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RESEARCH ARTICLE

Assessing Psychiatric Symptoms in Pediatric Multiple Sclerosis Patients

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Abstract

Objective: Multiple sclerosis (MS) is an autoimmune disease affecting both adults and children, often accompanied by various psychiatric disorders. Research on psychiatric symptoms in pediatric MS is relatively limited in comparison with adult-onset MS. To evaluate depression and anxiety levels in pediatric MS patients and compare them to healthy controls, and to assess the impact of clinical and sociodemographic variables on these levels.

Materials and Methods: A cross-sectional study was conducted involving 15 pediatric MS patients and 15 age and socioeconomic-matched healthy controls. Anxiety and depression levels were assessed using the State-Trait Anxiety Inventory (STAI) and Children's Depression Inventory (CDI).

Results: No significant difference was observed between the MS group and controls in terms of CDI scores, STAI state, and anxiety trait scores. Nevertheless, individuals in the MS group exhibited higher levels of trait anxiety. The average disability score among MS participants was low (0.33), potentially explaining the comparable psychiatric symptom levels with the controls. Sociodemographic data revealed a significant difference in fathers' education levels between the groups.

Conclusion: Depression and anxiety levels in pediatric MS patients were similar to healthy controls, possibly attributed to the low disability levels in the MS group. Extensive research is crucial to understand better psychiatric comorbidities and their correlation with disability progression in pediatric MS.

Keywords: Multiple sclerosis, pediatric, psychiatric symptoms

Introduction

Multiple Sclerosis (MS) is an autoimmune and chronic disorder that incites inflammatory damage to the myelin sheath, and while it is more prevalent among young adults, children can also be affected by MS. It is reported that between 3% and 10% of MS patients are under 16, and less than 1% of MS occurs in children younger than 10 (1). Pediatric MS patients tend to experience a broader range of symptoms at the onset of the disease, but despite the symptom variety, pediatric MS patients have a lower likelihood of developing progressive disease compared to adult MS patients (2,3). Timely diagnosis and effective management of MS in pediatric patients are critical as individuals in this age group tend to experience significant disabilities at an earlier stage of life than adults, and taking disease-modifying drugs at an early stage may help slow down the disease's progression (4,5). Although early diagnosis is critical, pediatric MS can be difficult to differentiate from other various diseases in children, leading to an underdiagnosis or a misdiagnosis (6,7). Recently, there has been a surge in research related to pediatric MS, which has led to a greater understanding of the condition and a continued interest in this field.

Extensive studies have investigated the correlation between neurological and psychiatric disorders. It has been particularly

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demonstrated by different studies that anxiety disorders and depression frequently accompany adult MS (8,9). Depression, in particular, is one of the most important problems associated with MS, and MS-related depression is generally reported to be of moderate severity (10). In different studies, depression has been shown to affect approximately 15.8% to 47% of the MS population (11-13). The lifetime prevalence of comorbid depression in MS patients is estimated at around 50% (14,15). Anxiety concerns approximately 16-48% of individuals with MS, and patients with low or moderate disabilities reportedly exhibit higher anxiety levels (16-19). This phenomenon has been explained by the fact that patients fear more severe disabilities in the future due to the knowledge of how debilitating their moderate handicaps can be. Fatigue and pain, which are frequently seen in MS, are also found to be associated with anxiety and depression (19).

Accurate recognition of psychiatric disorders accompanying MS and making the necessary interventions are essential in many different aspects. MS patients often experience secondary consequences due to depressive symptoms, including various physical and psychological effects (20). For instance, individuals with MS who experience depression are at an increased risk of premature mortality and suicide (21). Depression exerts a significant negative impact on the quality of life, level of independence in daily activities, and employment status of individuals with MS (22,23). Research has further suggested that depression may play a role in worsening fatigue and pain symptoms in individuals with MS (24,25). Depression among individuals with MS has also been found to exhibit a correlation with reduced adherence to medications, heightened disease severity, and deteriorating disability (26-28). Similarly, investigating the presence of anxiety is crucial for MS patients as, if remains untreated it can remarkably affect the quality of life, treatment adherence, and symptoms (29).

Depression and anxiety are linked with MS in adults, and studies suggest similar issues in pediatric MS. There is a great body of literature on psychiatric disorders accompanying adult-onset MS, whereas there are fewer studies on psychiatric disorders concomitant with pediatric MS. A limited number of studies reported that depression is present in 50% of children and adolescents with MS (30,31). In another study conducted with pediatric MS patients, anxiety disorder was found to be the most common psychiatric disorder among the sample (32). While data on the neurological attributes of pediatric MS is gradually accumulating, information about the psychiatric features of these children remains scarce. In order to enhance the quality of life and promote treatment adherence for pediatric patients with MS, it is imperative to gain a deeper understanding of the psychiatric comorbidities that often accompany this condition. Such knowledge can aid in the development of effective intervention strategies aimed at improving outcomes for this vulnerable population.

This study seeks to assess the levels of depression and anxiety in pediatric MS patients and draw a comparison with healthy controls. Furthermore, the objective of our investigation was to evaluate the potential impact of clinical and sociodemographic variables on the levels of depression and anxiety observed in children diagnosed with MS. The main hypothesis of our research was that depression and anxiety levels would be higher in children with MS than in healthy controls.

Materials and Methods

Fifteen children and adolescents with a MS diagnosis and 15 healthy controls matched with them in terms of age and socioeconomic level were included in our study after obtaining ethical approval from the ethics committee. Healthy controls were recruited for the study by placing an announcement in the hospital. Prior to the study, we obtained informed consent from all participants and their parents. The ethical committee approval number for our study is 2023/265. The diagnosis of children with MS evaluated within the scope of our study were made using the 2017 McDonald Criteria which have been shown to be equally applicable for pediatric onset MS (33). The inclusion criteria for children with MS were to be regularly followed up at the neurology clinic of Kocaeli University Faculty of Medicine with a definitive MS diagnosis. There was no specified age range among the inclusion criteria for the study and all eligible patients under 18 years of age were included. There were no specific exclusion criteria for the MS group except for failing to complete the necessary forms or withholding consent. In addition to the exclusion criteria valid for the MS group, having a neurological or other chronic medical disease was an exclusion criterion for the control group. The sociodemographic information of the participants was obtained through a sociodemographic form filled out by the researchers who conducted the interview. Depressive symptom levels of the participants were evaluated using the Children's Depression Inventory (CDI), and their anxiety levels were assessed using The State-Trait Anxiety Inventory (STAI).

The Children's Depression Inventory: Depression levels were measured by the CDI, a self-report scale assessing depression in children and adolescents. The scale comprises 27 Likert-type items rated on a scale of 0 to 2. The total score on the scale ranges from 0 to 54, with higher scores indicating greater severity of depression. To identify clinical depression, a score higher than 19 is considered the criterion (34,35).

The State-Trait Anxiety Inventory: The STAI assessment tool comprises two scales, each consisting of 20 items. Items 1-20 measure state anxiety (STAI-S), and 21-40 measure trait anxiety (STAI-T) (36). Each form allows for a minimum score of 20 and a maximum of 80, with each item scored from one to four (37).

Statistical Analysis

The data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 23.0. The Shapiro-Wilk test was utilized to define the normality of data distribution. Continous variables (e.g., age, CDI and STAI-C scores) were analyzed using the Mann-Whitney U test. Chi-squared and Fisher's exact tests were utilized for the categorical variables. The associations between scale scores and continuous sociodemographic data were examined with the Spearman's correlation test. All statistical tests conducted had a significance threshold of 0.05 and were two-tailed.

Results

A comparison of the sociodemographic data of the cases is presented in Table 1.

When the patients in the MS group were evaluated, the average age of diagnosis was found to be 12.90 (±3.05). The average duration of the disease was found to be 2.46 (±1.68) and the average number of attacks was 1.53 (±0.63). When average disability score (EDSS) scores were examined, the average score was found to be 0.33 (±0.72). The treatment agents of adolescents with MS are shown in Figure 1.

When the two groups were compared regarding CDI scores, STAI state, and anxiety trait scores, no significant difference was found between the groups. However, it was observed that the trait anxiety levels of adolescents with MS were higher than those of the control group. The comparison of scale scores across the groups is presented in Table 2.

In the MS group, no significant association was found between the scale scores and disease duration, number of attacks, age at diagnosis, and EDSS scores (all for p>0.05).

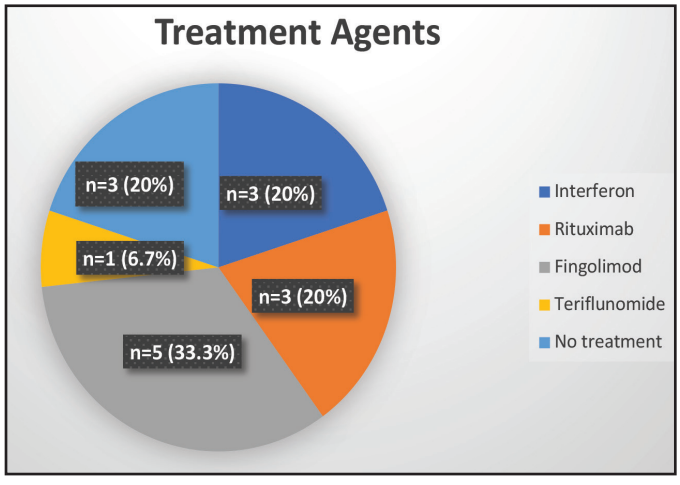

Figure 1. Treatment agents used in multiple sclerosis group

Discussion

This study aimed to examine the anxiety and depression levels of pediatric MS patients and compare them with healthy controls. The average age of MS patients was 16.5 years, and 10 (66%) of the cases were women. The female/male ratio in our study was found to be similar to a prior study reporting that 67% of adolescent MS cases were female, and a previous review on pediatric MS reporting a ratio of 2.8:1 in children ≥12 years old (38,39). There are studies in the literature reporting that as the age of onset of MS decreases, the proportion of males increases, especially in children under the age of 10 (40). It is suggested that investigating the reasons for the change in the female/male ratio as the age decreases, especially in pediatric MS, may help further elucidate the pathophysiology of MS.

Different studies have demonstrated that cognitive functions may be impaired in children with pediatric MS (30,41,42). While many studies have examined cognitive function in pediatric MS patients using neuropsychological batteries, only a limited number of studies have formally evaluated academic achievement, which may ensure a better indication of future success (43,44). Evaluating academic achievement is a complex and multifaceted process that lacks a universally accepted standard. Moreover, determining the most influential variables that contribute to academic success is challenging, as different factors may play a more significant role for different individuals. Approximately 55% of all studies investigating academic achievement measure GPA as the primary outcome, and in our research, academic success was evaluated by asking parents about children's grade point averages (45). Similar to some of the previous studies, no significant difference was found between the MS group and healthy controls in terms of academic achievement (46). However, there are also studies showing that the academic achievement of children with MS is lower than the controls (47,48). More studies are needed to evaluate how pediatric MS affects the current and future academic achievement of children and adolescents.

No statistically significant difference was detected between the two groups regarding CDI scores, STAI state, and anxiety trait scores. This is one of the unexpected results of our study and is not similar to those reported mainly by studies in the literature. Studies in the literature mostly show that depression and anxiety symptoms are increased in pediatric MS patients (49,50). The fact that the depression and anxiety symptoms of children with MS in our sample were not different from the control group can be explained by the low rates of disability in our patient population. The average EDSS score of the pediatric MS patients included in our study was 0.33, indicating that the disability levels of the patient group are relatively low.

Table 1. Sociodemographic characteristics of groups

Sociodemographic variables	MS (n=15) Mdn (IQR)/n (%)	Control (n=15) Mdn (IQR)/n (%)	p-value
Gender[a]			
Female	10 (66.66)	6 (40)	0.143
Male	5 (33.33)	9 (60)	
Child's age (years)[b]	16.5 (14.5-18.5)	16.5 (15.5-17.5)	0.289
Mothers' age (years)[b]	47 (43.5-50.5)	41 (39-43)	0.132
Fathers' age (years)[b]	47 (45-49)	46 (33.5-48.5)	0.754
Mothers' education level[c], n (%)			
Primary school	3 (20)	2 (13.33)	0.294
Secondary school	6 (40)	3 (20)	
High school	4 (26.66)	3 (20)	
College degree or higher	2 (13.33)	7 (46.66)	
Mothers' occupation[a]			
Housewife	12 (80)	7 (46.66)	0.128
Full time employed	3 (20)	8 (53.33)	
Fathers' education level[c], n (%)			
Primary school	9 (60)	0 (0)	**0.001****
Secondary school	1 (6.66)	3 (20)	
High school	2 (13.33)	3 (20)	
College degree or higher	3 (20)	9 (60)	
Fathers' occupation			
Unemployed	1 (6.66)	0 (0)	1
Full time employed	14 (93.33)	15 (100)	
Number of siblings[b]	1 (0.5-1.5)	1 (0-2)	0.710
Family type[c], n (%)			
Nuclear family	10 (66.66)	13 (86.66)	0.390
Extended family	5 (33.33)	2 (13.33)	
Psychiatric diagnosis[c], n (%)			
Absent	15 (100)	12 (80)	0.224
Present	0 (0)	3 (20)	
Academic success[a], n (%)			
Average	7 (46.66)	8 (53.33)	0.133
High	8 (53.33)	7 (46.66)	
Absenteeism from school[a], n (%)			
<3 days	2 (13.33)	5 (33.33)	0.163
3-10 days	6 (40)	8 (53.33)	
>10 days	7 (46.66)	2 (13.33)	

Medians are shown with interquartile range in parantheses.

*p<0.05, **p<0.01, ***p<0.001

MS: Multiple sclerosis, Mdn: Median, IQR: Interquartile range

[a]Chi-square test, [b]Mann-Whitney U test, [c]Fisher's exact test

Table 2. Comparison of scale scores across the groups

Scales	MS (n=15) Mdn (IQR)	Control (n=15) Mdn (IQR)	Z/U	p-value
CDI	11 (10.5-11.5)	13 (10.5-15.5)	-1.71/71.5	0.087
STAI-C				
State anxiety	30 (18.5-41.5)	37 (30-44)	-0.02/112.0	0.983
Trait anxiety	43 (37.5-48.5)	38 (33.5-42.5)	-0.12/109.5	0.900

Medians are shown with interquartile range in parantheses.

*p<0.05, **p<0.01, ***p<0.001

MS: Multiple sclerosis, Mdn: Median, IQR: Interquartile range, CDI: Children's depression inventory, STAI-C: State-trait anxiety inventory for children

Mann-Whitney U test

Studies have shown a positive relationship between disability status and depression and anxiety levels in MS patients, and our results might be due to the fact that the patients have not yet developed disability and, therefore, have low EDSS levels (51).

Study Limitations

There are several limitations of our study. Firstly, since our study is cross-sectional, a longitudinal evaluation of depression and anxiety symptoms in children and adolescents with MS could not be performed. Secondly, in our study, self-rating scales were used to evaluate depression and anxiety levels, but no psychiatric examination was performed, and this may have caused various biases in the measurement of psychiatric symptoms. Finally, in our study, MS patients who applied to the clinic were evaluated, and the clinical sample used in the evaluation limits generalizability to the population.

Conclusion

Our study offers a nuanced understanding of the anxiety and depression levels of patients with pediatric MS as compared to healthy counterparts. The findings, especially regarding depression and anxiety symptoms, highlight the importance of considering individual variability and clinical characteristics in this population. As always, continuous research efforts in this area will help refine our understanding and offer a comprehensive perspective on the multifaceted effects of MS on pediatric populations.

Ethics

Ethics Committee Approval: The study was approved by the institutional ethics committee of Kocaeli University (no: 2023/265; date: 10.08.2023).

Informed Consent: Informed consent was obtained from all the participants and their parents after being provided with details regarding the study.

Authorship Contributions

Surgical and Medical Practices: S.D.B., G.Y.E., Concept: S.D.B., G.Y.E., Design: S.D.B., Data Collection or Processing: A.S.G., R.D.T., Analysis or Interpretation: R.D.T., Literature Search: S.D.B., Writing: S.D.B., G.Y.E.

Conflict of Interest: No conflict of interest was declared by the authors.

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