Original Research

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Feactures of mastication and feeding behavior in children with autism spectrum disorder

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Abstract

INTRODUCTION. Children with autism spectrum disorder (ASD) often exhibit altered oral sensory processing, atypical feeding patterns, and non-standard responses to dental stimuli, complicating endodontic care.

AIM. To profile feeding behavior, mastication, and swallowing in ASD and to identify endodontically relevant risks: verification of odontogenic pain, effectiveness of local infiltration anesthesia, and tolerance to rubber-dam isolation.

MATERIALS AND METHODS. Observational controlled study of 178 children aged 3–9 years (ASD n = 124, controls n = 54). Caregiver questionnaires and clinician-rated protocols assessed meal frequency/duration, oral sensory responses, mastication, and swallowing. Dental visits were evaluated for pain verification, infiltration-anesthesia performance, and isolation tolerance. Between-group differences were tested at $\alpha = 0.005$, significant effects were observed for all $p \leqslant 0.003$.

RESULTS. ASD was associated with more frequent but smaller meals, prolonged mealtimes, heightened oral sensory reactivity, and higher rates of mastication/swallowing difficulties. In the dental setting, ASD patients more often demonstrated hard-to-verify odontogenic pain, variable infiltration-anesthesia efficacy, and poor tolerance to rubber-dam isolation.

CONCLUSIONS. The ASD feeding/sensory profile differs from neurotypical peers and predicts challenges in pain verification and treatment tolerance. Routine pre-visit preparation and sensory-aware communication improve cooperation. Stepwise behavior guidance and flexible isolation strategies reduce aversive responses. When infiltration shows inconsistent effect, clinicians should reassess pain source, adapt anesthetic technique, and allow sufficient latency/graded dosing within safety limits. Integrating caregiver-reported feeding/sensory cues into chairside decisions increases anesthesia success and overall endodontic feasibility.

Keywords: autism spectrum disorder, pediatric endodontics, feeding behavior, mastication, swallowing, pain assessment, local infiltration anesthesia

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Особенности жевания и пищевого поведения у детей с расстройствами аутистического спектра

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Резюме

ВВЕДЕНИЕ. У детей с расстройствами аутистического спектра (РАС) часто отмечаются особенности оральной сенсорики и пищевого поведения, а также атипичные реакции на стоматологические стимулы, что усложняет эндодонтическое лечение.

ЦЕЛЬ. Охарактеризовать пищевое поведение, жевание и глотание у детей с РАС и определить клинически значимые для эндодонтии риски: верификацию одонтогенной боли, эффективность инфильтрационной анестезии и переносимость изоляции.

МАТЕРИАЛЫ И МЕТОДЫ. Наблюдательное контролируемое исследование 178 детей 3–9 лет (РАС $n = 124$; контроль $n = 54$). Использованы опросники для родителей и клинические протоколы оценки частоты/длительности приемов пищи, оральной сенсорной реактивности, жевания и глотания. На приеме оценивали верификацию боли, работу инфильтрационной анестезии и переносимость коффердама. Межгрупповые различия тестировали при $\alpha = 0{,}005$, значимые эффекты отмечены при всех $p \leqslant 0{,}003$.
РЕЗУЛЬТАТЫ. У детей с РАС чаще наблюдались более частые, но меньшие по объему приемы пищи, удлиненные приемы пищи, повышенная сенсорная реактивность, нарушения жевания и глотания. В условиях стоматологического приема чаще фиксировались трудности верификации одонтогенной боли, вариабельная эффективность инфильтрационной анестезии и низкая переносимость изоляции.
ВЫВОДЫ. Профиль оральной сенсорики и питания при РАС значимо отличается от нейротипичного и предсказывает сложности с верификацией боли и переносимостью вмешательств. Предварительная подготовка и сенсорно-ориентированная коммуникация повышают успешность терапии. Поэтапное поведенческое ведение и адаптивные стратегии изоляции уменьшают аверсивные реакции. При нестабильной эффективности инфильтрационной анестезии следует пересматривать источник боли, корректировать технику и обеспечивать достаточную латентность/дробное введение в пределах безопасности. Учет родительских данных о питании и сенсорике повышает успех анестезии и осуществимость эндодонтического лечения.

Ключевые слова: расстройства аутистического спектра, детская эндодонтия, пищевое поведение, жевание, глотание, оценка боли, инфильтрационная анестезия

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INTRODUCTION

Over recent decades, many countries have reported an increase in the registered prevalence of autism spectrum disorders (ASD) [1–3]. This trend is attributed to a combination of factors, including changes in diagnostic criteria, expansion of screening programs, improved access to diagnostic services and awareness, as well as differences in case-ascertainment methodology. Verified epidemiological studies conducted in Europe and the United States in the 1970s reported low prevalence rates (approximately 2–5 per 10,000 for “classical” autism) [4]. Currently, according to reviews and international estimates, the global prevalence is approximately 1 in 100 children, with substantial intercountry variability. Data from the Autism and Developmental Disabilities Monitoring (ADDM) Network of the U.S. Centers for Disease Control and Prevention (CDC) for eight-year-old children in 2022 indicate a prevalence of 32.2 per 1,000 (1 in 31; 3.2%), with a wide range across regions. In the Russian Federation, comparable population-based prevalence estimates are lacking. Administrative data from the education system are used as proxy indicators. According to the All-Russian Monitoring, the total number of students with ASD in 2022 was 45,888 [5; 6]. Several years ago, a regional prevalence study of ASD in the Russian Federation was initiated with the aim of identifying a verified number of children aged 6–9 years; however, this project has not yet been completed.

In contemporary classifications (DSM-5, ICD-11), diagnosis is formalized through a two-domain model: social communication/interaction and restricted/repetitive behaviors [7–10]. Intellectual and speech impairments may co-occur with ASD but are not mandatory diagnostic criteria.

ASD occurs worldwide, irrespective of racial or ethnic background [2]. More than 50 million people globally are affected by ASD [5], a lifelong condition that imposes a substantial psychological and socioeconomic burden on families of children and adults with ASD, as well as on healthcare systems [6].

ASD is a distinctly multidisciplinary issue. In recent years, considerable attention has been devoted to maintaining optimal oral hygiene and to investigating the composition of the oral and gut microbiota in this pediatric cohort. Identified impairments in dental status are largely attributable to difficulties in performing oral hygiene procedures in this group, as repeatedly documented in the literature and confirmed by our own studies [10–14]. Clinicians and special education professionals have also increasingly focused on stereotyped feeding behavior and on specific features of chewing and swallowing in children with ASD [15–21].

Clinical assessment of chewing in children with ASD aged 3–9 years relies on three complementary tools:

– observational clinical scales of orofacial function;

– objective tests of masticatory efficiency;

– questionnaires capturing parent-reported observations of meals and feeding behavior.

Among clinical scales, the Nordic Orofacial Test-Screening (NOT-S) plays a key role in this age group [22–30]. NOT-S is designed to identify orofacial dysfunctions, including domains related to chewing and mastication, and has been validated and widely used internationally in speech-language pathology and developmental dentistry in children under 12 years of age (with an informed adult present) [31–34]. A separate category comprises scales developed specifically to assess chewing [35–37]. The most elaborated instrument is the Karaduman Chewing Performance

Scale (KCPS; see Appendix), a hierarchical scale of chewing function based on clinical observation of food bolus processing. Its reliability and validity have been demonstrated primarily in children with neuromuscular disorders, including age ranges overlapping 3–9 years. For younger children, the Schedule for Oral-Motor Assessment (SOMA) is also used internationally to evaluate oral motor function across different food textures [38–40]. However, SOMA was originally validated mainly for the age range of 8–24 months. Use outside this window reduces interpretability [41]. For our target age group, SOMA may serve only as an approximate tool in cases of pronounced developmental delay rather than as a primary source of quantitative assessment.

Chewing in a child is not merely mechanical food comminution but an integrative sensorimotor function involving synchronization of rhythmic mandibular movements, masticatory muscle activity, coordination of the tongue and cheeks, salivation, and sensory selectivity for textures and tastes. Under typical development, chewing progresses from coarse, variable early patterns to stable, efficient, and economical functional schemes of the dentoalveolar system: bite force increases, movement amplitudes and trajectories change, bolus fragmentation improves, and transport to the oropharynx becomes more effective. These changes are supported by electromyographic and kinematic observations in preschool and early school-age children and provide a neurophysiological basis for safe swallowing and expansion of the dietary repertoire. Conversely, persistent coordination or sensory integration impairments rapidly translate into clinical manifestations, ranging from difficulty transitioning to textured foods to pronounced selectivity and food refusal. In children with ASD, the burden of such impairments is higher than in typically developing peers: reduced chewing skills, delayed transition to “piece” and “finger” foods, strong texture dependence, atypical oral sensory reactivity, and specific behavioral patterns during meals are more frequently observed.

Analysis of validated international and domestic scales, combined with our own clinical experience, served as the basis for developing a questionnaire scale tailored to assess motor function, taste preferences, and chewing characteristics in children with ASD. The proposed instrument enables a comprehensive evaluation of these domains even in the presence of pronounced difficulties with verbal and tactile contact and high anxiety toward any manipulations in this cohort. At the same time, it should be acknowledged that standard assessment of chewing quality using conventional algorithms is challenging in these children due to specific food choices and external characteristics (texture, color, smell, presentation, and “trigger” features), necessitating individualization of the diagnostic protocol.

MATERIALS AND METHODS

A prospective controlled study was conducted between 2022 and 2025 at the Department of Pediatric, Preventive Dentistry and Orthodontics of the E.V. Borovsky Institute of Dentistry, the Department of Pediatrics of the N.F. Filatov Clinical Institute of Children’s Health, and the Sechenov Center for Motherhood and Childhood of the Federal State Autonomous Educational Institution of Higher Education I.M. Sechenov First Moscow State Medical University of the Ministry of Health of the Russian Federation (Sechenov University). The study protocol was approved by the Local Ethics Committee of I.M. Sechenov First Moscow State Medical University (No. 21/23 dated 16 November 2023).

Inclusion criteria were a confirmed diagnosis of autism spectrum disorder, age 3–9 years, and written informed consent signed by parents or legal representatives. Exclusion criteria included acute inflammatory diseases and severe concomitant somatic conditions that could interfere with participation in the study. A total of 178 children aged 3–9 years were enrolled: 124 children with autism spectrum disorders and 54 neurotypical children forming the comparison group.

All participants underwent assessment of the qualitative and quantitative composition of the oral and gut microbiota by analysis of microbial markers using gas chromatography–mass spectrometry. In addition, oral hygiene indices, caries index (dmft + DMFT), and characteristics of chewing, swallowing, and feeding habits were evaluated.

Statistical analysis was performed using IBM SPSS Statistics 27 and PAST software. Normality of quantitative variable distributions was assessed using the Shapiro–Wilk, Lilliefors, Anderson–Darling, and Jarque–Bera tests. Comparative analyses were conducted using Student’s t-test, the Mann–Whitney U test, repeated-measures analysis of variance, Fisher’s exact test, and its extended version for contingency tables. Post hoc comparisons were performed with Tukey and Bonferroni corrections. Differences were considered statistically significant at $p < 0.005$.

RESULTS

Based on international and domestic scales, taking into account psychoneurological characteristics and clinical experience in observing children with ASD, an assessment table of feeding habits and chewing was developed (Table 1). It includes indicators of meal frequency, meal duration, the presence in the diet of foods requiring active chewing (including raw fruits), preference for sweets/carbohydrates, refusal of new foods, and retention of food in the oral cavity for more than 5 minutes.

According to Table 1 and Fig. 1, in the younger age subgroup of the control group, the distribution of the number of meals deviates significantly from uniformity (exact χ^2 test: $p = 0.0008$): the proportion of children with four meals per day exceeds that of children with two or three meals per day, with no other significant differences observed. As shown in Table 2, among children with ASD, a two- or three-meal daily regimen predominated (89% of the group), compared to 29% in the control group. In the main ASD group, the distribution by number of meals also differed from uniformity (exact χ^2 test: $p = 0.0004$): the proportions of children with two- and three-meal regimens were significantly higher than those with four- and five-meal regimens.

Table 1. Assessment of eating habits and mastication in children aged 3–9 years: ASD group and control group

Таблица 1. Оценка пищевых привычек и жевания у детей 3–9 лет: группа с РАС и группа сравнения (контроль)

Features	Characteristics
Number of meals	2/3/4/5 times per day
Duration of meals	From 25 min/up to 35 min over 35 min
Presence of foods requiring chewing in the diet	yes/no
Presence of processed foods (including raw fruits) in the diet	yes/no
Preference for sweets/carbohydrates	yes/no
Refusal of new foods	yes/no
Duration of food retention in the mouth (over 5 minutes)	yes/no

Intergroup comparison of the younger age subgroup confirmed statistically significant differences (significance level 0.005): the ASD group had a higher proportion of children eating twice a day (difference in proportions 38 percentage points; 95% CI: 17–55) and a lower proportion of children with a four-meal regimen (difference in proportions 53 percentage points; 95% CI: 27–75).

According to Table 1 and Fig. 2, in the younger age subgroup of the control group, the distribution of meal duration significantly deviates from uniformity (exact χ^2 test: p = 0.0008): the proportion of children with meals lasting up to 25 minutes is higher (64%, 95% CI: 40–84%) compared with the ASD group (37%, 95% CI: 23–52%), whereas the proportion of children with meals lasting 35–45 minutes is lower (7%, 95% CI: 1–27% versus 29%, 95% CI: 17–43%). In the ASD group, the distribution of meal duration does not differ from uniform (exact χ^2 test: p = 0.78), indicating no evidence that children in this group more frequently have shorter or longer meal durations; the 95% CIs for all subcategories substantially overlap.

Table 2. Meal frequency and duration in children aged 3–9 years: ASD and control groups

Таблица 2. Частота и длительность приемов пищи у детей 3–9 лет: группы РАС и контроля

Criterion	Levels	Number of patients with 95% CI				*p*-value of Fisher's exact test (two-tailed) / VS-MPR	Cramér's V with 95% CI
		Control group		Main group			
		Person	As a percentage of the group size	Person	As a percentage of the group size		
Number of meals	2	0	$_{0}0_{15}$	24	$_{24}38_{55}$	$7.2 \cdot 10^{-9}$	$_{0.49}0.64_{0.79}$
	3	8	$_{12}29_{53}$	32	$_{35}51_{67}$		
	4	18	$_{41}64_{85}$	7	$_{4}11_{24}$		
	5	2	$_{1}7_{27}$	0	$_{0}0_{7}$		
Duration of meal, min	Up to 25	18	$_{40}64_{84}$	23	$_{23}37_{52}$	0.020/4.7	$_{0.11}0.28_{0.46}$
	25–35	8	$_{12}29_{53}$	22	$_{21}35_{50}$		
	35–45 and more	2	$_{1}7_{27}$	18	$_{17}29_{43}$		
Total		28	100	63	100	–	–

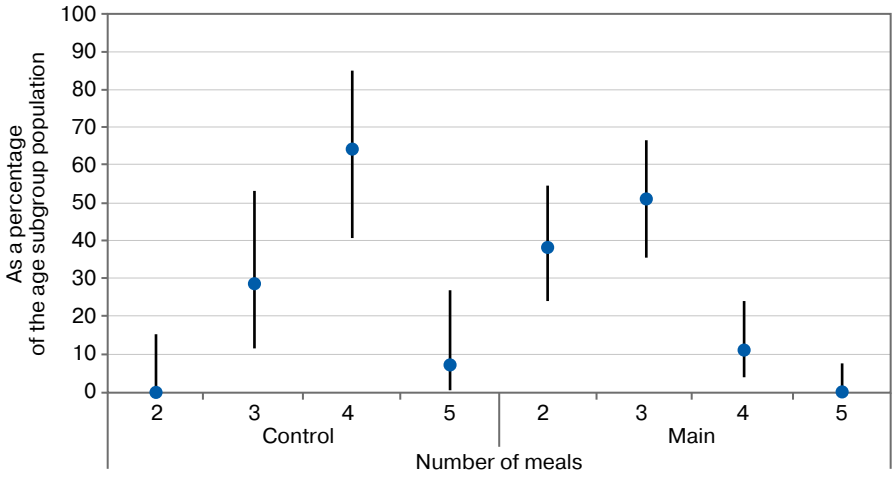

Fig. 1. Meal frequency in children aged 3–9 years (younger subgroup): comparison of ASD and control groups

Рис.1. Частота приемов пищи у детей 3–9 лет (младшая подгруппа): сравнение группы с РАС и контрольной группы

Thus, regarding meal duration, younger children in the control and ASD groups differ at a significance level of 0.05, with VS-MPR < 10; the lower bound of the 95% CI for Cramér's V does not exceed 0.3. It should be noted that the 95% CIs for proportions of children with the same meal duration in the two groups largely overlap, and the 95% CIs for the differences in corresponding proportions include 0 (see Table 1).

In summary, 64% of younger children with ASD had longer meal durations compared with neurotypical peers (in the control group, no more than 36%, with only 7% exceeding 35 minutes). Regarding feeding behavior and chewing characteristics (Table 2, Fig. 3–5), no statistically significant differences between the control and ASD groups were found in the younger age subgroup for the following indicators: preference for sweets and carbohydrates, refusal of new foods, and ability to chew nuts. The absence of significant intergroup differences for these parameters suggests a pronounced preference for sweets and "simple" carbohydrates not only among children with ASD but also among neurotypical children, consistent with recent trends of increased sugar consumption in the pediatric population.

At a significance level of 0.005, the subgroups differed statistically significantly on two indicators:

– presence of foods requiring active chewing (unprocessed foods): in the ASD group, the proportion was lower than in the control group – 44% (95% CI: 33–57%) versus 86% (95% CI: 68–94%), $p < 0.0002$;

– presence of raw fruits in the diet: in the ASD group, the proportion was lower than in the control group – 49% (95% CI: 37–61%) versus 82% (95% CI: 64–92%), $p < 0.003$.

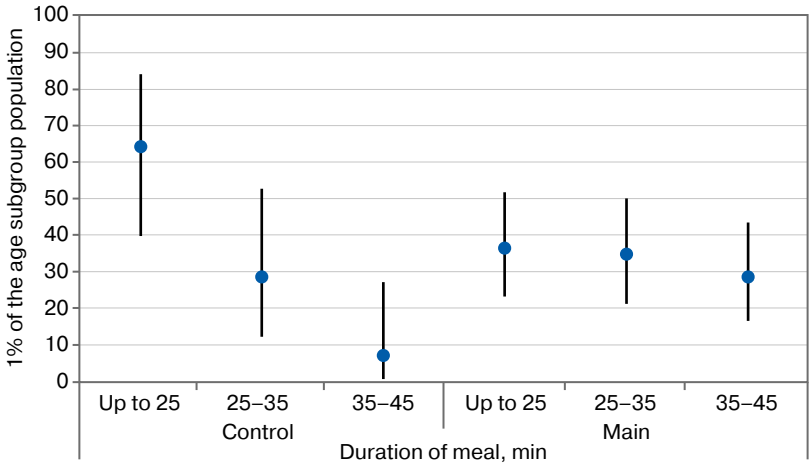

Fig. 2. Meal duration in children aged 3–9 years (younger subgroup): comparison of ASD and control groups

Рис. 2. Длительность приема пищи у детей 3–9 лет (младшая подгруппа): сравнение группы с РАС и контрольной группы

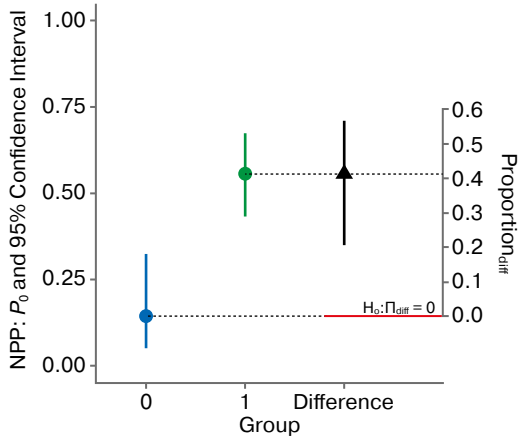

Fig. 3. Preference for sweets and carbohydrates in children aged 3–9 years (younger subgroup): comparison of ASD and control groups

Рис. 3. Предпочтение сладостей и углеводов у детей 3–9 лет (младшая подгруппа): сравнение группы с РАС и контрольной группы

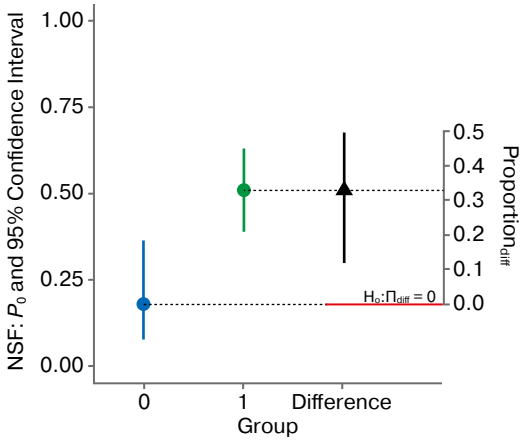

Fig. 4. Presence of chew-intensive foods in the diet (younger subgroup, ages 3–9): comparison of ASD and control groups

Рис. 4. Наличие в рационе продуктов, требующих активного жевания (младшая подгруппа, 3–9 лет): сравнение группы с РАС и контрольной группы

For the older age subgroup (5 years 7 months to 9 years), patterns in meal frequency and duration were as follows. According to Table 4 and Fig. 6, in the control group, the distribution of the number of meals significantly deviated from uniformity (exact χ^2 test: $p = 0.003$), with the proportion of children eating twice a day being lower than the other categories. In the ASD group, the distribution also differed from uniformity (exact χ^2 test: $p = 0.003$), with the highest proportion observed for three meals per day.

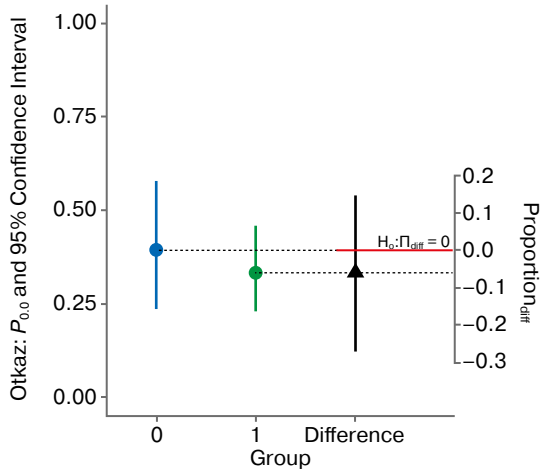

Fig. 5. Stereotyped eating behaviour: refusal of novel foods (Gardner–Altman plot)

Note: In the context of a Gardner–Altman plot, the value "zero" is critical, representing the absence of an effect or difference between the groups being compared. Zero is positioned on the effect size axis (typically the right-hand side of the plot), which usually depicts the difference in means between the control and experimental groups. The zero line (a horizontal line at value 0) serves as a reference point representing the null hypothesis, which states that there is no true difference between the two groups and that any observed difference is due to random variation. On a Gardner–Altman plot, the mean (or median) of the control group is usually aligned with these zero lines on the difference axis, while the mean of the experimental group is shown as a point with a confidence interval relative to zero. This visualization allows immediate assessment of whether the confidence interval of the effect size overlaps zero, indicating whether the difference is statistically meaningful.

Рис. 5. Стереотипии пищевого поведения: показатель отказа от новой пищи (график Гарднера–Олтмена)

Примечание: В контексте графика Гарднера-Олтмена, значение «ноль» имеет решающее значение и относится к отсутствию эффекта или разницы между сравниваемыми группами. Ноль расположен на оси размера эффекта (правая часть графика), которая обычно представляет собой разницу средних значений между контрольной и экспериментальной группами. Нулевая линия (горизонтальная линия, соответствующая значению 0) служит точкой отсчета, представляющей нулевую гипотезу. Нулевая гипотеза утверждает, что между двумя группами нет истинной разницы, и любое наблюдаемое различие является случайным. На графике Гарднера-Олтмена среднее значение (или медиана) контрольной группы обычно совмещается с этой нулевой линией на оси разницы, а среднее значение экспериментальной группы отображается как точка с доверительным интервалом относительно этого нуля

Intergroup comparison of the older subgroup revealed statistically significant differences at $\alpha = 0.005$: in the ASD group, the proportion of children eating twice a day was slightly higher (95% CI: 2–36%) and the proportion eating four times a day was lower (95% CI: 0.7–55%). This reflects difficulties in the feeding process affecting meal frequency (the lower bound of the 95% CI for Cramer's V did not exceed 0.3). Specifically, four meals per day were observed in **25%** of children with ASD (95% CI: 13–40%), compared with 54% of neurotypical peers (95% CI: 30–77%; $p < 0.005$), despite supervision by tutors in schools and parental monitoring.

According to Table 4 and Fig. 7, in the control group, the distribution of meal duration significantly deviated from uniformity (exact χ^2 test: $p = 0.009$). The predominant category was meals lasting up to 25 minutes, with its proportion significantly higher than the other duration intervals, while the proportions for the 25–35 and 35–45-minute intervals did not differ significantly from each other. In the ASD group, however, the distribution of meal duration did not differ from uniformity (exact χ^2 test: $p = 0.85$), indicating no clear dominance of shorter or longer meals; the 95% confidence intervals for all subcategories substantially overlapped, suggesting the absence of a pronounced modal duration within the group.

Intergroup comparison of the older age subgroup revealed statistically significant differences at $\alpha = 0.005$. In the ASD group, the proportion of children with meals up to 25 minutes was lower than in the control group (difference in proportions 43 pp; 95% CI: 13–63), whereas the proportion of children with meal durations of 35–45 minutes was higher (difference in proportions 30 pp; 95% CI: 10–45). Overall, this indicates a shift in meal duration toward longer episodes among children with ASD. Nevertheless, the association between group membership and duration structure remained weak (the lower bound of the 95% CI for Cramer's V did not exceed 0.3), which should be considered in result interpretation. Notably, most neurotypical children had meal durations $\leqslant$25 minutes (77%; 95% CI: 52–92%), whereas a substantial proportion of children with ASD had meals lasting $\geqslant$30 minutes: 30–35 minutes – 36% (95% CI: 22–52%) and 35–45 minutes – 30% (95% CI: 17–45%). Differences across the combined $\geqslant$30-minute categories were statistically significant ($p < 0.0003$).

Assessment of individual feeding behavior indicators in the older subgroup showed no significant intergroup differences for "retention of food in the mouth >5 minutes". However, the control group demonstrated a marked advantage in the ability to chew nuts: 88% of neurotypical children (95% CI: 72–97%) versus 49% of children with ASD (95% CI: 37–62%), a statistically significant difference ($p < 0.0006$). These data are consistent with the observed shift toward longer meal durations in children with ASD and indirectly indicate potential difficulties in chewing hard foods.

Table 3. Eating behaviour and mastication indicators in children aged 3–9 years (younger subgroup): comparison of ASD and control groups

Таблица 3. Показатели пищевого поведения и жевания у детей 3–9 лет (младшая подгруппа): сравнение группы с РАС и контрольной группы

Indicator	Level	Control group (28 participants)		Main group (63 participants)		Group comparison		
		Person	As a percentage of the total with 95% CI	Person	As a percentage of the total with 95% CI	Two-tailed Fisher's exact test *p*-value / VS-MPR	Estimate with 95% CI	
							Difference in "YES" proportions, percentage points	Odds ratio (OR)
Presence of foods in the diet that require chewing (unprocessed)	No	4	$_{6}14_{32}$	35	$_{43}56_{67}$	0.0002	$_{20}42_{55}$	$_{2.2}7.5_{32.5}$
	Yes	24	$_{68}86_{94}$	28	$_{33}44_{57}$			
Presence of raw fruits in the diet	No	5	$_{8}18_{36}$	32	$_{39}51_{63}$	0.003	$_{11}33_{48}$	$_{1.4}4.5_{17.8}$
	Yes	23	$_{64}82_{92}$	31	$_{37}49_{61}$			
Preference for sweets and carbohydrates	No	17	$_{42}61_{76}$	26	$_{30}41_{54}$	0.11	$_{-3}20_{39}$	$_{0.2}0.5_{1.2}$
	Yes	11	$_{24}39_{58}$	37	$_{46}59_{70}$			
Refusal of new foods	No	11	$_{24}39_{58}$	21	$_{23}33_{46}$	0.64	$_{-13}6_{26}$	$_{0.3}0.8_{2.2}$
	Yes	17	$_{42}61_{76}$	42	$_{54}67_{77}$			
Prolonged holding of food in the mouth (over 5 minutes)	No	22	$_{60}79_{90}$	34	$_{42}54_{66}$	0.035/3.1	$_{3}25_{41}$	$_{0.1}0.3_{1.0}$
	Yes	6	$_{10}21_{10}$	29	$_{34}46_{58}$			
Ability to chew nuts	No	16	$_{39}57_{74}$	39	$_{50}62_{73}$	0.82	$_{-16}5_{26}$	$_{0.4}1.2_{3.3}$
	Yes	12	$_{26}43_{61}$	24	$_{27}38_{50}$			

Table 4. Meal frequency and duration in children aged 5 years 7 months–9 years: ASD and control groups

Таблица 4. Частота и длительность приемов пищи у детей 5 лет 7 месяцев–9 лет: группа с РАС и контрольная группа

Feature or Characteristic	Level	Number of patients with 95% CI				Two-tailed Fisher's exact test *p*-value / VS-MPR	Cramér's V with 95% CI
		Control group		Main group			
		Person	As a percentage of the group size	Person	As a percentage of the group size		
Number of meals	2	0	$_{0}0_{15}$	13	$_{10}21_{36}$		$_{0.20}0.35_{0.50}$
	3	12	$_{23}46_{70}$	33	$_{38}54_{69}$		
	4	14		15	$_{13}25_{40}$		
Duration of meals, min	Up to 25	20	$_{52}77_{92}$	21	$_{21}34_{50}$	0.0003	$_{0.28}0.42_{0.57}$
	25–35	6	$_{8}23_{48}$	22	$_{22}36_{52}$		
	35–45	0	$_{0}0_{15}$	18	$_{17}30_{45}$		
Total		26	100	61	100	–	–

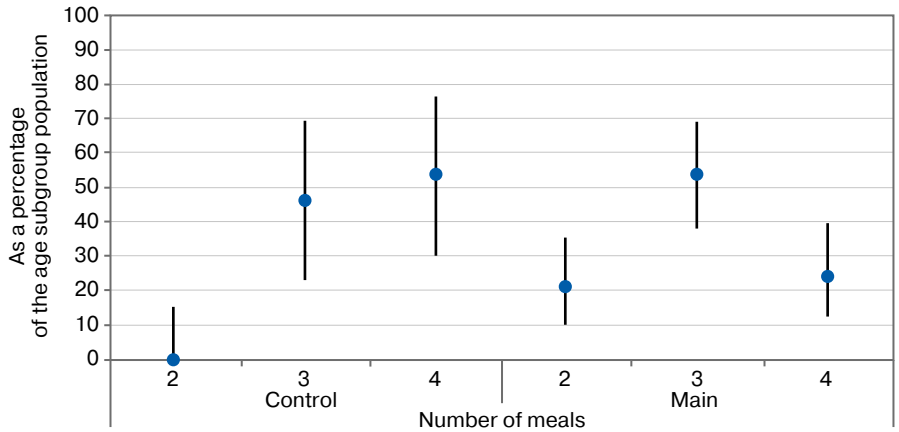

Fig. 6. Meal frequency in children aged 5 years 7 months–9 years (older subgroup): comparison of ASD and control groups

Рис. 6. Частота приемов пищи у детей 5 лет 7 месяцев–9 лет (старшая подгруппа): сравнение группы с РАС и контрольной группы

Additionally, a composite indicator of feeding behavior difficulties, based on binary markers, was analyzed (see Table 5). As summarized in Fig. 8 and 9, structural differences between children with ASD and neurotypical peers in each age interval reached statistical significance at $\alpha = 0.05$. At the same time, association measures indicate weak effect strength: Cramer's V values were low, and odds ratios suggest a moderate increase in the likelihood of feeding behavior difficulties. Specifically, children with ASD had approximately a 1.2-fold higher chance of exhibiting feeding behavior impairments compared to controls, highlighting intergroup differences despite the modest effect size.

Swallowing was classified as either infantile or somatic. The infantile type is typical for children under 2 years of age with normal development. Among most children with ASD, tongue interposition between the upper and lower dental arches was observed. When asked to swallow saliva, tension in the orbicularis oris, mentalis, and neck muscles was noted. During the act of swallowing in the infantile type, the tongue protruded between the dental arches, which can later contribute to the development of an open bite. Due to psychoneurological characteristics, only 36% of children in the ASD group were able to follow instructions adequately; for the remainder, swallowing characteristics were determined through observation during meals. Overall, the infantile type of swallowing dominated in 61% of the younger subgroup and 46% of the older subgroup.

In contrast, neurotypical children swallowed with closed lips, the orbicularis oris remained visually relaxed, facial muscles were at rest, and the tongue was positioned behind the upper incisors, at the palate, corresponding to the somatic type of swallowing.

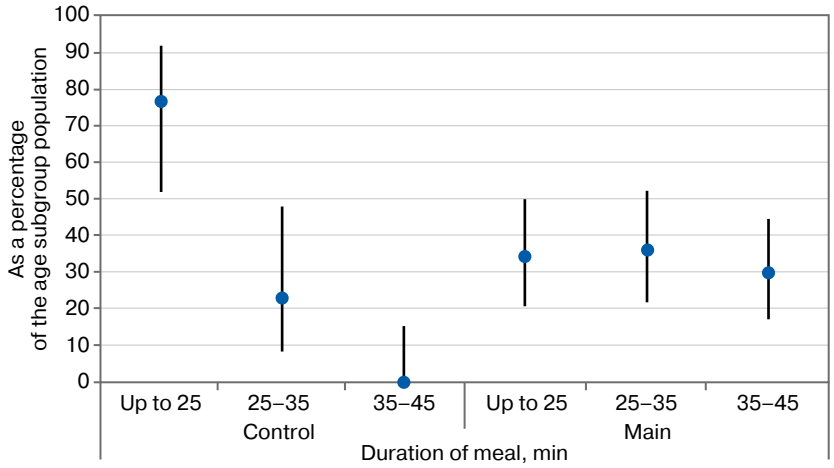

Fig. 7. Meal duration in children aged 5 years 7 months–9 years (older subgroup): comparison of ASD and control groups

Рис. 7. Длительность приема пищи у детей 5 лет 7 месяцев–9 лет (старшая подгруппа): сравнение группы с РАС и контрольной группы

Table 5. Composite score and distribution of binary indicators of disordered eating in children aged 3–9 years (younger subgroup): comparison of ASD and control groups

Таблица 5. Суммарный показатель и структура бинарных индикаторов нарушений пищевого поведения у детей 3–9 лет (младшая подгруппа): сравнение группы с РАС и контрольной группы

Age of children	Eating behavior (disorders)	Statistical estimates with 95% CI				Fisher's exact test p-value / VS-MPR	Cramér's V coefficient of association	Odds ratio (OR)
		Children with autism		Neurotypical children				
		Person	As a percentage of the group size	Person	As a percentage of the group size			
Younger	No	$_{29}38_{47}$	$_{49}61_{73}$	$_{17}24_{33}$	$_{70}86_{95}$	0.027 / 4.6	0.24	$_{1.2}3.8_{12.3}$
	Present	$_{17}24_{33}$	$_{27}39_{51}$	$_{1}4_{9}$	$_{5}14_{30}$			
	Total	62	100	28	100			
Older	No	$_{25}33_{42}$	$_{42}54_{66}$	$_{14}21_{29}$	$_{63}81_{92}$	0.029 / 4.9	0.25	$_{1.2}3.6_{10.7}$
	Present	$_{20}28_{37}$	$_{34}46_{58}$	$_{2}5_{11}$	$_{8}19_{37}$			
Total		61	100	26	100			

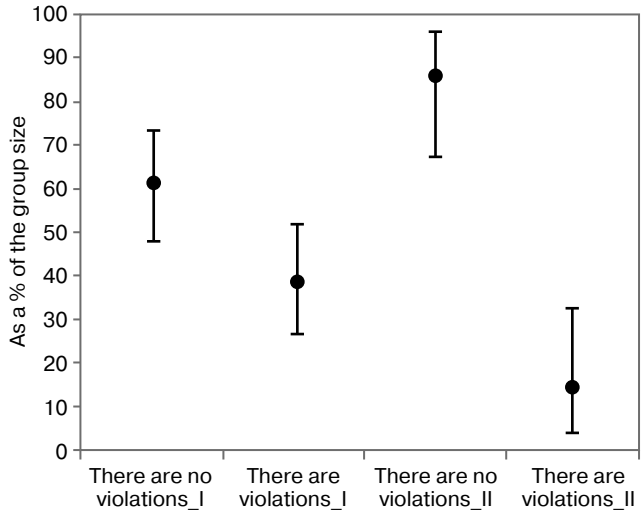

Fig. 8. Distribution of binary indicators of disordered eating in children aged 3–9 years (younger subgroup): comparison of ASD and control groups

Рис. 8. Структура бинарных индикаторов нарушений пищевого поведения у детей 3–9 лет (младшая подгруппа): сравнение группы с РАС и контрольной группы

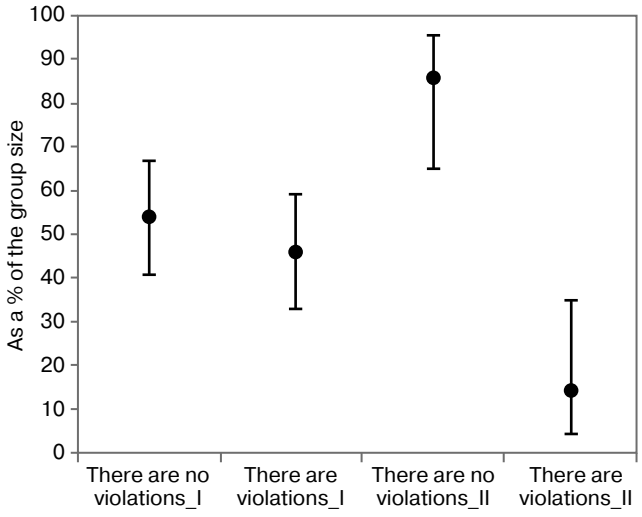

Fig. 9. Distribution of binary indicators of disordered eating in children aged 5 years 7 months–9 years (older subgroup): comparison of ASD and control groups

Рис. 9. Структура бинарных индикаторов нарушений пищевого поведения у детей 5 лет 7 месяцев–9 лет (старшая подгруппа): сравнение группы с РАС и контрольной группы

DISCUSSION

In the present controlled study, it was demonstrated that the profile of feeding behavior and oral motor function in children with ASD differs statistically and clinically from that of neurotypical peers. In the younger subgroup, children with ASD more frequently exhibited 2–3 meals per day, with a lower proportion of four meals per day, less frequent consumption of foods requiring active chewing (including raw fruits), and longer meal durations. The combination of these factors was associated with risks of difficulties in verifying odontogenic pain, variable efficacy of infiltration anesthesia, and low tolerance of operative field isolation.

These differences are interpreted in the context of sensory processing and orofacial motor patterns characteristic of ASD. Prolonged meal duration (⩾35 minutes) and a diet limited to foods not requiring significant masticatory effort likely result in reduced training of masticatory muscles and atypical swallowing patterns, as observed clinically. This aligns with the observed dominance of the infantile swallowing pattern in a significant proportion of participants, especially in the younger subgroup, who demonstrated difficulty following instructions.

In older children, intergroup differences for individual measures were less pronounced; however, the nearly twofold advantage of the control group in the ability to chew solid foods highlights potentially lower predictability of behavioral management and procedure duration in the ASD cohort.

From an endodontic perspective, these findings have several practical implications. First, there is an increased likelihood of false-positive or false-negative interpretation of pain complaints due to sensory and behavioral characteristics, as well as prolonged feeding rituals. This necessitates standardized pre-visit screening (feeding/oral function questionnaire) and expanded clinical testing (including objective cold/electro tests and repeated assessments accounting for communication limitations). Second, the observed variability in infiltration anesthesia efficacy supports the use of anesthetic buffering and alternative techniques (intraligamentary/intraosseous) when predictors of failure are present, as well as earlier planning of nerve block approaches for molar procedures. Third, low tolerance of isolation necessitates gradual introduction of the rubber dam (desensitization, practice with clamp-mannequin, use of soft clamps/frames) and shortened continuous working intervals through micro-breaks.

Additionally, the overall score of feeding behavior impairments in children with ASD was higher (odds ratio ~1.2), with a weak association by V-Cramer, indicating phenotypic heterogeneity and the need for personalized routing before invasive procedures (including preliminary "trial" visits, selection of a sensory-adapted clinical environment, and individualized anesthesia plans). These measures should be combined with structured behavioral management protocols and preparation of parents/caregivers as co-therapists during the visit.

Overall, our findings support the necessity of adapting standard endodontic protocols for children with ASD, from pain assessment and anesthesia planning to selection of isolation methods and behavioral support formats, based on preliminary screening and individualized treatment strategies.

CONCLUSION

1. Children with autism spectrum disorders exhibit a feeding behavior and oral motor profile that differs from that of the control group: longer meal durations, a narrower diet, and less frequent consumption of foods requiring active chewing.

2. The differences are most pronounced in the younger subgroup. In the older subgroup, a deficit in the ability to chew solid foods persists.

3. Sensory processing and motor features in children with ASD are associated with variable efficacy of infiltration anesthesia and reduced tolerance of operative field isolation.

4. For pediatric endodontics, this implies an increased risk of diagnostic errors in pain assessment and highlights the need for standardized pre-visit screening of oral functions.

5. Treatment strategies should include individualized anesthesia planning and gradual desensitization to the rubber dam, with shortened continuous working intervals.

6. These findings support a shift toward personalized protocols for managing children with ASD at the stages of diagnosis, anesthesia, and isolation, potentially improving both tolerance and predictability of endodontic procedures.

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