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Comorbid Psychiatric Disorders in Children and Adolescents with Down Syndrome: A Retrospective Study

Down Sendromlu Çocuk ve Ergenlerde Eşlik Eden Psikiyatrik Bozukluklar; Retrospektif Bir Çalışma

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Abstract: Down syndrome is one of the most common chromosomal abnormalities accompanied by intellectual disability. However, limited information is available regarding the psychiatric diagnoses and follow-ups of children with Down syndrome, except for intellectual disability. This study aimed to investigate the data on degrees intellectual disability, comorbid psychiatric diagnoses, treatment, and clinical follow-ups of children with Down syndrome. This study was conducted with cases who applied to our hospital between January 2016 and December 2023, were under the age of 18 and diagnosed with Down syndrome. Sociodemographic, comorbid psychiatric and medical diagnosis, and treatment data of a total of 181 cases were retrospectively analyzed. A total of 181 individuals (102 males and 79 females) with Down syndrome were included in the study. When the cases were classified based on their intellectual disability levels, it was found that mild intellectual disability was the most common. 58% of the cases had at least one medical comorbidity, and 22.4% had a psychiatric comorbidity. It was found that the most frequently diagnosed comorbid psychiatric disorder was Attention Deficit Hyperactivity Disorder, and comorbid psychiatric disorders were not associated with gender or degrees intellectual disability.It was observed that hospital applications of individuals diagnosed with Down syndrome were through health board reports. It was determined that outpatient clinic applications for comorbid psychiatric disorders and treatments, other than intellectual disability, were low. As a result, it is recommended to develop health policies that ensure psychiatric follow-ups of individuals with Down syndrome to ensure their positive gains in later life.
Keywords: Adolescent, Child, Down syndrome, Intellectual disability

Özet: Down Sendromu zihinsel yetersizliğin eşlik ettiği en yaygın kromozomal anormalliklerden biridir. Ancak Down Sendromlu çocukların zihinsel yetersizlik dışında psikiyatrik tanı ve takipleri hakkında bilinenler kısıtlıdır. Bu çalışmada Down sendromlu çocukların zihinsel yetersizlik düzeyleri, komorbid psikiyatrik tanıları, tedavi ve klinik izlemlerine dair verilerin incelenmesi amaçlanmıştır. Bu çalışma Ocak 2016 ve Aralık 2023 tarihleri arasında hastanemize başvurusu olan, Down Sendromu tanısı almış 18 yaş altı olgularla yapılmıştır. Toplam 181 olgunun sosyodemografik verileri, komorbid psikiyatrik ve tıbbi tanı ve tedavi verileri geriye dönük olarak incelenmiştir. Çalışmaya toplam 102'si erkek (%56,4) olmak üzere 181 Down Sendromlu birey dahil edilmiştir. Olgularda zihinsel yetersizlik düzeylerine göre sınıflandırıldığında en sık hafif düzeyde zihinsel yetersizliğin görüldüğü bulunmuştur. Olguların %58 'ine en az bir tıbbi komorbidite, %22, 4'ünde ise psikiyatrik komorbidite bulunmuştur. En sık eşlik eden psikiyatrik tanının Dikkat Eksikliği Hiperaktivite Bozukluğu tanısı olduğu ve eşlik eden psikiyatrik bozukluk tanısının cinsiyet, zihinsel yetersizlik düzeyleri ile ilişkili olmadığı bulunmuştur. Down Sendromu tanılı bireylerin hastane başvurularının sağlık kurulu raporları üzerinden olduğu görülmüştür. Zihinsel yetersizlik dışındaki komorbid psikiyatrik bozukluklar ve tedaviler için poliklinik başvurularının az olduğu saptanmıştır. Sonuç olarak; Down sendromlu bireylerin ileri yaşlardaki olumlu kazanımlarını sağlamak amacıyla psikiyatrik takiplerini sağlayan sağlık politikaları geliştirilmesi önerilmektedir.
Anahtar Kelimeler: Çocuk, Down Sendromu, Ergen, Zihinsel yetersizlik

Ethics Committee Approval: The study was approved by Recep Tayyip Erdoğan University Noninterventional Clinical Research Ethical Committee (Decision no: 2024/32, Date: 08.02.2024).

Informed Consent: The authors declared that it was not considered necessary to get consent from the patients because the study was a retrospective data analysis.

Authorship Contributions

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1. Introduction

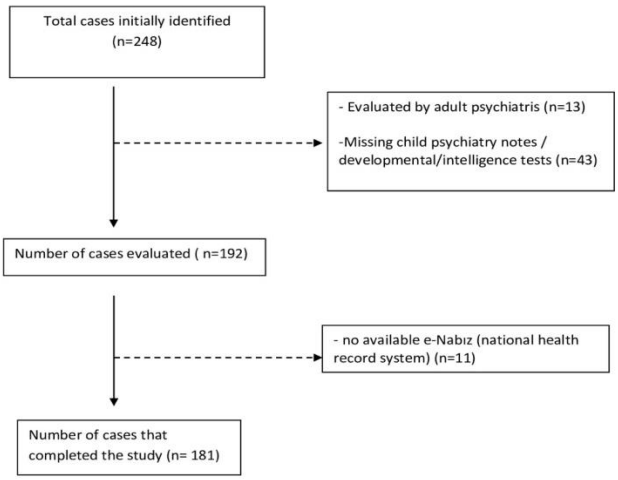
Down syndrome (DS) is the most common genetic cause of intellectual disability (ID) and it occurs due to the trisomy of chromosome 21 (1). Its worldwide prevalence is reported as approximately one in 800 live births (1). The genetic impairments associated with DS lead to problems related to increased comorbid medical conditions including craniofacial dysmorphic features as well as a range of neurological disorders, congenital heart diseases, endocrine disorders, and increased risk of infections (2). Individuals with DS experience impairments and difficulties in various developmental areas, particularly communication and comprehension skills, behavior and self-regulation, motor development, cognition, and attention (3,4). In addition to limitations in social and societal skills, these problems can lead to more frequent emotional and behavioral problems in individuals with DS (5,6). Furthermore, it has been reported that the achievements and difficulties experienced by these individuals, including the degree of ID, vary considerably within the population depending on the level of genetic impairment, and disorders and experienced difficulties increase with age (3,4). It has been revealed that the prevalence of psychiatric disorders seen in DS is higher than in the normal population, and when compared with other cases with ID, there are again some differences in the prevalence and severity of the disorders (3,4,7). In a study focusing on the frequency of psychiatric disorders in individuals with DS, it was reported that 8-23% of children with DS had a significant psychopathology (7). Another study found that 20-40% of children with DS had comorbid behavioral problems (8).

In the study conducted by Nærland et al. involving 674 children and adolescents diagnosed with Down syndrome (DS), it was reported that externalizing problems were most prevalent during the preschool period, with their rates decreasing with age, while internalizing problems increased with the onset of adolescence (9). In a smaller cross-sectional study conducted by Marino et al., the distribution and onset age of psychopathological risks were examined in a smaller sample of children with DS. It was found that 94% of the cases carried specific psychopathological risk factors, with externalizing problems such as Attention Deficit Hyperactivity Disorder (ADHD) and Oppositional Defiant Disorder (ODD) being more common in children, and internalizing problems such as anxiety and depression increasing during adolescence (10). Other studies conducted with children and adolescents with DS have also explored the prevalence of comorbid ADHD (11, 12) and Autism Spectrum Disorder (ASD) diagnoses (13) and externalizing problems (14,15); however, the number of such studies remains relatively limited.

Despite being the most common genetic disorder and the growing research interest in recent years, knowledge regarding the epidemiology, clinical presentation, and treatment approaches of psychiatric comorbidities in children and adolescents with Down syndrome (DS) remains limited. At the outset of our study, it was assumed that psychiatric referrals to child and adolescent psychiatry outpatient clinics were insufficient during the cognitive assessments of children with DS conducted within the scope of health board evaluations. This insufficiency may lead to delays in the diagnosis and treatment of psychiatric conditions in this population. In this context, our study aimed to examine the mode of referral, clinical follow-up, and treatment processes of patients aged 0–18 years in order to identify psychiatric comorbidities associated with DS. We believe that the findings obtained from this study will provide valuable data on the prevalence and treatment of comorbid psychiatric diagnoses in children and adolescents with DS and may serve as a foundation for future multi-center studies with larger sample sizes.

2. Materials and Methods

This study included cases who applied to Recep Tayyip Erdogan University Rize Training and Research Hospital between January 2016 and December 2023, were under the age of 18, and received a DS diagnosis with Q90.0, Q90.1, Q90.2, and Q90.9 ICD-10(International Classification of Disease-10) codes. The file data of the cases were retrospectively examined through the Hospital Information Recording System. The study initially included 248 cases; after excluding 67 cases, the final analysis comprised 181 cases (Figure 1).



Şekil 1.Flow chart of patient presented

The examined data of the cases included their ages, genders, comorbid pathologies with DS, ongoing treatments, applications for health board reports (Special Needs Report for Children as of 2019), their ages at the time of the first report, applications to the child psychiatry outpatient clinic, ages at the first application to psychiatric clinic, follow-ups, whether or not they had a diagnosis of intellectual disability as a result of psychiatric evaluation and its level, comorbid psychiatric disorders, and medication treatments used if any. The intellectual disability degree and psychiatric diagnoses of the cases were obtained from the child psychiatry's examination notes. Diagnoses were by re-evaluating patient anamnesis according to Diagnostic and Statistical Manual of Mental Disorders (DSM) criteria. The results were recorded in detail on data recording forms prepared by the researchers. The approval of the ethics committee of the Institution was obtained for the study (Ethics committee date: 08.02.2024; decision no: 2024/32). All procedures involving human participants in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later versions.

3.1. Statistical Analysis

The Statistical Package for the Social Sciences (SPSS, Chicago, IL, USA, version 29.0) software was used for data analysis. Proportional data are presented as percentages, normally distributed data as mean ± standard deviation, and non-normally distributed data as median (minimum-maximum). The normality of data distribution was determined by the Kolmogorov-Smirnov test. The chi-square test was used to compare categorical data between groups. A p-value of <0.05 was considered statistically significant.

3.Results

It was determined that 56.4% (n=102) of the children were male and 43.6% (n=79) were female. The mean age at which cases first applied to the child psychiatry outpatient clinic was found to be 31.6 ± 35.7 months. When the nature of the applications was evaluated, it was determined that the most common reason for application was for a disability evaluation board application (%74.6, n=135). It was found that only 22.7% (n=41) of the cases applied to the child psychiatry outpatient clinic regularly attended follow-up appointments, while 2.8% (n=5) did not apply to the child psychiatry outpatient clinic at all. In our study, the mean age of cases for disability evaluation board applications was found to be 31.8 ± 36 months (minimum: 1 month / maximum: 115 months). Additionally, it was determined that 37% of the cases (n=65) were under 1 year old at the time of the application for the report.

Excluding psychiatric disorders, the comorbid medical pathologies of the cases were examined, and it was found that they were most frequently accompanied by cardiovascular system pathologies, followed by endocrine and urinary system pathologies, respectively. The distribution of comorbid medical pathologies by system is shown in Table 1. It was determined that 23.8% (n=43) of the cases had continuous medication usage due to their comorbid medical pathologies.

When the data regarding the intellectual disability levels of the cases were evaluated, it was determined that low level intellectual disability was the most

common comorbidity with DS (n=86, 47.5%). In the study, it was determined that 22.1% (n=40) of the cases had at least one psychiatric disorder in addition to ID, and 6.1% (n=11) had at least two different psychiatric disorders in addition to ID. The most common comorbid psychiatric disorder was found to be ADHD, and it was followed by Conduct Disorder (CD) and anxiety disorders, respectively. It was determined that 18.8% (n=34) of the cases received medication for comorbid psychiatric disorders, and 5% of these cases (n=9) used more than one medication. Table 2 shows the distributions of degree ID, comorbid psychiatric disorders and data related to medication treatments.

When the distribution of intellectual disability levels by gender was examined, no statistically significant difference was found between female and male cases (x^2=8.491, p=0.075). When the presence of comorbid psychiatric diagnosis by gender was examined, no statistically significant difference was found between females and males(x^2=0.25, p=0.517).

3.2 . Tables

Table 1. Distribution of medical pathologies comorbid with Down syndrome by different systems

	n	**%**
Comorbid medical pathology	105	58
Cardiovascular System	53	29.3
Endocrine System	30	16.6
Urinary System	10	5.5
Nervous system	9	5
Hearing System	9	5
Gastrointestinal System	7	3.9
Visual System	5	2.8
Skeletal System	3	1.7
Respiratory System	3	1.7
Skin Diseases	2	1.1

n: number of cases, %: percent

Table 2. Data on the degree of intellectual disability, comorbid psychiatric diagnoses, and psychotropic medication use in individuals with Down syndrome

	N	%
Intellectual Disability Degree		
Mild ID	86	47.5

Moderate ID	72	39.8
Severe ID	10	5.5
Borderline ID	8	4.4
Not received diagnosis because of age (age <6 months)	5	2.8
Comorbid Psychiatric Disorder		
ADHD	17	9.4
Conduct Disorder	15	8.3
Anxiety Disorder	9	5
ASD	4	2.2
Stuttering	2	1.1
Enuresis nokturna	2	1.1
OCD	1	0.5
ODD	1	0.5
Psychiatric medication used		
No	147	
Yes	34	
Distribution of psychotropic drugs used		
Antipsychotic	25	13.8
Methylphenidate-Atomoxetine	14	7.7
SSRI	2	1.1
Mood stabilizer	1	0.5

n: number of cases, %: percent, ADHD: Attention Deficiency Hyperactivity Disorder, ASD: Autism Spectrum Disorder, ID: Intellectual Disability, OCD: Obsessive Compulsive Disorder, ODD: Oppositional Defiant Disorder, SSRI: Selective Serotonin Reuptake Inhibitor

4. Discussion

In this study, a retrospective evaluation was conducted on individuals under 18 years of age diagnosed with DS at a tertiary healthcare center. Clinical data regarding comorbid psychiatric disorders, application types of patients, clinical follow-ups, and treatments used were examined. Results showed that the number of male cases was higher, and more than half of the cases had at least one medical pathology in addition to psychiatric disorders. When DS cases were evaluated according to their degree's intellectual disability, mild ID was found to be the most common, and no significant difference was found between genders in terms of ID levels. Approximately one-quarter of the cases had at least one comorbid psychiatric disorder and ADHD was the most common comorbid diagnosis.

The data obtained from the study revealed that the number of male cases was higher. This finding is consistent with the literature showing a higher prevalence of DS among males (2,13,16). In the study, it was determined that 74.7% of the cases were applied to the child psychiatry outpatient clinic through the disability evaluation board, while only 24.7% applied to the child psychiatry outpatient clinic for examination purposes. Similarly, in a study conducted in our country by Efendi et al. on children with DS, it was reported that 62.5% of the patients applied to the child psychiatry outpatient clinic for medical report (17). It was observed that data on psychiatric clinic applications, diagnoses, and follow-up of children with DS in our country is very limited in the literature. Considering this limited but valuable data from two studies conducted in our country, it can be assumed that if there were no individual special education and care fees that necessitate the health board application, a large majority of the cases would not have applied for mental health services (18). Among the underlying reasons for this situation, a primary barrier may be the lack of awareness among families regarding the psychiatric comorbidities that can accompany Down syndrome (DS), as well as the misconception that such issues are simply part of the natural course of DS. Secondly, the absence of routine psychiatric screening protocols for individuals with DS in our healthcare system, along with insufficient referral mechanisms within primary care services, constitutes systemic barriers to early diagnosis and intervention.To address the mental health needs of children with DS, certain interventions can be planned. Based on these findings, first, educational programs and awareness campaigns for families could be organized to increase understanding of psychiatric comorbidities in DS. Secondly, routine psychiatric screening protocols specifically for individuals with DS could be developed within primary care services, and access to child psychiatry consultations could be facilitated. The implementation of these recommendations may play a crucial role in improving the quality of life and supporting the long-term psychosocial functioning of individuals with DS.

The study found that the mean age at first application to the child psychiatry clinic was 31.6 ± 35.7 months, and the mean age at the application to the disability evaluation board was 31.8 ± 36 months. In a study conducted in our country, the mean age of the first psychiatric evaluation for children with DS was found to be 4.16 ± 2.8 years, while the mean age at which patients started individual special education was 20.15 ± 14.24 months. The study revealed that the difference between the age of initial psychiatric outpatient clinic application and the age of starting individual special education was primarily due to the fact that most patients initially sought services from pediatric departments to be eligible for government-funded special education (17). In this study, it was thought that the fact that the vast majority of initial psychiatric evaluations were conducted as a result of disability evaluation board applications explained the similarity between the mean ages of first psychiatric clinic application and disability evaluation board application.

Based on the data obtained in the study, it was found that nearly half of the individuals with DS had mild ID (47.5%), and this was followed by moderate (40%) and severe (5.5%) degrees of ID. In the study conducted by Efendi et al. with 72 children, differing from our results., moderate ID was observed in nearly half of the cases (45.7%), followed by mild ID (32.9%) and severe ID (21.4%) (17). In another study conducted with 16-19-year-old adolescents with DS, it was reported that the degree of ID was moderate in 43% of them, followed by severe (30%) and mild (17%) degrees of ID (19). There are differences in the prevalence of degrees ID between the results obtained from the literature. This situation may be related to the ages of the individuals included in the study and the differences in standardized tests used to assess ID. It is known that cognitive development is slower in individuals with DS compared to their normally developing peers. In addition to the individual variability in the degree of ID in DS, it is emphasized that intellectual development slows down as age increases, and the age at which the level of intellectual disability is assessed is important in this regard (20-22). Moreover, the improvement in healthcare conditions and the increased public awareness of DS have made it possible for individual special education to begin at an earlier age. This may have led to a higher diagnosis rate of mild ID in individuals with DS.

Research findings indicated that 22.1% of cases had at least one psychiatric disorder, and 6.1% had at least two different psychiatric disorders in addition to ID. It is seen that the number of studies on the prevalence of psychiatric disorders in children with DS is fewer compared to adults. In a scale-study conducted by Marino et al. with 97 children and adolescents with DS, it was reported that 94% of the participants had psychopathological risk factors (10). In the study by van Gameren-Oosterom et al.,

513 adolescents were evaluated, and problematic behavioral scale scores were obtained in 51% of the cases (19). Both studies are based on data obtained from scale scores rather than clinically structured assessments. In the study by Efendi et al., a psychiatric disorder diagnosis was found in 56% of cases with DS (17). In conclusion, there are widely varying rates reported across studies for comorbid psychiatric disorders and behavioral problems. It is reported that the fact that the studies were few in number, they were conducted with small sample sizes, and the diagnostic methods used were different may cause fluctuations in the results over wide ranges (23).

The results of this study revealed that ADHD was the most common comorbid psychiatric disorder, and it was observed in 9.4% of cases. In the study by Marino et al. showed that the prevalence of ADHD was 15% (10). Spinazzi et al reported this rate as 9.6% in their retrospective study on children with DS (24). In the study conducted by Startin et al. with DS children under the age of 15, the prevalence of ADHD was reported as 8.6% (2). Another study reported that 15.7% of participants already had an ADHD diagnosis, and the prevalence of ADHD obtained through the scales used in the study was 40.7% (12). Efendi et al. reported an ADHD diagnosis rate of 29.2% (17). In contrast to these results, In two different studies with smaller sample sizes, the ADHD diagnosis rate in children with DS was reported as 44% (11) and 34% (13). The results obtained from the studies report highly variable rates regarding the comorbidity of DS and ADHD. It is thought that these differences may have been due to the age distribution of the samples included in the studies, the use of structured interviews or scale applications as diagnostic methods, and the selection of different geographical region samples. In this study, it is considered that the fact that most of the cases were patients evaluated by a health board, only one-fifth had a child psychiatry appointment, and families had insufficient knowledge about comorbid psychiatric disorders in Down syndrome may have affected our results.

In this study, as an unexpected result, the prevalence rate of ASD was found to be 2.2%. Individuals with DS were characterized as having better social skills compared to individuals with other IDs. On the other hand, ASD is associated with limitations in communication skills in a range of social and societal areas (25). However, previous studies have reported that the prevalence of ASD in individuals with DS can vary between 16% and 42% and that the rate of ASD is higher in DS compared to the general population (25, 26). In the study by Marino et al. reported that in 7% of the cases, the scale scores obtained for ASD were above the clinical cut-off point (10). Spinazzi et al reported the prevalence rate of ASD was reported as 13% (24). This rate was reported as 5.7 % in the study by Startin et al (2). In a study conducted by Efendi et al., this rate was reported as 6.9% (17). The prevalence rates obtained in the literature vary considerably. The results obtained from this study, on the other hand, yielded a much lower value compared to the literature. It is thought that this situation may have been caused by the age group of the cases included in the study and the fact that the clinical appearance of OSB in children with DS is different. Regarding the comorbidity of DS and ASD, it has been reported that ASD diagnosis is made later in children with DS compared to children with only ASD, and that ASD may be more difficult to identify in this population due to the phenotypic social behavior patterns of DS (27, 28). The fact that the ASD frequency data was lower in this study compared to the literature may have been due to the difficulty of diagnosing ASD and the fact that the application rates of cases with DS for psychiatric examination were low outside the disability evaluation board.

In our study, it was found that 5% of the cases were diagnosed with anxiety disorder, but no case was diagnosed with a mood disorder. In the study conducted by Marino et al., in which the diagnosis was made using a scale, it was reported that mood disorders were observed in 9% of the cases and anxiety symptoms were observed in 36% of the cases (10). In the study of Spinnazi et al., the prevalence of depressive disorder was reported as 4.2% and anxiety disorder as 6.8% (24). In another study, the prevalence of depressive symptoms was reported as 9.6% between the ages of 5-11 and 7.6% between the ages of 12-21 (23). In a study conducted by Efendi et al., it was reported that 4.2% of the cases had anxiety disorder, and 1.4% of the cases had diagnosis of depressive disorder (17). Similar to the results of our study, in the study by Startin et al., it was reported that there were no children with Down syndrome diagnosed with depressive disorder, and anxiety disorder was detected in 2.9% of the cases (2). It has been revealed that depressive disorder diagnosis is seen at lower rates in children and adolescents with DS compared to adults with DS (29). It has also been reported that it is difficult to diagnose depressive disorder in individuals with intellectual disability due to the neurodevelopmental difficulties they experience, such as speech delay and inadequate nonverbal communication. Considering the age distribution of the cases included in the obtained results and the difficulty of diagnosing depressive disorder due to intellectual

disability, it is thought that this was a contributing factor.

In this study, it was found that ODD was comorbid in 0.5% of the cases, while CD was comorbid in 8.3% of the cases. There are limited number of studies investigating disruptive behaviors in children with DS in the literature. One of these studies was conducted with 100 children with DS aged 6-18, and it was reported that the prevalence of ODD was 8% and the prevalence of CD was 4% (14). In terms of the rates of DS and ODD comorbidity, a study conducted with 101 children with DS, using a semi-structured interview, found that 17% of the cases met the diagnostic criteria for ODD (15). In the study conducted by Marino et al., reported positive ODD symptoms in 26% of the sample (10). In our study, it was found that the prevalence of CD was higher compared to the literature, while the prevalence of ODD was much lower than expected. There are differences in the tools and methods used for diagnosis in the studies. This suggests that the differences in the results obtained may be related to the methodological approaches used. It is thought that the results of our study may have been affected by the fact that ODD and CD diagnoses were made by a child psychiatrist according to DSM-5 criteria, not by scale results, and that the diagnoses were obtained through medical records. In addition, it is thought that the lack of awareness of families about psychiatric comorbidities associated with DS and the low rates of application to psychiatric outpatient clinics other than the disabled health board may have contributed to these differences.

In this study, it was found that 18.2% of the cases were receiving psychiatric medication, and 5% of these cases were using more than one psychiatric medication. In the retrospective study of 832 children with DS, the rates of psychiatric medication use were reported as 17% for ages 5-11 and 25% for ages 12-21 (23). In the study by Efendi et al., it was reported that 44.4% of the cases required psychiatric medication (17). Cultural background plays a significant role in shaping Turkish families' general attitudes toward psychiatric medications. In Turkey, cultural values such as family honor, religious beliefs, and the social stigma surrounding mental health issues may influence a family's decision to seek or accept psychiatric treatment for their child with Down syndrome (30-33). In this context, the differences in medication use rates observed between the two studies may be attributed to the inclusion of families from different cultural regions of the country, where values such as family honor, religious beliefs, and stigma surrounding mental health issues may vary. Additionally, the differences observed in the rates of psychiatric medication use in the literature may be associated with various factors, such as methodological differences between studies, the low number of outpatient visits for psychiatric comorbidities among individuals with DS in this study, and the less frequent use of psychiatric medications in individuals with DS due to comorbid medical conditions and potential side effects. It is emphasized that there is insufficient data regarding the use of psychiatric medications in children with DS, and that more studies are needed to evaluate the efficacy and tolerability of these medications (3,23).

In this study, no significant difference was found between genders in terms of psychiatric disorder. While there are studies that report no significant differences similar to our results (34,35), some studies have reported significant differences between genders for psychiatric disorders (2,9,19,26). These results may have been due to the methodological differences between studies, such as age, geographic region, and diagnosis. In conclusion, it is thought that gender differences in comorbid psychiatric disorders in DS need to be investigated further.

The results of this study should be interpreted within the context of certain limitations. First and foremost, the retrospective nature of the data, obtained from hospital records, is a significant limitation. This may have led to a potential recording bias. Another limitation of the study is that the results obtained were not compared with those of individuals with other IDs. This could have contributed to a more detailed interpretation of the prevalence of comorbid psychiatric disorders determined. Finally, the fact that the study was conducted at a single center somewhat limits the generalizability of the results.

Despite these limitations, the findings of this study make a significant contribution to the literature by retrospectively examining comorbid psychiatric disorders in children and adolescents with Down syndrome (DS) at a tertiary care center. Due to the limited number of studies in our country regarding psychiatric referral patterns, diagnostic distributions, and treatment approaches in individuals with DS, this research represents an important step toward addressing the data gap in this field. It reveals that children with DS are predominantly evaluated through disability health board applications and that routine psychiatric follow-ups are largely insufficient. In the study, at least one psychiatric disorder was identified in approximately one-fourth of the DS cases, with ADHD being the most

frequently co-occurring diagnosis. Compared to the existing literature, the lower-than-expected prevalence of diagnoses such as ASD and mood disorders highlights the diagnostic challenges and referral tendencies specific to individuals with DS, which is a noteworthy point for clinical practice. The study highlights the importance of regular psychiatric follow-up for children with Down syndrome (DS) and underscores the need to develop early diagnosis and intervention programs. Recommendations such as utilizing disability health board evaluations as opportunities for psychiatric assessment and expanding family education programs stand out as original contributions to clinical practice. In conclusion, this study is a unique piece of research that provides a multidimensional examination of the psychiatric profiles of children and adolescents with DS, compares national data with the existing literature, and offers practical recommendations for clinical application. The findings obtained from this study are of guiding value for the development of policies aimed at meeting the mental health needs of individuals with DS.

5. Conclusion

It has been stated that having a comorbid psychiatric disorder predicts a lower quality of life for individuals with DS (36). It is accepted that psychiatric disorders negatively impact the ability of individuals with intellectual disabilities, including DS, to acquire skills such as daily living skills, adaptive functioning, and academic performance. Given these reasons, psychiatric clinic applications, recognition of comorbid psychiatric disorders, early appropriate interventions, and treatments are considered highly important for the DS population, just as much as applications and check-ups for other medical conditions. Considering that the difficulties experienced by individuals with DS increase with age, and that cognitive decline progresses negatively over time, early diagnosis and intervention for ID and comorbid psychiatric conditions become even more important. To this end, it is important that future studies are planned to be more comprehensive and methodologically robust. It is recommended that future research be conducted with larger sample sizes, incorporating standardized diagnostic tools and including control groups composed of individuals with other intellectual disabilities as well as typically developing peers. Additionally, it is considered essential to plan longitudinal follow-up studies that allow for the monitoring and tracking of clinical records, along with qualitative research exploring the barriers families face in accessing psychiatric services. These planned studies will not only provide a clearer understanding of the specific psychiatric profile of individuals with DS but will also allow for the evaluation of the effectiveness of intervention programs.

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