

Functional constipation frequency in children diagnosed with autism spectrum disorder

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Abstract

In our study, we aimed to determine the frequency of functional constipation in children diagnosed with autism spectrum disorders by child and adolescent psychiatry and mental health. Between September 2017 and September 2018, children with autism spectrum disorder who applied to BakırköySadiKonuk Education and Research Hospital Child and Adolescent Psychiatry Outpatient Clinic were evaluated by means of childhood autism rating scale (CARS). A total of 108 patients were evaluated with the Roman IV criteria and the frequency of functional constipation was investigated. A total of 108 cases, 87% (n = 94) male and 13% (n = 14) female, were studied. The ages of the patients were between 2 and 15 years and the mean age was 6.89 ± 2.76 . Organic constipation was not detected in patients with constipation and all of them were diagnosed as functional constipation. There was no statistically significant difference between the rates of functional constipation in cases according to gender. The incidence of functional constipation in males was significantly higher in patients with severe autism than in those with mild to moderate autism. “Two or fewer defecations in the toilet per week” criteria was found significantly higher in girls than in boys. No significant difference was found for the other five criteria according to gender. Each of the six criteria of the Rome IV criteria were found to be significantly higher in patients with severe autism than those with mild to moderate autism according to CARS scores. One of the Roman IV criteria, “History of large diameter stools that may obstruct the toilet” was found significantly higher in patients aged nine years and older. No significant correlation was found between the other criteria and age groups. All of the six criteria of the Roman IV criteria were significantly higher in cases with severe autism according to CARS, compared to those with mild to moderate autism.

Keywords: Functional constipation, Autism spectrum disorder, CARS.

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Introduction

Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder that requires regular follow-up by child and adolescent psychiatry and child health and diseases specialists. It is reported that many medical conditions such as epilepsy and gastrointestinal problems are seen more frequently in patients with ASD, as well as other comorbid psychiatric disorders (Lever, A. G., et al., 2016). Some recent studies draw attention to the frequency of functional constipation in these patients, where selective and irregular nutrition is common (Volkert, V. M., et al., 2010).

Functional constipation is a type of constipation diagnosed by Roman IV criteria, without alarm symptoms and any underlying structural or biochemical causes. For children and adolescents with developmental age of four years or older, functional constipation is defined by the presence of at least two of the following symptoms occurring at least once per week for at least one month, which are not explained by another medical condition; 1) Two or fewer defecations per week, 2) At least one episode of fecal

incontinence per week, 3) History of retentive posturing or excessive volitional stool retention (stool withholding), 4) History of painful or hard bowel movements, 5) Presence of a large fecal mass in the rectum, 6) History of large-diameter stools that may obstruct the toilet (Rasquin A. et al., 2006).

The number and character of defecation in the pediatric age group are different depending on age, diet type and environmental factors. Appropriate defecation number and character is one of the indicators of being healthy and constipation is a very common defecation disorder in the pediatric age group. Rare and painful defecation causing distress for the family and patient is called constipation. While constipation can be a harbinger of a serious organic disorder in the neonatal period, functional constipation is much more common in older children.

In this study, it was aimed to investigate the frequency of the functional constipation and its relationship with sociodemographic and clinical variables in pediatric patients between the ages of 4-15 who are diagnosed with ASD. Our hypothesis was that the diagnosis of functional constipation is common in ASD, which has a complex genetic etiology, and is more common in male cases and those with higher ASD disease severity.

Method

A total of 108 patients with ASD who applied to the Pediatric Gastroenterology Hepatology and Nutrition Outpatient Clinic OF Bakırköy Dr. Sadi Konuk Research Hospital between September 2017 and September 2018 were included in the study. The diagnosis of all patients who were referred from the child and adolescent psychiatry outpatient clinic was made by the relevant specialist according to DSM-5 diagnostic criteria and the severity of autism (mild-moderate or severe) was determined using CARS. Sociodemographic information of the participants such as height-weight values, age-gender and presence of constipation were noted. Patients with constipation were evaluated according to the Rome IV criteria.

To eliminate the underlying organic causes in patients, late meconium discharge, abdominal distention, neurological signs, empty rectum in the rectal touch, gushing defecation in the rectal touch, too tight or too loose anal tone, increased hair growth or pigmentation in the sacral region, presence of sacral dimple, Down syndrome, anal stenosis, imperforate anus, anticholinergic drug use, history of diabetes mellitus, connective tissue disease, anorexia nervosa were questioned and the data were recorded in the data collection.

Name - Last Name
 Age
 Gender
 Weight Z score
 Height Z score
 Late meconium discharge
 Abdominal distention
 Neurological signs
 Empty rectum in the rectal touch
 Gushing defecation in the rectal touch
 Questioning stool retention behavior
 too tight or too loose anal tone
 increased hair growth or pigmentation in the sacral region
 Down syndrome
 Spinal cord defects
 Anal stenosis, imperforate anus
 Anticholinergic drug use
 Diabetes mellitus
 Connective tissue disease
 Anorexia nervosa

For children and adolescents with developmental age of four years or older, functional constipation is defined by the presence of at least two of the following symptoms occurring at least once per week for at least one month, which are not explained by another medical condition; 1) Two or fewer defecations per week, 2) At least one episode of fecal incontinence per week, 3) History of retentive posturing or excessive

volitional stool retention (stool withholding), 4) History of painful or hard bowel movements, 5) Presence of a large fecal mass in the rectum, 6) History of large-diameter stools that may obstruct the toilet

NCSS (Number Cruncher Statistical System) 2007 (Kaysville, Utah, USA) program was used for statistical analysis. Descriptive statistical methods (mean, standard deviation, median, frequency, percentage, minimum, maximum) were used when evaluating the study data. The suitability of the quantitative data to normal distribution was tested by Shapiro-Wilk test and graphical examinations. Independent groups t test was used for the comparison of the quantitative variables with normal distribution and Mann-Whitney U test was used for the comparison of the quantitative variables with no normal distribution between the two groups. Pearson chi-square test and Fisher's exact test were used to compare qualitative data. Statistical significance was accepted as $p < 0.05$.

Childhood Autism Rating Scale

It is a likert-type scale based on observation of behaviors, consisting of 15 items and each item is evaluated between 1 and 4 points. Children's relations with other people, body and object use, adaptation to change, verbal and non-verbal communication and imitation skills, sensory features, fears and activity levels are scored by professionals. According to CARS scoring, those with 37-60 score are the severe ASD, those with 30-36.5 score are the mild-moderate ASD group, and those with 15-29.5 score are the ones without autistic symptoms. The scale was developed by Schopler et al. in 1980. The CARS score has been shown to have high correlation with DSM-III and DSM-III-R and is thought to be highly correlated with DSM-IV. Although there is no Turkish validity and reliability study, CARS scoring was used in the studies previously associated with autism in Turkey.

Results and Discussion

There are 87% (n=94) of the participants were boys and 13% (n=14) were girls. The ages of the patients who participated in the study ranged between 4 and 15 years and the mean was found to be 6.89 ± 2.76 years. 78.7% (n=85) of the cases were at the age of 8 and below, 21.3% (n=23) of at the age of 9 and above. In 66.7% of the cases, 33.3% of them were mild to moderate severity autism. No significant relationship was found between gender groups and ASD disease severity.

The weight Z scores of the participants in the study ranged between -2.36 and 3.5, with an average of 0.59 ± 1.27 . The height X scores of the participants in the study ranged between -2.98 and 3.16, with an average of 0.65 ± 1.27 . 40.7% of the cases (n = 44) had constipation and as a result of the clinical examinations, organic constipation was not found in any of these patients with complaints of constipation and all were diagnosed with functional constipation.

While the rates of functional constipation were not statistically different in patients by gender ($p = 0.055$; $p > 0.05$), in female cases, the positive rate of the one of the Rome IV criteria "Two or fewer defecations per week" was statistically significantly higher than in male cases ($p = 0.019$; $p < 0.05$).

The rate of diagnosis of functional constipation was similar in age groups. When the frequency of each of the Rome IV criteria was analyzed in age groups, the rate of "large-scale defecation history that would obstruct the toilet" was found to be statistically significantly higher in patients aged 9 years and older than those under 9 years of age (< 0.05). the incidence of other criteria was independent of the age group. (Table 1).

When the cases were analyzed by severity of ASD, the rate of functional constipation was found to be statistically significantly higher in patients with high ASD severity than those with mild-moderate severity ($p=0,001$; $p<0,01$). When analyzed by sex, in male cases, the rate of functional constipation was statistically significantly higher with high ASD severity than in patients with mild-moderate ASD severity. ($p=0,001$; $p<0,01$). In female cases, the presence of functional constipation was not affected by the severity of the disease. ($p>0,05$) (Figure 2).

Table 1 <Evaluation of Functional Constipation Criteria by Age>

Functional Constipation Criteria	Age		Test Value
	≤8 Years	≥9 Years	

(Functional constipation frequency in children ...)

	n (%)	n (%)	p
Two or fewer defecations per week	35 (41,2)	11 (47,8)	$\chi^2:0,327; ^a0,567$
At least one episode of fecal incontinence per week	22 (25,9)	8 (34,8)	$\chi^2:0,715; ^a0,398$
History of retentive posturing or excessive volitional stool retention (stool withholding)	27 (31,8)	8 (34,8)	$\chi^2:0,075; ^a0,784$
History of painful or hard bowel movements	28 (32,9)	9 (39,1)	$\chi^2:0,308; ^a0,579$
Presence of a large fecal mass in the rectum	20 (23,5)	7 (30,4)	$\chi^2:0,460; ^a0,497$
History of large-diameter stools that may obstruct the toilet	20 (23,5)	10 (43,5)	$\chi^2:3,591; ^a0,058$

^aPearson Chi-Square Test

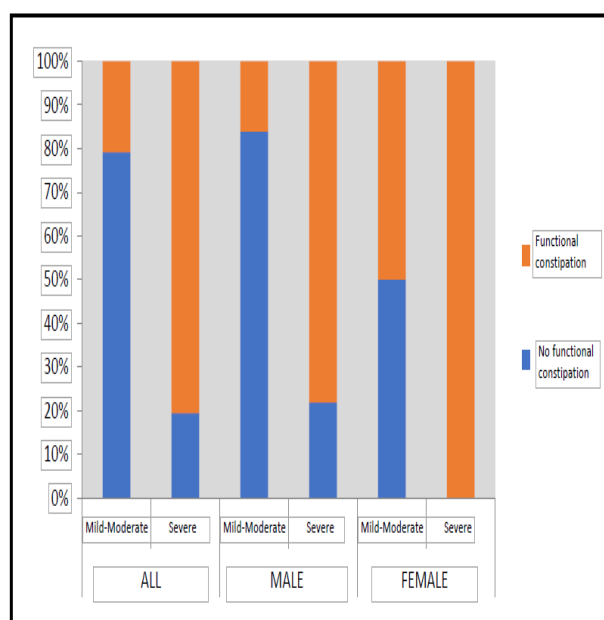


Figure 2 <Presence of Functional Constipation Based on CARS in All Cases and Genders>

In cases with severe ASD, each criterion of functional constipation was found to be statistically significantly higher than those with mild-moderate severity. ($p=0,001$; $p<0,01$). Please look forward to Table 2.

ASD is a life-long, early-onset neurodevelopmental disorder that negatively affects the quality of life of the patient and family and is accompanied by other chronic psychiatric disorders and medical diseases, as well as chronic and repetitive behavior and attention patterns and ongoing limitations in social communication and interaction (Weitlauf A. S., 2014). Functional constipation is a gastrointestinal disorder whose symptoms last at least 1 month under the age of 4 and at least 2 months between the ages of 4-18, without a structural or biochemical cause and without fully meeting the criteria for irritable bowel syndrome. Patients who suffer functional constipation complain about persistent, difficult, infrequent or incomplete defecation (Rasquin A. et al., 2006). The Rome IV criteria used for diagnosis consist of six items in total.

In many studies, comorbid constipation with different frequency and severity has been shown in children with ASD. Gorrindo et al found that the most common gastrointestinal dysfunction in patients with ASD was functional constipation with 85% in 121 patients-study in 2012 (Gorrindo P. et al., 2012).

Table 2<Evaluation of Functional Constipation Criteria Based on CARS Score>

Functional Constipation	Autism Classification by CARS Score
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Criteria	Mild-Moderate Autism n (%)	Severe Autism n (%)	Test Value P
Two or fewer defecations per week	16 (22,2)	30 (83,3)	χ^2 :36,656; <i>a</i> 0,001**
At least one episode of fecal incontinence per week	9 (12,5)	21 (58,3)	χ^2 :25,131; <i>a</i> 0,001**
History of retentive posturing or excessive volitional stool retention (stool withholding)	13 (18,1)	22 (61,1)	χ^2 :20,311; <i>a</i> 0,001**
History of painful or hard bowel movements	11 (15,3)	26 (72,2)	χ^2 :34,554; <i>a</i> 0,001**
Presence of a large fecal mass in the rectum	7 (9,7)	20 (55,6)	χ^2 :26,889; <i>a</i> 0,001**
History of large-diameter stools that may obstruct the toilet	9 (12,5)	21 (58,3)	χ^2 :25,131; <i>a</i> 0,001**

^aPearson Chi-Square Test

***p*<0,01

Ibrahim et al. (2009) in community-based cohort studies in which they examined the frequency of gastrointestinal diseases in ASD, found that there is no significant relationship between ASD and diarrhea, abdominal bloating, irritability, gastroesophageal reflux, vomiting. However, constipation, nutritional problems and food selectivity are common in ASD. As there are behavioral causes rather than organic causes in the etiology of both constipation and nutritional problems-food selectivity, it is predictable that the frequency of these two clinical conditions in ASD is more frequent than others (7). In another recent study, the frequency of functional constipation in patients with ASD was shown to be 42.5% (8). In another metaanalysis study, in which gastrointestinal symptoms in ASD patients aged 0-18 were investigated, showed that gastrointestinal symptoms were 4 times higher in patients with ASD than those without ASD. According to this study, diarrhea was the most common symptom accompanying ASD, followed by general gastrointestinal complaints, constipation and abdominal pain, respectively (Ibrahim S. H., 2009).

In our study, the frequency of diagnosis of functional constipation was investigated in a total of 108 patients with ASD aged 4-15 years. It was found that 40.7% (n = 44) of all cases had complaints of constipation. This result is compatible with the literature. None of these cases with constipation had any alarm symptoms, drug use, comorbid disease that may cause organic constipation and all of them diagnosed with functional constipation after excluding organic causes.

Relationship of constipation and gender has been investigated in many studies and similar rates in girls and boys were observed (Del Ciampo IRL, 2002; Uğuralp S., 2003). The mean and median prevalence of functional constipation are reported to be 14% and 12%, respectively (Mugie S. M., 2011). Van den Berg et al (2006) stated that incidence of the functional constipation was highest was the age of toilet training (Van Den Berg M. M., 2006). We found that there was no significant relationship between sex and constipation in our study and this result is similar to the literature.

In our study, when the frequency of Rome IV criteria was evaluated separately, we found that 1st criterion in 42.5%, 2nd criterion in 27.7%, 3rd criterion in 32.4%, 4th criterion in 34.2%, 5th criterion in 25%, 6 in 27.7% of cases. The rate of first criteria was higher in girls than in boys. The incidence of the other five criteria did not differ between genders. The reason why gender differences are not obvious may be the low number of our female cases.

When the cases were separated by age groups, the rates of functional constipation did not change with age. However, one of the criteria of Rome IV in the age of 9 years and older, "History of large-diameter stools that may obstruct the toilet" was significantly higher. The reason for this situation may be an increase in the frequency of functional constipation due to increased function loss in the intestinal system with increasing age. Moreover, we think that the difficulties encountered in education in these children can be seen in toilet education as well, and the wrong education at this point may cause permanent results.

In our study, when we evaluated the cases according to the severity of ASD, the diagnosis of functional constipation and each Rome IV criterion were found statistically significantly higher in patients with severe autism. Considering the genders, the rate of the diagnosis of functional constipation in male cases was found to be statistically significantly higher in patients with severe ASD than those with mild-moderate severity. This situation was not observed in female cases. ASD can cause more frequent feeding

problems, nutritional selectivity and behavioral problems in cases of high severity. Another explanation may be that ASD and functional defecation disorders share similar genetic background. ASD is a neurodevelopmental disorder with a complex genetic etiology that occurs with multiple gene-gene and environmental interactions (Constantino J. N., 2015). It is reported that the severity of autism may be associated with increased genetic burden. In the study conducted by Peeters et al., it was thought that more severe ASD presentation may have different and multiple genetic causes (Peeters B., 2019). Increased functional constipation in patients with severe OSD suggests that one of the affected chromosomal regions may be related to the gastrointestinal tract. The fact that we could not show a significant relationship between functional constipation and ASD severity in female cases may be due to the low number of female cases.

Conclusion

In our study, we found that the frequency of functional constipation in children with ASD is 40.7%. Functional constipation rates were similar between genders, while they were associated with ASD severity. In cases with severe ASD, the diagnosis of functional constipation and positivity of each ROMA IV criterion were higher than those with mild-moderate severity. Since these problems negatively affect the quality of life and worsen behavioral problems, it is important to be diagnosed. Considering the existence of this problem while following up these patients who have significant limitation in expressing themselves, can reduce the patient's behavioral problems related to defecation. Therefore, we think that it is important that ASD patients should be followed up by pediatric gastroenterology, hepatology and nutrition physicians, and pediatric health and diseases specialists, as well as child and adolescent psychiatry specialists.

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