Original Article

Clinical and Parental Characteristics of Hospitalization in Children and Adolescents with Autism Spectrum Disorder

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ABSTRACT

Aim: The aim of this study was to compare inpatient and outpatient cases diagnosed with autism spectrum disorder (ASD) and to show which factors were more associated with hospitalization in children and adolescents.

Materials and Methods: We included 85 outpatient and 34 inpatient children and adolescents with ASD. Psychiatric diagnoses were assessed with the K-SADS-PL. Factors relevant to the hospitalization of ASD cases were evaluated with a logistic regression model.

Results: The Childhood Autism Rating Scale scores (p=0.002), comorbid psychopathology (p=0.04), multiple psychotropic medication (p=0.001), and psychopathology of the parents (p<0.001) and siblings (p=0.029) were higher, and the education levels of the mothers (p=0.017) were lower in the inpatient-ASD group. The logistic regression model showed that the psychopathology of the mother (odds ratio=10.293, p<0.001) was associated with psychiatric hospitalization.

Conclusion: It is very important to provide psychiatric and psychosocial support especially to mothers during the inpatient treatment process in addition to outpatient family support.

Keywords: Child and adolescent mental health, neurodevelopmental disorder, autism spectrum disorder, hospitalization, mental health service

Introduction

Autism spectrum disorder (ASD) is a neurodevelopmental disorder characterized by significant difficulties with the social communication and interaction domain, and restricted, repetitive patterns of behaviors, interests and activities (1). It is about 4 times more prevalent among boys than among girls and it is observed in approximately 1 out of 27 boys and 1 out of 114 girls (2). Similar to the increasing prevalence rates, an increase has been reported in psychiatric and non-psychiatric emergency department (ED) visits in children and adolescents with ASD (3,4). Liu et al. (4,5) reported that for adolescents with ASD between the ages of 12 and 21, there were over four times more ED applications than for those without ASD, and prescriptions for two or more classes of psychotropics medication also predicted higher numbers of ED visits. In line with the higher number of ED visits, the rate of hospitalization also increased significantly and this was largely due to psychiatric conditions (6).

Besides the core symptoms of ASD, additional psychiatric diagnoses are also found in the majority of individuals. Leyfer et al. (7) stated that at least one

psychiatric diagnosis was reported in 72% of cases aged between 5 and 17 years with a diagnosis of ASD, and also Simonoff et al. (8) found 70% of children with ASD had a minimum of one comorbid condition. Attention-deficit/hyperactivity disorder (ADHD), anxiety disorders, depression, sleep-wake disorders, obsessive-compulsive disorder (OCD), conduct disorders and bipolar disorder were reported as being common comorbid diagnoses among the ASD population (9-11). While the prevalence of intellectual disability (ID) in children and adolescents with ASD varies according to studies, Maenner et al. (2) reported 33% of cases had ID. In terms of psychotropic medication, children with ASD were nearly 9 times more likely to use psychotherapeutic medications than children without ASD (12).

Approximately 25% of those children and adolescents diagnosed with ASD have a history of psychiatric hospitalization and 11% of the patients diagnosed with ASD have a history of hospitalization in the psychiatry service between the ages of 0-21 years (13,14). Croen et al. (12) reported that children with ASD had 12 times more psychiatric inpatient hospital days than children without ASD. Examining the factors related to hospitalization in children and adolescents with ASD can determine potential intervention points which can reduce the need for the hospitalization of children with ASD (15).

In some studies, the risk of hospitalization was found to be higher in patients with ASD who had aggressive and self-destructive behaviors, late diagnoses, were adopted, or those who had a psychiatric comorbidity such as ADHD, ID, or OCD (15-17). Croen et al. (12) reported that the most common discharge diagnoses for psychiatric hospitalizations were mood disorders, psychotic disorders, and impulse disorders for children with ASD. In a study by Righi et al. (18) comparing outpatients and inpatients with ASD in terms of individual and family characteristics, it was shown that the presence of ID and mood disorders was more common in inpatients.

Knowing the characteristics and risk factors of those patients in need of inpatient treatment is important in order to reduce the need for hospitalization. Also, it may contribute to the development and improvement of the services designed for those patients who need hospitalization. In this study, we aimed firstly to compare outpatient and inpatient children and adolescents diagnosed with ASD in terms of their individual, clinical, and parental characteristics and secondly to investigate those factors associated with hospitalization in Turkey, the bridge between eastern and western cultures. We tested these hypotheses: Are the symptom severity, intellectual functioning, the presence of medical illness, comorbid psychiatric disorders, psychopathology history in the parents of the patients with ASD and polypharmacy in the inpatient ASD group higher than in the outpatient ASD (OP-ASD) group?

Materials and Methods

Participants

All participants were recruited from Ege University Faculty of Medicine Hospital. Children and adolescents with ASD, aged between 4-18 years, who were treated in the Inpatient Service (n=34) and those who were being followed up at the Ege University Faculty of Medicine Hospital (n=85) were included in this study. The files of 338 cases, which included the diagnosis and treatment processes of the patients between 2013-2019, were evaluated for the inpatient ASD (IP-ASD) group by the authors. According to the file records, 34 patients diagnosed with ASD according to the Diagnostic and Statistical Manual of Mental Disorders-5 (DSM-5), and who did not have any other genetic syndromes or chromosome anomalies were selected for inclusion. The parents and participants were verbally informed about the aims of this study, and written informed consent was obtained from the parents in accordance with the Declaration of Helsinki.

For the OP-ASD group, the files of children and adolescents who were followed up with a diagnosis of ASD in the neurodevelopmental disorders outpatient clinic between 2013-2019 were evaluated randomly and they were invited onto this study during their routine polyclinic examinations or by telephone. Of the 124 ASD cases invited, the parents of 85 subjects agreed to participate and were included in this study.

Instruments

Childhood Autism Rating Scale (CARS)

The scale consists of 14 functional areas and a final general category referring to 'degree of autism'. Each item is graded with a half-degree scoring between 1 and 4, based upon the abnormality degree of observed behavior. Scoring of the scale is between 15 and 60. Scores of 30-36 indicate mild to moderate autism and scores above 36 indicate severe autism (19,20).

Schedule for Affective Disorders and Schizophrenia for School Aged Children, Present and Lifetime Version (K-SADS-PL)

K-SADS-PL is a semi-structured interview form to diagnose psychopathologies in children and adolescents according to DSM-5-TR criteria (21,22).

Wechsler Intelligence Scale for Children-Revised Form (WISC-R)

WISC-R, developed by Wechsler (23) in 1949, was revised in 1974 and became applicable to children between 6 and 16 years of age. Standardization and norms were adapted for the Turkish sample (24).

Ankara Developmental Screening Inventory (ADSI)

ADSI was developed to assess the developmental levels of Turkish children (25). It is administered to the caregiver and consists of 154 items for the assessment and evaluation of language, cognitive, fine and gross motor, communicative, social and self-care skills in children aged between 0 and 6 years.

Case Report Form

This form was composed by the authors in order to record the demographic, clinical and parental characteristics of the participants.

Assessment

The diagnostic ASD evaluation and interview of the cases were completed according to a form that was developed based on DSM-5 criteria (1). The OP-ASD group, firstly, were evaluated during their routine clinic examination, including an observation of the children via DSM-5 and an observation of the children in a playroom. Secondly, the diagnoses of the cases were re-evaluated by two of the authors with 20 years of experience in the diagnosis and follow-up of ASD, and the diagnoses were confirmed.

The IP-ASD group were diagnosed according to DSM-5 diagnostic criteria. The parents of 34 patients who met the study criteria were contacted and their files were examined after informed consent was obtained. The sociodemographic and clinical characteristics of the patients were reviewed from the patients' files. CARS, K-SADS, WISC-R, and ADSI results, which were determined during hospitalization, were obtained from the files. Diagnosis was also confirmed by two of the authors.

The presence of psychiatric disorders and/or psychopharmacological agent use was considered as a factor for the presence of psychopathology in the family. Sports participation status such as doing gymnastic exercises, bike riding, swimming, walking, or running were investigated and included if they were performing any of these activities regularly for at least 30 minutes.

Statistical Analysis

The Statistical Package for Social Sciences (version 25.0) was used for the statistical analysis. The distribution of quantitative variables was evaluated by the Kolmogorov-Smirnov test. Statistics of quantitative variables are shown as the median (25th to 75th percentile), and the groups were compared with the Mann-Whitney U test if not normally distributed. Descriptive statistics of these variables are expressed as a frequency. Categorical variables are given as number and percentage, and chi-squared analyses were carried out. The binary logistic regression model was used to evaluate the contribution to the likelihood of hospitalization. All statistical significance was set at $p<0.05$.

Results

Sample Characteristics

The sample of this study consisted of 119 (n=85 in OP-ASD; n=34 in IP-ASD) cases. The individual, educational and familial characteristics of the groups are presented in Table I and Table II. The presence of psychopathology

Table I. Individual and educational characteristics of outpatient and inpatient ASD groups

	Outpatient ASD (n=85)	Inpatient ASD (n=34)	Statistic
Gender n (%) Female Male	 15 (17.6) 70 (82.4)	 7 (20.6) 27 (79.4)	χ^2: 0.139 df: 1 p=0.709
Age (median score)	12 (10-15)	12.5 (9-15)	*Z: -0.804 p value=0.421
Education status n (%) Formal education Special-education class No education	 46 (54.1) 30 (35.3) 9 (10.6)	 19 (55.9) 7 (20.6) 8 (23.5)	χ^2: 4.550 df: 2 p=0.103

Table I. Continued

	Outpatient ASD (n=85)	Inpatient ASD (n=34)	Statistic
Special education n (%)	73 (85.9%)	29 (85.3%)	χ^2: 0.007 df: 2 p=0.934
Intellectual/developmental functioning n (%) Normal Border Mild Moderate Severe	24 (28.2%) 3 (3.5%) 18 (21.2%) 17 (20%) 23 (27.1%)	7 (20.6%) 1 (2.9%) 18 (52.9%) 5 (14.7%) 3 (8.8%)	χ^2: 12.734 df: 4 **p=0.013**

χ^2: Comparison of categorical variables was checked using chi-square analysis. *Mann-Whitney U test, bold value mark statistically significant differences.
ASD: Autism spectrum disorder

Table II. Familial characteristics of the outpatient and inpatient ASD groups

	Outpatient ASD (n=85)	Inpatient ASD (n=34)	Statistic
Mothers' age (median, min-max)	40 (37-43)	38.5 (35-46)	*Z: -0.197 p=0.844
Mothers' education years (median, min-max)	11 (0-15)	8 (0-15)	*Z: -2.394 **p=0.017**
Mother's employment n (%) Unemployed Working	61 (71.8) 24 (28.2)	22 (64.7) 12 (35.3)	χ^2: 3.463 df: 4 p=0.484
Mother's psychiatric disorder n (%)	8 (9)	21 (61.8)	χ^2: 36.115 df: 0 **p<0.001**
Father's age (median, min-max)	45 (40.5-49)	44 (38.75-51.25)	*Z: -0.259 p=0.795
Fathers' education years (median, min-max)	11 (0-15)	11 (0-15)	*Z: -0.304 p=0.761
Father's employment n (%) Unemployed Working	2 (2.4) 83 (97.6)	0 34 (100)	χ^2: 11.028 df: 5 p=0.51
Father's psychiatric disorder n (%)	2 (2.4)	8 (23.5)	χ^2: 14.149 df: 0 **p<0.001**
Sibling's psychiatric disorder n (%)	9 (10.6)	9 (26.5)	χ^2: 4.772 df: 1 **p=0.029**

χ^2: Comparison of categorical variables was checked using chi-square analysis, *Mann-Whitney U test, bold values mark statistically significant differences.
ASD: Autism spectrum disorder, min-max: Minimum-maximum

in the family was significantly higher in the IP-ASD group (mother psychopathology: χ^2=36.115; df=1; p<0.001, father psychopathology: χ^2=14.149; df=1; p<0.001, sibling psychopathology: χ^2=4.772; df=1; p=0.029) than in the OP-ASD group.

The rate of comorbid psychopathology was significantly higher in the IP-ASD group (χ^2=8.238; df=1; p=0.004). When we compared the CARS scores, the CARS median value was 36 (27.75-45) in the OP-ASD group, and it was 44 (35.75-52) in the IP-ASD group (Z score=-3.143, p=0.002).

The comparison of clinical characteristics is presented in Table III.

Logistic Regression

The factors associated with hospitalization of ASD cases were demonstrated with the binary logistic regression analysis model (Table IV). The presence of psychopathology in the mother was found to be the factor which was associated with hospitalization (OR=10.293, p<0.001).

Table III. Comparison of clinical characteristics between the groups

	Outpatient ASD (n=85)	Inpatient ASD (n=34)	Statistic
Comorbid psychopathology n (%)	59 (69.4)	32 (94.1)	
ADHD	51 (60)	20 (58.8)	
ADs	10 (11.8)	1 (2.9)	
OCD	3 (3.5)	2 (5.9)	χ^2: 8.238 df: 1
Conduct disorder	6 (7.1)	5 (14.7)	**p=0.04**
MDD	2 (2.4)	2 (5.9)	
BPD	1 (1.2)	2 (5.9)	
Psychotic disorder	0	2 (5.9)	
Psychotropic medication use n (%)			
Atypical antipsychotic	64 (75.3)	34 (100)	
Risperidone	35 (41.2)	23 (67.6)	
Olanzapine	5 (5.9)	6 (17.6)	
Aripiprazole	23 (27.1)	15 (44.1)	
Quetiapine	1 (1.2)	3 (8.8)	
Clozapine	0	1 (2.9)	
Typical antipsychotics	6 (7.1)	12 (35.3)	
SSRIs			
Escitalopram	2 (2.4)	9 (26.5)	χ^2: 10.200 df: 1
Sertraline	8 (9.4)	3 (8.8)	**p=0.01**
Fluoxetine	4 (4.7)	1 (2.9)	
Fluvoxamine	0	1 (2.9)	
Stimulants	23 (27.1)	8 (23.5)	
Atomoxetine	10 (11.8)	9 (26.5)	
Mood stabilizer	2 (2.4)	12 (35.3)	
Benzodiazepines	0	14 (41.2)	
Anticholinergic	1 (1.2)	8 (23.5)	
Melatonin	1 (1.2)	4 (11.8)	
Number of drugs used n (%)			
No drug used	21 (24.8)	0	
Single drug used	24 (28.2)	2 (5.9)	*Z: -6.915
Dual drug used	28 (32.9)	1 (2.9)	**p value: <0.001**
Use of three or more drugs	12 (14.1)	31 (91.2)	
Medical comorbidity n (%)	13 (15.3)	8 (23.5)	χ^2: 1.133 df: 1 p=0.287
Exercising regularly n (%)	33 (38.8)	4 (11.8)	χ^2: 8.299 df: 1 **p=0.04**
CARS groups n (%)			
15-29	23 (27.1)	4 (11.8)	
30-36	24 (28.2)	7 (20.6)	χ^2: 5.542 df: 2 p=0.063
37-60	38 (44.7)	23 (67.6)	
CARS score (median, min-max)	36 (27.75-45)	44 (35.75-52)	*Z: -3.143 **p=0.002**

χ^2: Comparison of categorical variables was checked using chi-square analysis, *Mann-Whitney U test, p: p value, bold values mark statistically significant differences.
ADHD: Attention-deficit/hyperactivity disorder, ADs: Anxiety disorders, OCD: Obsessive-compulsive disorder, MDD: Major depressive disorder, BD: Bipolar disorder, CARS: Childhood Autism Rating Scale, SSRIs: Selective serotonin reuptake inhibitors, min-max: Minimum-maximum

Table IV. Results of binary logistic regression model showing the likelihood of psychiatric hospitalization and relationship between associated factors

	β	OR	95% CI	p value
Comorbid psychiatric disorder	1.497	4.467	0.686-29.077	0.117
Presence of mild intellectual disability	-0.454	0.635	0.176-2.289	0.488
Psychopathology of the mother	2.332	10.293	3.479-30.452	<0.001
Psychopathology of the father	1.640	5.155	0.848-31.356	0.075
Psychopathology of the sibling	0.859	2.362	0.657-8.490	0.188

β: Estimate, OR: Odds ratio, CI: Confidence interval

Discussion

In this study, the OP-ASD group and the IP-ASD group were compared in terms of their individual, familial and clinical characteristics. According to the findings, although there was no significant difference between the age, gender, and educational status of the cases, it was observed that mild intellectual functioning was more associated with the hospitalization of patients with ASD. The rate of individual and familial psychopathology and medication usage of the inpatients was higher. Also, it was observed that the presence of psychopathology in the mother was a factor associated with hospitalization. Although there was no significant difference between the groups in terms of the presence of medical illness and participation in special education, it was observed that a history of participation in sports was higher in the OP-ASD group. In addition, when the two groups were compared in terms of the severity of their autism, it was determined that the autism severity scores of the IP-ASD group were higher than the OP-ASD group.

Symptom Severity and Comorbid Psychopathology of ASD Cases

The CARS scores of the IP-ASD group were found to be significantly higher. We thought that greater ASD severity necessitates intensive medical and hospitalization support, such as intensive and frequent school support (26). Taylor et al. (27) compared patients with ASD hospitalized in specialized and general psychiatry services using the Aberrant Behavior Checklist (ABC) and the ABC scores were found to be significantly higher in the specialized psychiatry service before hospitalization. Jang and Matson (28) showed that more severe symptoms of ASD were associated with more severe comorbid psychopathology. In our study, comorbid psychopathology, CARS scores and multiple psychotropic medication use were found to be significantly higher in the inpatient group.

In our study, comorbid psychopathology rates were significantly higher in the IP-ASD group than the OP-ASD group (94.1% vs 69.4%). Comorbid psychopathology diagnosis groups and rates in the OP-ASD group were consistent with literature (7-11). Righi et al. (18) reported that mood disorders and sleep problems were found to be higher in the inpatient group and showed that the presence of a mood disorder was the strongest predictor of hospitalization. In accordance with the literature, comorbid psychopathology was found to be significantly higher and mood disorders, psychotic disorder and conduct disorder were more common in the IP-ASD group. In our study, the

use of psychotropic drugs was also found to be significantly higher in the inpatient group and this was also consistent with the literature findings (15,28). The symptom severity and higher comorbid psychopathology rates could have increased the medication rates. In line with our results, Mayes et al. (29) stated that more severely impaired children were more often medicated regardless of diagnosis. Additionally, many studies including cases with ASD have shown that psychotropic medication use increased with the presence of comorbid conditions such as ADHD, mood disorders, conduct disorders, aggression and ID (15,30,31).

In studies investigating risk factors associated with hospitalization in ASD, accompanying ID was found to be higher in the inpatient group (15,18). The accompanying severe ID in the OP-ASD group may lead to receiving diagnosis earlier. Children diagnosed with an ID were diagnosed with ASD 23 months earlier, and earlier diagnosis leads to accurate earlier intervention increasing adaptive functioning, decreasing challenging behaviors and is associated with more effective outcomes (32,33). As stated, ASD severity was lower in the OP-ASD group. These factors may be associated with hospitalization, in addition to the small sample size of the IP-ASD group.

This study detected that medical comorbidities did not differ significantly between the groups. In a study conducted by Righi et al. (18), the inpatient and outpatient groups were compared in terms of sleep problems, seizure history, dental problems, endocrine problems and gastrointestinal problems. In their study, the presence of sleep problems was found to be a predictor for hospitalization, but no significant difference was found in terms of the other factors. Similarly, there was no relationship between medical comorbidities and psychiatric hospitalization in our study. Also, regular participation in sports was found to be lower in the IP-ASD group. It can be said that participation and adaptation of sport activities were difficult due to the higher severity of ASD, and comorbid psychopathology in the IP-ASD group. There are also publications reporting a decrease in behavioral problems of those who can continue to exercise regularly (34,35).

Psychopathology of Parents

In the literature, many factors related to the hospitalization of children and adolescents diagnosed with ASD have been discussed, but there is no study investigating parental psychopathology and education levels. It is known that neurological and psychiatric diseases are more common in those families of children and adolescents diagnosed with ASD (36). Parental psychopathology is also known to be

a risk factor for psychiatric morbidity in children (37). In addition, in a study comparing adolescents between the ages of 13 and 17 in terms of their hospitalization history, it was shown that the presence of psychopathology in the mother was higher in adolescents with a hospitalization history, regardless of ASD diagnosis (38). However, the parents of children with ASD often endure more stressors than the caregivers of typically developing children, and so are at risk of experiencing increased risks for mental health problems (39-41). The level of parental stress is associated with child irritability, and the severity of the child's behavioral problems may predict psychopathology in the parents (42,43). In our opinion, this relationship can be bi-directional. The psychopathology and low education of mothers may affect ability to cope with the difficulties and find solutions for those children with neurodevelopmental difficulties. This may lead to the need for hospitalization in this group with high rates of psychiatric comorbidity. Although studies report different results, the importance of the parents' psychoeducation and participation in the treatment of ASD youth is mentioned (44,45). It is clear that the well-being and mental health of the parents are considerably important. Therefore, creating treatment models which include psychosocial support systems and providing consultancy services to families for preventive healthcare would be beneficial in the treatment of children and adolescents with ASD in order to reduce the risk of hospitalization, especially in developing countries.

Study Limitations

Similar to increasing prevalence rates, an increase has been reported in psychiatric hospitalization in children with ASD, but studies on the relevant factors associated with hospitalization are limited. The small sample size of IP-ASD cases is a limitation and restricts the generalizability of our data. Also, being based on self-report may mean that our results are subject to response bias. However, this was the first study from Turkey on IP-ASD cases. Therefore, studies with more cases are needed. In addition, the findings would be stronger if structured psychiatric interviews had been carried out with the parents.

Conclusion

The need for studies assessing individual characteristics such as disease severity, comorbid psychiatric disorders and medical illnesses, medication profiles, intellectual functioning, and education level, alongside familial factors such as psychopathology in siblings and parents, as well as parental age, has been reiterated in the literature concerning hospitalization in patients with ASD from various perspectives. Knowing which factors accompany those patients who are more associated with hospitalization may provide useful preliminary data to clinicians and mental health professionals. As the practice parameters of the American Academy of Child and Adolescent Psychiatry stated, the clinician should maintain an active role in the long-term treatment planning and as part of this long-term engagement, the parents and siblings of children with ASD will need support in addition to the support for the individual with ASD (46). In addition to outpatient family support, as the mother's well-being may be related to the severity of ASD in the child, we thought that it is also very important to have a team providing psychosocial support especially to the mothers during the treatment process.

Ethics

Ethics Committee Approval: Ethics committee approval was obtained from the Ege University Faculty of Medicine Clinical Research Ethics Committee (approval no: 20-7.1T/13, date: 22.07.2020).

Informed Consent: Parents and participants were verbally informed on the aim of the study, and written informed consent was obtained from parents in accordance with the Declaration of Helsinki.

Peer-review: Externally and internally peer-reviewed.

Authorship Contributions

Concept: S.K., N.D., İ.B., B.Ü., E.T., Design: S.K., N.D., İ.B., B.Ü., E.T., Data Collection or Processing: S.K., N.D., İ.B., B.Ü., E.T., Analysis or Interpretation: S.K., N.D., İ.B., B.Ü., E.T., Literature Search: S.K., B.O., N.D., İ.B., Writing: S.K., B.O., N.D., İ.B., B.Ü., E.T.

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