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The influence of fatigue on the daily functioning of multiple sclerosis patients

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Abstract

Introduction. Fatigue is a complex and often debilitating symptom of multiple sclerosis (MS), affecting a large number of individuals with the condition. Research has shown that fatigue and impaired mobility are the two main causes of work loss in people with MS, with fatigue being one of the leading causes of unemployment.
Aim. The research aimed to study the impact of fatigue on individuals with MS, including its effects on physical functioning, daily life activities, work, family, and social life.
Material and method. The data was collected using the Fatigue Assessment Scale, a tool specifically designed for individuals with multiple sclerosis to assess the impact of fatigue on their work, home, and school life. The Fatigue Severity Scale measures fatigue levels, which distinguishes fatigue from clinical depression due to overlapping symptoms. Approximately 700 participants from all over the world participated in the study, with the majority coming from the USA, Canada, and Germany.
Results. The results indicate that fatigue presents a significant challenge for individuals with MS, impacting activities of daily life including leisure, work, and treatment (kinesitherapy). The results also show a connection between gender and fatigue, although the dependence or independence between the two was not determined. Our findings suggest that fatigue is one of the three symptoms that causes significant difficulties for people with MS, affecting all areas of their functionality.
Conclusions. In conclusion, this scientific paper highlights the importance of addressing fatigue in individuals with MS, as it can have a significant impact on their quality of life. Effective management strategies are essential to ensure the health, well-being, and recovery of affected SM patients. Further research is needed to understand the various causes of fatigue in MS and to develop effective interventions to address it.

Key words*: rehabilitation, multiple sclerosis, physical therapy, fatigue.*

Rezumat

Introducere. Oboseala este un simptom complex şi adesea debilitant şi afectează un număr mare de persoane care suferă de scleroză multiplă (SM). Cercetările au arătat că oboseala şi limitarea mobilităţii sunt cauze principale care pot determina pierderea locului de muncă în cazul persoanelor cu SM, oboseala fiind una dintre principalele cauze ale şomajului.
Scop. Cercetarea şi-a propus să studieze impactul oboselii, la persoanele cu SM, asupra funcţiei fizice, activităţilor zilnice, muncii, familiei şi vieţii sociale.
Material şi metodă. Am utilizat Scala de evaluare a oboselii, un instrument special conceput pentru persoanele cu scleroză multiplă pentru a evalua impactul oboselii asupra muncii, acasă şi la şcoală. Scala de severitate a oboselii măsoară nivelul de oboseală şi distinge oboseala de depresia clinică din cauza suprapunerii simptomelor. In acest studiu au participat aproximativ 700 de participanţi din întreaga lume, majoritatea venind din SUA, Canada şi Germania.
Rezultate. Rezultatele indică faptul că oboseala prezintă o provocare semnificativă pentru persoanele cu SM, având un impact asupra activităţilor din viaţa de zi cu zi, inclusiv asupra petrecerii timpului liber, muncii şi tratamentului (kinetoterapiei). Rezultatele arată şi o corelaţie între gen şi oboseală, deşi dependenţa sau independenţa dintre cei doi parametrii nu a fost determinată. Rezultatele noastre sugerează că oboseala este unul dintre cele trei simptome care provoacă dificultăţi semnificative pentru persoanele cu SM, afectând toate domeniile funcţionalităţii acestora.
Concluzii. În concluzie, această lucrare ştiinţifică subliniază importanţa abordării oboselii la persoanele cu SM, deoarece aceasta poate avea un impact semnificativ asupra calităţii vieţii acestora. Strategii eficiente de management sunt esenţiale pentru a

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asigura sănătatea, bunăstarea şi recuperarea pacienţilor cu SM. Sunt necesare cercetări suplimentare pentru a înţelege diferitele cauze ale oboselii în SM şi pentru a dezvolta intervenţii eficiente pentru a o aborda.

***Cuvinte cheie**: recuperare, scleroză multiplă, terapie fizică, oboseală*

Introduction

Multiple sclerosis (MS) is a chronic condition that affects the central nervous system and primarily affects young people. The role of the immune system in MS is well established, and immunity can be divided into two categories: the innate immune system and the adaptive immune system. The adaptive immune system is specific to the antigen-immunological inflammation that is characteristic of MS, which was first identified in 1948 by Alvin Kabat (Fassbender et al., 1998). He found the presence of oligocolonal immunoglobulins in the cerebrospinal fluid of MS patients. Over the years, researchers have made great progress in understanding the role of both the adaptive and innate immune systems in experimental autoimmune encephalomyelitis, but the extent to which they interact in MS is still not fully understood (Weiner et al., 2003; Lassmann et al., 2007).

In most cases, multiple sclerosis starts off as a relapsing-remitting type, and later many patients develop secondary progressive multiple sclerosis. However, there is also a small group of patients who experience the primary progressive form of the disease from the start. The distinction between the relapsing and primary progressive forms of multiple sclerosis is significant, but they can still be connected, as there are instances where individuals within the same family have both forms of the disease. Not all patients eventually progress to secondary progressive multiple sclerosis, and even among those who do, there are variations in the course of the disease, including benign and malignant forms. The diversity in the clinical course of multiple sclerosis may be linked to issues with the adaptive and innate immune systems during the progression of the disease. The progressive form of the disease is often most affected by similar underlying mechanisms (Breji et al., 2008; Hinson et al., 2008).

Multiple sclerosis is a debilitating illness that affects the central nervous system, leading to the gradual degeneration of myelin and causing severe neurological problems. It typically strikes early in adulthood and has a profound impact on a person's family, career, and social life. The loss of myelin results in a slowed transmission of nerve impulses, causing difficulties in performing daily activities and affecting behavior in a profound way (Misu et al., 2007).

Multiple sclerosis typically leads to a gradual worsening of neurological symptoms and impairments. Despite recent advancements in research, the exact cause and process of the disease are still not fully understood. However, there is increasing evidence that suggests stressful events can trigger relapses in multiple sclerosis. The areas affected during each relapse can be the same or different parts of the white matter in the central nervous system. Complete recoveries are uncommon and can last for varying lengths of time (Ramsaransing et al., 2006).

Despite limited understanding of multiple sclerosis, there have been recent advancements in identifying new strategies for intervention. This includes the use of disease-modifying medications that have been shown to have positive effects on slowing down the progression of the disease and reducing the intensity of relapses. Healthcare professionals working with people living with multiple sclerosis should concentrate on addressing factors that can be prevented or changed, with the aim of improving their quality of life (Pittock et al., 2004; Hawkins et al., 1999; Authier et al., 2008).

Many individuals with multiple sclerosis often experience fatigue that affects their daily activities. This can be a result of several factors, including physical exertion, nerve impulse fatigue, depression, and an unknown cause. Shapiro et al. (1987) classified fatigue into four categories: fatigue after physical activity, fatigue from nerve impulse after intense activity, fatigue associated with depression and sleep disturbances, and an abnormal feeling of fatigue. People with multiple sclerosis seem to be especially susceptible to the last type, the abnormal feeling of fatigue, which is not well understood. Another factor that contributes to fatigue in individuals with multiple sclerosis is the slowing down of nerve impulses along partially demyelinated axons (Feinstein et al., 1999).

Krupp and his team created the Fatigue Severity Scale (FSS) in 1988, a 9-question survey where patients assess their fatigue levels. This scale has been proven to have consistent reliability, stability, and accurately reflects how fatigue affects daily life (Poeck et al., 1968). It's noteworthy that the level of fatigue was not significantly linked with depression

in people with multiple sclerosis, indicating that fatigue and depression are distinct yet interrelated conditions (Feinstein et al., 1997).

The summer heat, overheated rooms, hot baths, and physical exertion can exacerbate symptoms of multiple sclerosis, leading to increased fatigue and other symptoms (Seliger et al., 1992). This is thought to be due to a reduction in the protective effect of myelin on nerve fibers, making them more sensitive to temperature changes. As a result, individuals with multiple sclerosis may experience a temporary increase in sensory symptoms after exercising or being in hot water. However, this does not have a lasting effect on fatigue and overall function (Iannaccone et al., 1996; Ruggieri et al., 2003; Al-Araji et al., 2005).

On the other hand, cold temperatures can have a positive impact on MS symptoms. Research has shown that cooling the nerves can improve the transmission of nerve impulses, leading to an improvement in symptoms. There are various cooling products available that can help to lower the body temperature, preventing the worsening of symptoms associated with MS (Thompson et al., 2005; Yorkston et al., 2005).

Methodology

The research aimed to study the impact of fatigue on the daily activities of people with multiple sclerosis. The data was collected using the Fatigue Assessment Scale, a tool specifically designed for individuals with multiple sclerosis to assess the impact of fatigue on their work, home, and school life. Approximately 700 participants from all over the world participated in the study, with the majority coming from the USA, Canada, and Germany.

The survey investigated various aspects of fatigue, such as motivation, physical therapy, obstacles to physical function, impact on work, and its effect on family and social relationships.

The data was analyzed using the chi-squared test to examine the relationship between fatigue, physical function, gender, the type of multiple sclerosis, and other variables. The main hypothesis of the research was that fatigue causes frequent problems. Additionally, the research aimed to determine if the type of multiple sclerosis is related to the impact of fatigue on work, family, and social life.

Moreover, our research sought to understand the interplay between fatigue and multiple sclerosis, with fatigue being considered as the dependent variable and the disease being considered as the independent variable.

Results

Table I. Analysis of respondents by gender

Gender	Total	Percentage	Valid percentage	Cumulative percentage
Female	593	84.4	85.6	85.6
Male	100	14.2	14.4	100.0
Total	693	98.6	100.0	
Respondents who did not answer the question	10	1.4		

According to Table 1, there were 703 participants in the study. Out of these, 100 were men, accounting for 14.2% of the total participants, and 593 were women, accounting for 84.4% of the total participants. The data shows a higher incidence of multiple sclerosis among women. The youngest female participant was diagnosed with the disease at the age of 11, while the oldest female participant was 80 years old. The youngest male participant was diagnosed with the disease at the age of 10, and the oldest male participant was 76 years old.

Table II. Type of multiple sclerosis among the respondents

Type of multiple sclerosis	f	%
Clinically isolated syndrome	37	5
Relapsing-remitting type	484	68
Primary-progressive type	102	14
Secondary-progressive type	90	13

According to Table II, information was gathered on the type of multiple sclerosis that the participants were suffering from. This information is important as the symptoms of multiple sclerosis can vary depending on the type of the disease. The results showed that the majority of the participants had relapsing-remitting multiple sclerosis, accounting

for 68% of the total participants. The smallest group of participants had clinically isolated syndrome, accounting for only 5% of the total participants.

Table III. FSS-Scale for assessing the severity of fatigue

Question	I agree		I disagree	
	f	%	f	%
My motivation is reduced when I'm tired	725	93	52	**7**
Exercise makes me tired	587	76	190	24
I get tired easily	640	82	137	18
Fatigue interferes with my physical functioning	622	80	153	20
Fatigue causes me frequent problems	537	69	240	31
Fatigue prevents me from performing my duties properly	496	64	282	36
Fatigue is one of the three worst symptoms of MS	580	75	195	25
Fatigue affects my work, family or social life	575	74	202	26

In this study, fatigue was analyzed as a major contributor to difficulty performing daily activities. Table 3 presents the results of the Fatigue Assessment Scale, which was designed to measure the severity of fatigue in people with multiple sclerosis. The results showed that most of the participants reported having fatigue as a significant issue in their daily lives, with high percentages of positive responses to statements such as: reduced motivation when tired (93%), exercises causing fatigue (76%), easily getting tired (82%), fatigue interfering with physical functioning (80%), causing frequent problems (69%), preventing them from carrying out their duties properly (64%), being one of their three worst symptoms (75%), and affecting their work, duties, or social life (74%). However, only a small portion of participants (36%) reported that fatigue prevents them from carrying out daily duties, and only 7% disagreed with the statement that fatigue reduces their motivation.

The relationship between gender and fatigue was also analyzed using a chi-square test with 2 degrees of freedom. The results showed that there was a significant relationship between the two, with fatigue being one of the three worst symptoms for both genders, but the significance level was only $p = 0.033$ ($chi2 = 4.527$).

The relationship between fatigue and the type of multiple sclerosis was analyzed, and results showed that there was a correlation. A chi-squared test was conducted to determine if there was dependence between the two variables, and the results showed that there was a significant dependence, with a p-value of 0.001 and a chi-squared value of 14.366 (2 degrees of freedom). In other words, respondents who reported that fatigue affects their physical functioning were more likely to have a primary progressive or secondary-progressive type of multiple sclerosis.

Table IV. Correlation of fatigue during physical functioning with the type of MS

Impact of fatigue on physical functioning	Primarily-progressive	Relapsing-remitting	Secondary-progressive	Total
I agree	87	362	80	529
	16.4 %	68.4 %	15.1 %	100 %
I disagree	11	113	9	133
	8.3 %	85.0 %	6.8 %	100 %
Total	98	475	89	662
	14.8 %	71.8 %	13.4 %	100 %

Table V. Correlation of fatigue and frequent problems with the type of MS

Fatigue causes frequent problems	Primarily-progressive	Relapsing-remitting	Secondary-progressive	Total
I agree	80	316	71	467
	17.1 %	67.7 %	15.2 %	100 %
I disagree	18	159	18	195
	9.2 %	81.5 %	9.2 %	100 %
Total	98	475	89	662
	14.8 %	71.8 %	13.4 %	100 %

The results of the research show that there is a correlation between fatigue and the type of multiple sclerosis. The chi2-test of independence indicated a significant dependence, with a p-value of 0.001, suggesting that respondents who agreed that fatigue causes frequent problems were more likely to have primary-progressive or secondary-progressive type of multiple sclerosis. This highlights the importance of considering the type of multiple sclerosis when evaluating the impact of fatigue on daily activities and in developing appropriate treatment plans to alleviate symptoms and improve quality of life for people with multiple sclerosis.

Table VI. Correlation of the type of multiple sclerosis with fatigue and its impact on the adequate performance of duties

Fatigue prevents me from performing my duties properly	Primarily-progressive	Relapsing remitting	Secondarily progressive	Total
I agree	69	290	69	428
	16.1 %	67.8 %	16.1 %	100.0 %
I disagree	29	185	20	234
	12.4 %	79.1 %	8.5 %	100.0 %
Total	98	475	89	662
	14.8 %	71.8 %	13.4 %	100.0 %

Additionally, the results of this research indicate that there is a clear link between the type of multiple sclerosis and the ability to carry out daily obligations effectively. The chi2-test results with 2 degrees of freedom showed a significant relationship, with p = 0.005 (chi2 = 10.570). This means that respondents who agreed with the statement that their multiple sclerosis affects their ability to perform daily duties have a higher likelihood of having primary-progressive or secondary-progressive type of the disease.

Table VII. Relationship of the type of multiple sclerosis with fatigue and its impact on work, family and social **life**

Fatigue affects work, family or social life	Primarily progressive	Relapsing remitting	Secondarily progressive	Total
I agree	81	340	74	495
	16.4 %	68.7 %	14.9 %	100 %
I disagree	17	135	15	167
	10.2 %	80.8 %	9.0 %	100 %
Total	98	475	89	662
	14.8 %	71.8 %	13.4 %	100 %

It appears that there is a clear relationship between the type of multiple sclerosis and the impact of fatigue on one's work, family, and social life. The results of the chi-square test with 2 degrees of freedom indicate a significant relationship, with a p-value of 0.011 (chi2 = 9.103). In other words, those respondents who agreed that fatigue affects their work, family, and social life have a higher probability of having either primary-progressive or secondary-progressive type of multiple sclerosis.

Discussions

This research paper emphasizes the importance of considering fatigue in the management of multiple sclerosis and its impact on patients' physical, occupational, and social functioning (Broch et al., 2022).

According to our results, the severity of fatigue is greater in patients with primary-progressive and

secondary-progressive types of the disease, which is linked to the progression of the disease. On the other hand, fatigue is less pronounced in patients with the relapsing-remitting type of multiple sclerosis.

Additionally, exercise and its impact on fatigue was also analyzed in a separate study, which indicated that fatigue can be reduced through appropriately dosed kinesitherapy. However, this finding is debatable, as the results of this study seem to differ from the results of another research paper where 76% of the respondents reported that exercise significantly increases their fatigue. This discrepancy may be due to differences in the therapeutic approach taken by therapists in the two studies. Nevertheless, both studies highlight the importance of addressing fatigue in individuals with multiple sclerosis and the role of exercise and therapy in managing it (Nazanin et al., 2020).

Moreover, the results of another study showed that fatigue significantly impacts the quality of life in patients with multiple sclerosis, leading to difficulties in performing daily activities, working, and having social relationships. Occupational therapy and rehabilitation programs have proven to be effective in improving the physical functioning and reducing the symptoms of fatigue in patients with multiple sclerosis. This highlights the importance of addressing the issue of fatigue in the management of multiple sclerosis and suggests that occupational therapy may be a valuable tool in helping patients with multiple sclerosis maintain independence and improve their overall quality of life (Perez de Heredia-Torres et al., 2020).

We can state that fatigue is a major issue for patients with multiple sclerosis, and particularly for those with the primary-progressive or secondary-progressive types of the disease. This highlights the need for interventions that can help reduce fatigue and its consequences for these patients, such as work accommodations, rehabilitation programs, and support from family and friends. It's also crucial to address the social and economic consequences of fatigue, as it can result in reduced quality of life for patients and their families.

Conclusions

In conclusion, fatigue is a major concern for individuals suffering from multiple sclerosis and has a profound impact on all aspects of their daily life

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