

Review Article

Directions in Understanding Autistic Child in Dentistry Practice

Diana Monica Preda^{1*}, Viorela Gabriela Nițescu^{1,2}, Oana Maria Udrea¹, Denisa Iulia Dănilă³, and Alexandra Mariana Buică^{1,2}

¹Department of Pathology, "Grigore Alexandrescu" Emergency Clinical Hospital for Children, Romania

²Department of Pharmacy, "Carol Davila" University of Medicine and Pharmacy, Romania

³Department of Pathology, "St Pantelimon" E Clinical Hospital, Romania

***Corresponding author**

Diana Monica Preda, "Grigore Alexandrescu" Emergency Clinical Hospital for Children, Calea Dorobanilor 58, 014054, Bucharest, Romania; Tel: 40-722213196.

Submitted: 12 January 2024

Accepted: 30 January 2024

Published: 31 January 2024

Copyright

© 2024 Preda DM, et al.

OPEN ACCESS**Keywords**

- ASD
- Dental health
- ADHD
- Behavior management

Abstract

Compared to neurotypical children, children with autism are more vulnerable to a variety of dental diseases, especially caries, because of challenges with personal independence, sensory integration or self-aggressive actions that frequently result in oral cavity traumas.

This study seeks to provide an overview of the primary oral diseases that pediatric autistic patients encounter, along with the difficulties that dental services have when diagnosing and treating these kids.

30 children aged between 3 and 16 years, with different degrees of autism spectrum disorders were included in the study; 60% (18) of patients had dental cavities because of inadequate oral hygiene and minimal dental visits, while only 26,6% (8) possessed abilities that made it easier for them to keep up a good dental routine. 70% (21) of patients was having an uncooperative behavior and psycho-motor agitation, while only 30% (9) are able to complete dental treatments without the need for anesthesia or sedation; 2 teenagers with severe forms of autism suffer oral and dental trauma as a result of self-aggression.

The best methods for managing behavior were verbal praise, token rewards, and positive reinforcement; visual teaching model for improving oral hygiene was useful. In extreme situations where behavioral methods are ineffective, general anesthesia was required.

While there isn't a single approach that works for all ASD patients, tailoring care to the patient's needs, cognitive abilities, and degree of expressive and receptive language development can help improve addressability and meet their dental health needs.

ABBREVIATIONS

ASD: Autism Spectrum Disorders; ADHD: Attention Deficit Hyperactivity Disorder; ID: Intellectual Disability; ICD-10 International Statistical Classification of Diseases and Related Health Problems 10th Revision

INTRODUCTION

While children's distress and disruptions are common exhibited during dental treatment, the special problematic compliance of children with Autism Spectrum Disorder (ASD) in dental services brings complex challenges [1]. Our article addresses the issue of pediatric patients with ASD who require dental interventions due to the need of continuous improvement of safe and effective treatment for these children and for a better understanding of the behavioral and sensory processing particularities of the atypical neurodevelopmental patients.

Complex neurodevelopmental disorder, autism is linked to patterns of repetitive, restricted, or sensory behaviors and has a major impact on social interactions and communication [2]. ASD

covers a continuum from mild to severe, with different degrees of limitations. In DSM 5 all diagnostic categories in DSM IV-TR, were reunited under the name autism spectrum disorders and included in the chapter Neurodevelopmental disorders [2]. It is an important change in the taxonomy of autism because of the impossibility in delineating different disorders, which, actually, represent a single medical condition with varying degrees of severity.

According to epidemiological studies reported by the Center for Disease Control (CDC) USA in 2023, for data collected in 2020, 1 in 36 children suffer from ASD, with a considerable increase in incidence compared to data provided by studies 15-20 years ago [3]. The incidence and prevalence of ASD have gradually increased since the 1990s, and the explanation of this phenomenon is still a topic debated by clinicians and researchers [4]. In the context of this "worldwide pandemics" of autistic disorders, higher numbers of autistic patients are presenting in dental practice departments, most of the dental specialists encountering daily challenges in approaching their uncooperative behaviors.

Given that autism spectrum disorder is a lifelong condition,

the specific clinical picture of the disease may present symptoms that improve, remit or worsen over time, depending on the effectiveness of the therapy program adapted to the child's needs, his cognitive potential and the life contexts he experiences [5]. Children with a low IQ present impaired daily functionality, requiring a protective environment and adequate supervision, resulting in an unfavorable prognosis of expected acquisitions for chronological age [6].

Another aspect that makes the dental approach difficult and increases the likelihood that these children have a chronic poor oral hygiene is related to the presence of comorbidities, additional disorders that accompany in many cases the symptoms of ASD. 70% of ASD patients receive at least one comorbid diagnose and 50% of them have multiple co-occurring mental health disorders [7]. The most common disorders that accompany autism are: Intellectual Disability (ID), ADHD, anxiety disorders and epilepsy [8].

The aims of the research were not only to characterize the behavioral difficulties of these children in the dental settings, but also to establish the proportion of associated disorders, that can influence compliance to oral hygiene and dental maneuvers. In the study group, the comorbidities encountered in children with ASD, were ADHD and ID.

Since most of the patients included in our study had the most frequent comorbidity with Attention Deficit Hyperactivity Disorder (ADHD), we will provide some details about the particularities of patients with these two coexisting disorders. According to specialized literature, 50 to 70% of children with ASD have comorbid ADHD [9]. These are two neurodevelopmental disorders that develop in childhood, and frequently children with autism experience hyperactivity, inattention and impulsiveness which are the core symptoms in ADHD. Children who present this diagnostic association present a more severe psychopathological picture in terms of social communication, conduct problems (often tantrums and oppositional behaviors in small ages), anxiety and depression symptoms [10]. These two different entities have an underlying neuropsychological overlap based on emotion regulation mechanisms [11].

The second most co-occurring condition with ASD is ID, the rates of patients with this comorbidity being ranged up to 60% in the ASD cases [12]. ID is characterized by cognitive impairment and deficits in social and adaptive skills necessary in tasks of daily life. The lower the IQ level, the more challenging the atypical behaviors in ASD children [13].

Most of the children from our study, that presented the associated disorders detailed above, manifested impaired communication abilities (both verbal and nonverbal). It is known that while children with high functional autism develop exceptional linguistic abilities, the ones with comorbid cognitive impairments experiment language/speech challenges on a continuum of severity. All the children in our study presented a delay in onset or use of words, some of them remaining nonverbal or minimally verbal. After evaluating these children,

we considered language difficulties as integrated symptoms to their neurodevelopmental disorder, not classified as a different, separate diagnostic entity. Expressed manifestations that impact the dental procedures and compliance to interventions related to the particular traits of ASD:

- Sensory processing difficulties. Certain sensory stimuli, such as bright lights, loud noises, or unfamiliar textures can make the dental environment overwhelming for ASD patients.

One specific type of sensory processing difficulty, relevant in the dental setting, is sensory defensiveness. Common in ASD, sensory defensiveness can occur in any of the seven sensory systems: tactile, vestibular, auditory, visual, proprioceptive, gustatory, and olfactory and it is manifested as a behavioral overreaction to or extreme avoidance of common sensory experiences that others find tolerable. During the dental interventions these can translate into over-responsiveness to unforeseen touches inside oral cavity, unpleasant physical states brought on by the movements of the dental units; fear of bright light or the dentist wearing a mask over his face; excessive reactions to the sound of dental instruments; refusal of prescribed solutions because of their flavor, texture or smell [15].

Due to the sensory processing difficulties, psychomotor agitation, massive discomfort may occur at behavioral level, generated by certain stimuli like sounds or textures, even considered imperceptible by others. Also, some autistic children engage in sensory-seeking behaviors, such as chewing on objects or fidgeting, that must be considered to ensure the child's safety in the dental setting. The high prevalence of sensory integration deficits in children with ASD, up to 100%, is revealed in recent studies [16].

- **Communication challenges:** To build rapport with kids, explain dental procedures, provide information to help with decision-making, and offer advice on preventing oral disease, effective communication between the dental team, kids, and parents is crucial. Additionally, it plays a significant part in reducing kids' anxiety and enhancing their cooperation during therapy.
- Also, difficulty with transitions and changes in routine for autistic children can lead to increased anxiety or resistance. So, not only the specific dental anxiety is driving maladaptive reactions. Dental procedures anxiety is an important factor contributing to avoidance of those interventions, leading to oral chronic pathologies [18].

MATERIALS AND METHODS

A cross-sectional study was conducted in "Grigore Alexandrescu" Children Emergency Hospital from Bucharest, in the Pediatric Dentistry Department. The study aimed to explore the particularities of a group of dental pediatric patients previously diagnosed with ASD, in terms of behavioral aspects, compliance to dental procedures/ assessment and oral health status.

The participants were included in the study according to the following criteria

ASD diagnosis prior to study enrollment, age under 18, addressability to the pediatric dental service. For each patient included in the study group (30 participants) parents fulfilled and signed an informed consent. Exclusion criteria consisted of other acute medical conditions that interfere with the child's state.

Dental clinic examination and treatment were performed in the constant presence of a parent or caregiver.

Psychiatric and psychological assessments were fulfilled prior to the dental procedures.

The presence of neurodevelopmental disorders for the children participants in the study was assessed according to the diagnostic criteria set out in the ICD-10. The Autism profiles of the Pervasive Developmental Disorder heading of the ICD-10 were encompassed, childhood autism, atypical autism and Asperger syndrome included.

For the ADHD, according to the ICD-10 diagnosis criteria Attention Deficit Hyperactivity Disorder Predominantly Inattentive Type, and Attention Deficit Hyperactivity Disorder Combined Type were included.

A reported pre-existing diagnosis of ASD represented an inclusion in the study criteria. The psychiatric evaluation was focused on confirming the presence of ICD-10 criteria for ASD and identifying the relevant concerning symptoms and their management including psychotropic medication, and to assess psychiatric and neurodevelopmental comorbidities. In addition, the psychological clinical evaluation supported this objective with validated psychometric instruments, Autism Disorder Observation Scale, Child-ADHD Rating Scale ADHD and also included cognitive development assessment.

We considered ID a cognitive impairment corresponding to an IQ lower than 69, according to ICD 10 criteria, assessed with age-appropriate psychometric tests Stanford-Binet, WISC IV.

Data regarding the presence of comorbidity with ADHD and ID were recorded in order to observe how these co-occurring symptoms influence child's compliance to dental assessment and intervention. No other psychiatric conditions, according to the ICD-10 criteria were identified and recorded for the participants. There were no specific sensory, locomotor or other disabilities presented to children included in the study and acute medical conditions were considered an exclusion criterion.

Data were recorded on the following oral health indicators and behavioral indicators

Oral health indicators

- **Odontal status**

Investigation of decayed, missing, and filled teeth as well as periodontal status was performed and data were

synthesized in terms of carious affection or general dental damage reported on total erupted teeth, on a 4-level scale: Low (<25% affected rate) Mild (26–50%) Moderate (51–75%) Severe (>75%).

- **Oral hygiene skills of the child were assessed by the parent or caregiver on a 3-level scale**

Independent-Cooperative (the child has age-appropriate skills on brushing teeth, prompted or with little help); *Assisted by the caregiver* (the teeth brushing is managed by the caregiver, accepted by the child) *Refusal* (the child is consistently refusing to brush his or her teeth).

Behavioral indicators

- Child's compliance in terms of behavior assessment was done using Frankl's behavior rating scale, a behavioral observation type of instrument used in both clinical dentistry and research on ASD patients. Frankl's behavior rating scale, developed in 1962, is one of the most widely used behavior evaluation scales in pediatric dental research and in daily clinical practice [19]. Currently Frankl's behavior rating scale lacks on statistical documentation regarding its psychometric properties specifically on validity for Romanian children population. Despite this limitation, researchers and scholars continue to use the Frankle Scale in their studies on these demographics, recognizing its value in identifying children behavior in these specific medical contexts [20].

Each child's behavior was classified by an experienced pediatric dentist in one of the four categories of the Frankl scale, covering reactions in the dental setting during the procedures as follows [21]

Definitely negative: Refusal of treatment, extreme opposing attitude, screaming, agitation, and aggression.

Negative: Reluctant to accept treatment, uncooperative, some evidence of negative attitude but not pronounced.

Positive: Acceptance of treatment, cautious, reserved, inhibited, patient follows the dentist's instructions

Definitely positive: Good compliance during intervention, curious regarding the procedures, relaxed.

- The presence of psychomotor stereotypes and the exhibited agitation crises were recorded as present or absent during the dental appointment by an experienced pediatric dentist after clarifying with the mental health team the specific autistic manifestations.

Data analysis included descriptive statistics, relative frequencies, and percentages for categorical variables, means for interval scaled variables, multivariate analysis. To explore the relationship between behavioral and dental health variables Spearman Rank Correlation was used.

RESULTS AND DISCUSSION

Sample

The participants were 30 children (19 boys and 11 girls). The age ranges were 3 to 16 yrs, Mean age 10.13 yr. SD 3.989 [Table 1].

Distribution of the sample participants according to the presence of motor stereotypes and agitations crises

A significant proportion of the children (60%) exhibited stereotyped and repetitive motor mannerisms. Displayed manifestations like hand or finger flapping or twisting, or complex whole-body movements impacted complying with dental treatment procedures. Addressing motor mannerisms, both behavioral and pharmacological can be a key direction in order to ensure a safer and higher compliance.

Agitation crises were a problematic behavior displayed in the dental setting with 36.7% of the children expressing these manifestations. These episodes of intense restlessness, excessive irritability, emotional distress, disruptive behaviors made the procedures more challenging in order to ensure the safety, comfort and compliance of the child.

ADHD and cognitive impairment comorbidity in the study sample

In the study group, the distribution of sample participants revealed an important presence of ADHD, with 66.7% of the children having been also diagnosed in comorbidity with ADHD. Additionally, cognitive impairment was also prevalent, with 60% of participants presenting clinical criteria of cognitive impairment. These findings highlight the importance of considering both ADHD and cognitive impairment when analyzing ASD children behavior in dental setting. Results are consistent to data in literature and relevant for the expected expressed behaviors in the dental setting of these patients [22].

A study focusing on children with ID highlighted the increased tendency to experience fear or agitation in hospitals associated with less favorable healthcare experiences [23].

Behavioral indicators

A significant percentage of the participants (70%) were observed to be uncooperative. The mean score for cooperation on Frankl's behavior rating scale was 2.10, with a standard

deviation of 0.888. Additionally, 43.3% of the participants showed reluctance in accepting treatment and displayed uncooperative behavior. Some evidence of a negative attitude towards dental procedures was noted, with 26.7% of participants expressing total refusal. It is worth mentioning that only 2 patients demonstrated a positive attitude and active involvement in the dental procedures highlighting the challenges faced in achieving acceptance of treatment among children with ASD.

Our data align with literature data. In an extensive recent study aimed on Oral Health Status of Children with Autism in Central Italy, 229 autistic children aged between 5 and 14 years were investigated and the results on shows most children with ASD (87%) not cooperative, according to the same Frankl's Behavior Rating Scale

The results indicate that patients diagnosed with ASD associated with ADHD or ASD associated cognitive impairment showed lower scores on the Frankl's Behavior Rating Scale, specifically reflecting manifestations of impairing levels. Statistical analysis using a t-test revealed significant differences for both associated conditions. When comparing participants with ADHD and those without ADHD comorbidity, the t-value was 15.23, with a significance level of .001. Similarly, for comorbidity with cognitive impairment, the t-value was 15.39, also with a significance level of .001. These findings suggest that children with ASD and ADHD comorbidity and ASD associated with cognitive impairment may exhibit more challenging behaviors and difficulties relevant in terms of compliance during dental procedures [Figure 1,2].

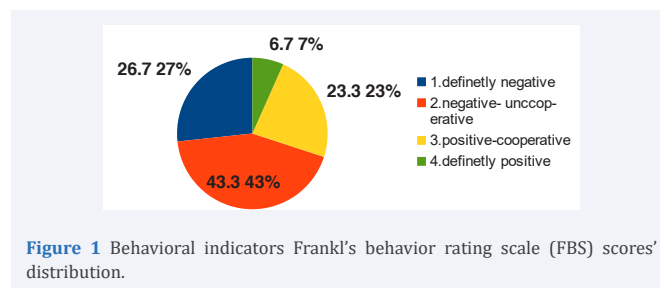


Figure 1 Behavioral indicators Frankl's behavior rating scale (FBS) scores' distribution.

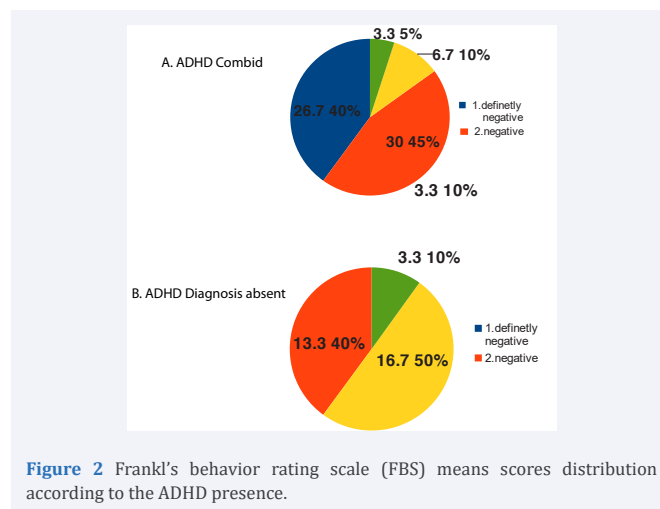


Figure 2 Frankl's behavior rating scale (FBS) means scores distribution according to the ADHD presence.

Table 1: Age distribution of the sample

Gender	Age group intervals			Total participants
	3-7 years	8-11 years	12-16 years	
Male, count	6	7	6	19
Male, % of total	20.0%	23.3%	20.0%	63.3%
Female, count	4	2	5	11
Female, % of total	13.3%	6.7%	16.7%	36.7%
Total participants, count % of total	10 33.3%	9 30.0%	11 36.7%	30 100.0%

A certain level of distress associated with hyperactivity, impulsivity, and inattention and low comprehension is expressed in the in-compliant behavior of the child.

Negative behavioral compliance measured with Frankle Scale demonstrates a significant correlated with the presence of ADHD diagnosis (.516, $p < .004$) and Cognitive impairment (.521, $p < .003$) among the study group [Table 2].

A relevant direction for centering the explanations of low compliance in the dental setting of ASD patients appear to be not only related to the specific characteristics of autism, but to relevant comorbidities

The focus on concurrent hyperactivity and impulsiveness from the psychiatric and behavioral management may provide an efficient approach for the dental care for the expulsions of low compliance related to dental procedures and oral health of ASD patients. By incorporating comprehensive and systematic observations from dental practice into developing the behavioral therapy programs may lead to improved outcomes in dental health of children with autism. Further research and interventions may be necessary to address these specific needs and improve dental experiences for neurodiverse children.

Odontal status aspects

Relevant within the study' selected sample included the presence of dental trauma on 6 patients (20%) with 2 severe self-harm injuries.

According to parental assessment, there was a high prevalence of refusal of oral hygiene and carer management of oral hygiene skills among the children with ASD in this study. Only 26,6% (8) children in the sample group had age-appropriate skills that helped them in maintaining a healthy dental routine.

Within the sample, the relationship between child's lack of oral health skills and levels of uncooperative behaviors in the dental measured with Frankl's behavior rating scale, was significant, $X^2 = 16,76$, $p < .01$. These findings sustain the direction of behavioral interventions aimed at enhancing oral health skills

in neuroatypical children as a measure of prophylaxis and also of developing complacency for dental interventions. As highlighted in literature studies the use of applied behavior analysis practices focused on oral health skills and behaviors in the dentistry, has a high chance of improving the outcome of conventional approach [1,24].

As a relevant aspect concerning the dental management related to child behavior among the participants in the study, 30% (9) of them manage to complete dental treatments with general anesthesia and for 70% (21) of patients with uncooperative reactions and sedation was performed.

Inter-correlation analysis between behavioral variables and oral health variables indicates a significant connection between expressed negative behavioral compliance in the dental setting and the following characteristics of the participants: poor oral hygiene skills (.543, $p < .002$), dental trauma (.567, $p < .001$) and the option for dental sedation (.665, $p < .000$) [Table 2].

The main dental pathology of the sample group revealed the presence of caries secondary to poor oral hygiene on 60% of the patients (18 children).

Carious affection as *general dental damage reported on total erupted teeth* on a 4-level scale revealed a high percent of severe and moderate dental damage for 53.5% of the participant children.

CONCLUSION

We acknowledge as limitations of the study the small sample size and lack of a control group and would like to emphasize the need for future research into dental complacency in youth with ASD using a comprehensive approach. Our study recognizes the highly problematic noncooperation of neurodiverse children with dental procedures, with relevant disruptive behaviors and a lack of oral health skills.

The comorbidities of ASD with ADHD and cognitive impairment hold significant importance in the broad field of neurodiverse characteristics influencing a child's level of

Table 2: Correlations matrix Spearman's for Behavioral and Dental health indicators (N=30)

	AGE	ADHD	Cognitive impairment	FBS	Motor-stereotypes	Agitation crises	Odontal severity	Oral hygiene skills	Dental trauma	Sedation
AGE	1.000									
ADHD	.124	1.000								
Cognitive impairment	-.246	.289	1.000							
FBS	.137	.516(**)	.521(**)	1.000						
Motor-stereotypes	.655(**)	.241	-.111	.146	1.000					
Agitation crises	.089	.538(**)	.480(**)	.759(**)	.056	1.000				
Odontal severity	.138	.484(**)	.192	.198	.074	.066	1.000			
Oral hygiene skills	.395(*)	.626(**)	.192	.543(**)	.376(*)	.514(**)	.546(**)	1.000		
Dental trauma/injury	-.102	.354	.238	.567(**)	.068	.484(**)	.235	.471(**)	1.000	
Sedation	-.042	.772(**)	.505(**)	.665(**)	.059	.498(**)	.472(**)	.545(**)	.327	1.000
	30	30	30	30	30	30	30	30	30	30

**Correlation is significant at the 0.01 level (2-tailed).

*Correlation is significant at the 0.05 level (2-tailed).

Abbreviations: ADHD: Attention Deficit Hyperactivity Disorder; FBS: Frankle Behaviour Scale

cooperation with dental procedures and the adoption of oral health-related behaviors, along with the intrinsic traits of sensorial sensitivity and communication impairments.

Autistic children in dentistry practice require special attention to meet their medical needs. Main expressed reactions of children with ASD in the dental practice settings includes: anxiety, defensive reactions, hyper stimulated, making visits difficult for healthcare providers due to tantrums and aggressive behaviors toward themselves [14].

For ASD patients, inabilities in social communication and expressive and receptive language impairment represent a major barrier in the dental setting, so these children with impairments in communication often have more unmet health needs than those without communication difficulties [17].

Understanding the challenges from a multidisciplinary perspective can support the management of these cases and the development of adjustment strategies. This, in turn, can contribute to reducing oral health disparities in neurodiverse children.

The results of this study draw attention to the continuous increase in the need to implement dental evaluation and treatment strategies / programs to which as many neuroatypical children as possible have accesses. As future research directions, we emphasize the need to extend research to a much larger group of children with such difficulties, as well as to investigate their behavioral difficulties in other medical services where paraclinical investigations are carried out for various somatic disorders (blood tests, ultrasound, radiology or imaging).

REFERENCES

- Chandrashekhar S, Bommangoudar JS. Management of Autistic Patients in Dental Office: A Clinical Update. *Int J Clin Pediatr Dent*. 2018; 11: 219-227.
- Diagnostic and statistical manual of mental disorders: DSM-5. Washington, D.C: American Psychiatric Association(APA). 5th edition, 2013.
- Prevalence of Autism Spectrum Disorder Among Children Aged 8 Years - Autism and Developmental Disabilities Monitoring Network, 11 Sites, United States. *Surveillance Summaries*. Centers for Disease Control and Prevention (CDC). 2023.
- Lyall K, Croen L, Daniels J, Fallin MD, Ladd-Acosta C, Lee BK, et al. The Changing Epidemiology of Autism Spectrum Disorders. *Annu Rev Public Health*. 2017; 38: 81-102.
- Kopetz PB, Endowed DL. Autism worldwide: prevalence, perceptions, acceptance, action. *J Social Sci*. 2012; 8: 196-201.
- Styles M, Alsharshani D, Samara M, Alsharshani M, Khattab A, Qoronfle MW, et al. Risk factors, diagnosis, prognosis and treatment of autism. *Front Biosci (Landmark Ed)*. 2020; 25: 1682-1717.
- Lai MC, Kassee C, Besney R, Bonato S, Hull L, Mandy W, et al. Prevalence of co-occurring mental health diagnoses in the autism population: a systematic review and meta-analysis. *Lancet Psychiatry*. 2019; 6: 819-829.
- Rong Y, Yang C-J, Jin Y, Wang Y. Prevalence of attention-deficit/hyperactivity disorder in individuals with autism spectrum disorder: a meta-analysis. *Res Autism Spectr Disord*. 2021; 83: 101759.
- Farhat LC, Brentani H, Calegari de Toledo VH, Shephard E, Mattos P, Baron-Cohen S, et al. ADHD and autism symptoms in youth: a network analysis. *J Child Psychol Psychiatry*. 2022; 63: 143-151.
- Sprenger L, Bühler E, Poustka L, Bach C, Heinzel-Gutenbrunner M, Kamp-Becker I, et al. Impact of ADHD symptoms on autism spectrum disorder symptom severity. *Res Dev Disabil*. 2013; 34: 3545-3552.
- Velarde M, Cárdenas A. Autism spectrum disorder and attention-deficit/hyperactivity disorder: challenge in diagnosis and treatment. *Medicina*. 2022; 30: 67-70.
- Munson J, Dawson G, Sterling L, Beauchaine T, Zhou A, Koehler E, et al. Evidence for latent classes of IQ in young children with autism spectrum disorder. *Am J Ment Retard*. 2008; 113: 439-452.
- Polyak A, Kubina RM, Girirajan S. Comorbidity of Intellectual Disability Confounds Ascertainment of Autism: Implications for Genetic Diagnosis. *Am J Med Genet B Neuropsychiatr Genet*. 2015; 168: 600-608.
- Bultas MW. The health care experiences of the preschool child with autism. *J Pediatr Nurs*. 2012; 27: 460-470.
- Preda DM, Mirică A, Rad F, Udrea OM, Muntean A, Nițescu VG, et al. Challenges of dental assessment in children with autism spectrum disorders. *Pediatru.ro*. 2022; 67: 2022.
- Tomchek SD, Dunn W. Sensory processing in children with and without autism: a comparative study using the Short Sensory Profile. *Am J Occup Ther*. 2007; 61: 190-200.
- American Academy of Pediatric Dentistry. Behavior guidance for the pediatric dental patient. *The Reference Manual of Pediatric Dentistry*. Chicago, Ill.: American Academy of Pediatric Dentistry. 2022; 32.
- Park Y, Guzick AG, Schneider SC, Fuselier M, Wood JJ, Kerns CM, et al. Dental Anxiety in Children with Autism Spectrum Disorder: Understanding Frequency and Associated Variables. *Front Psychiatry*. 2022; 13: 838557.
- Bossù M, Trottini M, Corridore D, Di Giorgio G, Sfasciotti G.L, Palaia G, et al. Oral Health Status of Children with Autism in Central Italy. *Appl Sci*. 2020; 10, 2247.
- Savin C, Mihalaș E, Balcoș C, Hurjui L, Baciuc G, Sirghe A. Evaluation of dental anxiety in a 4 -12 years old children sample Romanian. *J Oral Rehabil*. 2021; 13.
- Riba H, Al-Zahrani S, Al-Buqmi N, Al-Jundi A. A Review of Behavior Evaluation Scales in Pediatric Dentistry and Suggested Modification to the Frankl Scale. *EC Dent Sci*. 2017; 16, 269-275.
- Hours C, Recasens C, Baleyte JM. ASD and ADHD Comorbidity: What Are We Talking About? *Front Psychiatry*. 2022; 13: 837424.
- Inoue N, Okanishi T, Inoue M, Maegaki Y. Psychological preparations affecting the emotions of children with developmental disorders toward hospitals. *Yonago Acta Med*. 2021; 64: 92-97.
- Hernandez P, Ikkanda Z. Applied behavior analysis: behavior management of children with autism spectrum disorders in dental environments. *J Am Dent Assoc*. 2011; 142: 281-287.