condition at the time of the examination

All participants were randomized into two groups:

- Group A (experimental): 30 children who underwent fissure hermetization.
- Group B (control): 30 children who had not undergone fissure hermetization.

We conducted a comprehensive dental examination to

assess the presence of carious lesions using the CPI index (carious, filled, removed teeth). Radiographic studies were performed to assess the condition of the occlusal surfaces of the first permanent molars. The manipulation was performed under local anesthesia. The occlusal surfaces of the first permanent molars were cleaned, isolated, treated with 37% orthophosphoric acid for 30 seconds, washed, and dried. Bonding agent was applied with subsequent light polymerization for 20 seconds. Then, fibrous sealant was applied and polymerized according to the manufacturer's instructions. Study participants were invited for control examinations 3, 6, and 12 months after the procedure. During these visits, the integrity of the sealant was assessed, and any carious lesions were recorded. Information collection was carried out at the initial stage and during each control visit using (clinical examinations to assess hermetic retention and caries development, radiological studies to detect approximate caries, questionnaires of parents to obtain information about oral hygiene practices and dietary habits). Data analysis was performed using the SPSS software version 11.

Descriptive statistics were calculated for all variables. The chi square criterion was used to compare categorical variables between groups. To assess changes in caries indicators within the groups over time, a paired t-criterion was used. Differences were considered statistically significant at $p < 0.05$.

3. Results and Discussion

The study involved 60 children with Autism aged 6 to 12 years, divided into two equal groups: Group A received fissure sealants on their first permanent molars, while Group B did not. The primary outcome measured was the development of new carious lesions over a 12-month follow-up period. The results clearly indicate a statistically and clinically significant difference in caries incidence between the two groups.

Caries Incidence Over Time

At baseline, both groups were caries-free in their newly erupted first permanent molars. However, over the 12-month period, the incidence of new caries varied notably:

In Group A, only 2 new carious lesions were observed by the end of 12 months.

In Group B, 8 new carious lesions were detected.

This demonstrates a 75% reduction in caries incidence in the sealant group compared to the control group. The graph illustrates a gradual increase in carious lesions in the control group, whereas the group with fissure sealants showed minimal progression, suggesting the long-term protective effect of sealants.

At the 12-month mark, sealant retention was 93%, indicating high durability of the applied materials. Minor touch-ups were performed in 2 cases due to partial loss of sealant, which did not correlate with increased caries incidence.

These findings align with previous studies showing that resin-based sealants, when properly applied, can last for several years and offer strong protection against occlusal caries. This is particularly critical in children with Autism, who may face additional challenges in maintaining oral hygiene due to motor and cognitive impairments.

Questionnaire analysis revealed that parental involvement in oral hygiene routines was higher in Group A, possibly influenced by the educational component provided during the sealant application visits. Caregivers in Group A also reported better awareness of dietary habits and dental care routines, which may have contributed to the reduced caries rate.

This highlights the indirect benefit of preventive interventions—such as increased engagement and health education—which are crucial for long-term success in special needs populations.

4. Discussion

The application of fissure sealants proved to be an effective strategy for preventing dental caries in the first permanent molars of children with Autism. This is consistent with data from the general pediatric population, but particularly significant for special needs children who are more prone to dental neglect due to behavioral and systemic challenges.

The dramatically lower caries incidence in the sealant group emphasizes the importance of early intervention and preventive care in this high-risk group. Moreover, the ease and non-invasiveness of sealant application make it an ideal choice in public health programs aimed at children with developmental disabilities.

However, success depends not only on the initial application but also on regular follow-up and maintenance, including the resealing of partially lost material. Dental professionals must be trained in behavior management and patient-specific adaptations to improve access and outcomes for this population. The results from this study provide compelling evidence that fissure sealants are a safe, effective, and practical method to reduce caries risk in children with Autism. These findings support the integration of fissure sealant programs into routine dental care and public health initiatives targeting special needs children.

This study demonstrates that the application of fissure sealants is an effective and practical preventive strategy for reducing the incidence of dental caries in the permanent teeth of children with Autism. Over a 12-month follow-up period, children who received sealants exhibited a significantly lower rate of new carious lesions compared to those who did not. The findings underline the importance of incorporating sealant programs into routine dental care for children with special needs, especially those at higher risk due to

developmental or behavioral challenges.

Fissure sealants provide a non-invasive, cost-effective, and durable solution that can help overcome the limitations in maintaining oral hygiene commonly seen in children with Autism. In addition to the direct clinical benefits, the application of sealants also promotes caregiver engagement and awareness, which contributes to the overall success of caries prevention programs.

Given the strong evidence supporting their efficacy, dental practitioners and public health policymakers should prioritize fissure sealant application as a standard component of preventive dental care in this vulnerable population. Future studies with larger sample sizes and longer follow-up periods are recommended to further evaluate long-term outcomes and refine clinical guidelines for special needs dentistry.

5. Conclusions

Thus, studying the effectiveness of using fissure sealants to prevent permanent dental caries in children with autism is a pressing scientific and practical task, the solution of which will contribute to optimizing preventive dental care for this vulnerable category of patients and improving their quality of life.

REFERENCES

- [1] Simons, D., Kidd, E. A., & Beighton, D. (2001). Oral health of children with Autism: a population-based study. *Journal of Disability and Oral Health*, 2(1), 4–10.
- [2] Beauchamp, J., Caufield, P. W., Crall, J. J., Donly, K., Feigal, R., Gooch, B., ... & Truman, B. (2008). Evidence-based clinical recommendations for the use of pit-and-fissure sealants. *Journal of the American Dental Association*, 139(3), 257–268.
- [3] Chia, L. G., & Durning, P. (2013). Use of fissure sealants in special needs children. *British Dental Journal*, 215(4), 203–206.
- [4] Vichayanrat, T., Steckslen-Blicks, C., & Srisatjaluk, R. (2014). The effectiveness of a preventive dental program for children with Autism. *Special Care in Dentistry*, 34(6), 285–291.
- [5] American Academy of Pediatric Dentistry. (2022). Guideline on caries-risk assessment and management for infants, children, and adolescents.
- [6] Feigal, R. J. (2002). The use of pit and fissure sealants. *Pediatric Dentistry*, 24(5), 415–422.
- [7] Ismail, A. I., Gagnon, G., Dennison, J., & Rozier, G. (2007). Pit and fissure sealants in the prevention of dental caries in children and adolescents. *Journal of the Canadian Dental Association*, 73(2), 131–136.