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Investigating the Relationship Between Physical and Psychological Parameters in Participants with Multiple Sclerosis

Multipl Sklerozlu Bireylerde Fiziksel ve Psikolojik Parametreler Arasındaki İlişkinin Araştırılması

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Abstract

This study investigates the relationship between disease duration, balance, anxiety, and depression in people with Multiple Sclerosis (MS), and how these parameters correlate with quality of life. Sixty-three participants with an average age of 45.65±11.04 years were included. Spearman correlation analysis measured these correlations. The Hospital Anxiety and Depression Scale (HADS) was used to measure anxiety and depression symptoms, the Berg Balance Scale (BBS) to measure balance, and the Multiple Sclerosis Quality of Life-54 Questionnaire (MSQOL-54) to measure quality of life. A negative and significant relationship was found between participants' disease duration and balance (r =-0.362, p = 0.004). However, no significant correlations were found between duration of illness and anxiety, depression, and quality of life (p> 0.05). Negative correlations were found between balance and anxiety (r =-0.330, p = 0.008) and between balance and depression (r =-0.311, p = 0.013). Additionally, a positive correlation was observed between balance and quality of life, while negative correlations were found between quality of life and both anxiety and depression. Given that MS profoundly affects individuals, a holistic evaluation is crucial for a comprehensive understanding. Future studies should take a holistic approach that includes assessments of cognitive state and examines the interrelationships between these parameters.

Keywords: Anxiety, balance, depression, multiple sclerosis, quality of life

Özet

Bu çalışma, Multipl Skleroz (MS) hastalığına sahip bireylerde hastalık süresi, denge, anksiyete ve depresyon arasındaki ilişkileri, ayrıca bu parametrelerin yaşam kalitesi ile nasıl ilişkilendiğini araştırmaktadır. Ortalama yaşı 45.65±11.04 olan 63 katılımcı dahil edildi. Spearman korelasyon analizi bu ilişkileri değerlendirdi. Hastane Anksiyete ve Depresyon Ölçeği (HADS) anksiyete ve depresyon belirtilerini ölçerken, Berg Denge Ölçeği (BBS) dengeyi değerlendirdi ve Multiple Sclerosis Quality of Life-54 Anketi (MSQOL-54) yaşam kalitesini değerlendirdi. Katılımcıların hastalık süresi ile denge arasında negatif ve anlamlı bir ilişki bulundu (r =-0.362, p = 0.004). Ancak, hastalık süresi ile anksiyete, depresyon ve yaşam kalitesi arasında anlamlı bir ilişki gözlemlenmedi (p> 0.05). Denge ile anksiyete (r =-0.330, p = 0.008) ve depresyon (r =-0.311, p = 0.013) arasında negatif korelasyonlar belirlendi. Ayrıca, denge ile yaşam kalitesi arasında pozitif bir korelasyon gözlemlendi, yaşam kalitesi ile anksiyete ve depresyon arasında ise negatif korelasyonlar belirlendi. MS'nin bireyleri derinden etkilediği göz önüne alındığında, kapsamlı bir anlayış için bütünsel bir değerlendirme önemlidir. Gelecekteki çalışmalar, bilişsel durumları değerlendiren ve bu parametreler arasındaki ilişkileri araştıran bütünsel bir yaklaşım benimsemeye teşvik edilmektedir.

Anahtar Kelimeler: Kaygı, denge, depresyon, multiple skleroz, yaşam kalitesi

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1. Introduction

Multiple sclerosis (MS) is characterized by an autoimmune response in which the body's immune system mistakenly attacks the central nervous system, leading to a cascade of neuroinflammatory processes (Filippi et al., 2016; Solomon et al., 2023; Thompson et al., 2018). People living with MS struggle with a range of symptoms on a daily basis. these include physical challenges such as difficulties with mobility and walking, as well as cognitive and emotional issues such as pain and fatigue (Alghwiri et al., 2018).

MS brings with it a variety of physical symptoms, such as spasticity, cerebellar dysfunction, sensory impairments, visual disturbances, and vestibular disorders, all of which contribute to problems with balance and walking. The impact of these balance impairments on the overall functional abilities of people with MS is critical (LaRocca, 2011). Balance deficits usually occur early in the course of MS and worsen as the disease progresses (Alghwiri et al., 2018; Cavanaugh et al., 2011; Comber et al., 2017; Sosnoff et al., 2011).

As there is no cure for MS and it is often diagnosed in the prime of life, sufferers have to deal with disheartining symptoms and navigate a fluctuating disease course over an extended period of time (Jones, 2014; Tingey, 2020). Previous MS studies often included cohorts with mixed disease durations and neglected a specific focus on disease duration in their analyses. Disease duration, i.e. the time a participant has been exposed to the disease, regardless of the person's age at diagnosis, is critical to understanding the progression and impact of MS. Despite its importance, few studies have examined its impact. In particular, the relationship between disease duration and its impact on balance and quality of life in MS patients is poorly investigated in existing research. (McNicholas et al., 2021).

Balance has a major impact on functional independence and is an important aspect of intervention strategies. In MS patients, impaired balance leads to a lower level of physical activity, an increased risk of falling, and loss of quality of life (Klevan et al., 2014; Nilsagård et al., 2009). Balance and mobility are closely linked, as balance problems increase the likelihood of falls and impair walking ability in people with MS (Cameron & Lord, 2010; Cattaneo et al., 2002; Middleton et al., 2015; Sosnoff et al., 2011). Previous research has examined the relationship between depression and balance in participants with multiple sclerosis and highlighted the importance of considering depression as a factor that may affect balance (Alghwiri et al., 2018; Hainaut et al., 2011). The importance of examining variables that may influence balance, a crucial aspect of overall functioning, is re-emphasized (Alghwiri et al., 2018; Siegert & Abernethy, 2005).

Depression and anxiety are common mood problems in people with MS that have a significant impact on their adherence to treatment (Margoni et al., 2023). The unpredictable and variable nature of MS poses significant challenges for those affected, including the possibility of relapses, hospitalizations, and disability progression, which adds to the uncertainty of the disease course (Giovannetti et al., 2017). Although depression ranks high among mood problems in people with MS, the number of studies looking at anxiety is insufficient. Anxiety, a symptom that is often overlooked in the context of MS, is associated with several factors, including physical limitations, particularly those that affect mood

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(Algahtani et al., 2017). Previous research has investigated the relationship between anxiety levels and gait/balance performance in individuals without health limitations (Hainaut et al., 2011; Pacheco-Unguetti et al., 2010).These findings show that anxiety can affect the way participants walk and maintain balance, even in the absence of health limitations.

Physical limitations and mood problems can collectively influence the quality of life, which encompasses biological, economic, social, and psychological needs (Chwastiak & Ehde, 2007). Studies conducted on individuals with MS have primarily focused on the assessment of physical parameters and related interventions. However, MS is a chronic disease that significantly affects the individual's entire life and therefore requires more comprehensive assessments. For this reason, comprehensive assessments that also include psychosocial parameters such as mental state, quality of life, and physical parameters that are beneficial. This study aims to investigate the relationship between disease duration, balance, anxiety, and depression in MS patients and how these parameters correlate with quality of life. Understanding these relationships may provide valuable insights for comprehensive rehabilitative therapy options that benefit participants living with MS.

2. Method

2.1. Participants

A total of sixty-three participants provided sufficient data for inclusion in this study. Inclusion criteria included a definitive diagnosis of MS confirmed by a neurologist, age between 18-65 years, and remission of the disease. Exclusion criteria included participants receiving non-medical treatments, individuals with physical or psychiatric illnesses coexisting with MS, and individuals with neurological disorders other than MS. The sample size was determined using the G-Power 3.1.9.7 software package with a type I error rate of 0.05 and a test power of 0.8. The minimum sample size required for the study was calculated to be 52 participants. To allow for an attrition rate of 10, a total of 57 participants were included in the study.

2.2. Procedure

Participants were screened for eligibility by the second author. The research team explained the study procedure to eligible participants with MS who met the inclusion criteria. Participants then gave their informed consent. The study was approved by the non-interventional ethics committee of the University of XXX. The design of the observational study complied with the ethical guidelines of the Declaration of Helsinki. A physiotherapist with twenty-six years of experience, who conducted the examinations, was trained according to the established protocols. All tests were conducted in a standardised manner so that the order of administration was consistent for all participants.

2.3. Measurements

Participants provided demographic data, including age, gender, employment status, marital status, and duration of illness. Levels of anxiety levels were then measured using the Hospital Anxiety and Depression Scale (HADS), balance using the Berg Balance Scale (BBS), and quality of life using the Multiple Sclerosis Quality of Life-54 Questionnaire (MSQOL-54).

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2.3.1. Berg Balance Scale

Functional balance was assessed using a questionnaire that evaluates performance on 14 items ranging from 0 (complete inability) to 4 (normal performance). The total score ranges from 0 to 56, with higher scores indicating better balance and lower scores indicating poorer balance. In particular, scores in the range of 41 to 56 indicate a degree of independence, while scores between 21 and 40 indicate that you need help for walking. Scores between 0 and 20 indicate that no help with mobility is needed. The validity and reliability of the scale has been demonstrated (Sahin et al., 2008).

2.3.2. Hospital Anxiety and Depression Scale

The (HADS) comprises 14 multiple-choice questions, each of which is rated on a Likert scale from 0 to 3. It measures symptoms related to anxiety (7 items) and depression (7 items). The HADS Anxiety (HADS-A) and HADS Depression (HADS-D) scores range from 0, indicating the absence of symptoms, to 21, indicating the most severe symptoms (Zigmond & Snaith, 1983). The purpose of the scale is to quickly identify individuals at risk for anxiety and depression from physical illness. The scale uses cut-off scores of 10/11 for anxiety and 7/8 for depression to categorize individuals into risk groups. Accordingly, those above these scores are considered at risk for anxiety and depression. Validation and reliability assessments were conducted for the Turkish version of the HADS (Paker et al., 2013).

2.3.3. Multiple Sclerosis Quality of Life-54 Questionnaire

It was used to assess the quality of life of participants with MS. Responses were scored on a Likert scale with higher scores indicating better quality of life. The scale includes composite physical health, composite mental health, and changes in health. The composite MSQOL-54 Physical includes subcategories such as role limitations due to physical problems, pain, energy level/fatigue, social functioning, perception of health, stress related to health, and sexual functioning. Conversely, within the MSQOL-54 Mental Composite, various aspects such as role limitations due to emotional problems, emotional well-being, health-related stress, cognitive functioning, and overall quality of life are assessed as subgroups (Vickrey et al., 1995). The adaptation and validation of the MSQOL-54 scale for Turkish society was carried out by Egemen İdiman et al. (Idiman et al., 2006).

2.4. Statistical Analysis

The Statistical Package for the Social Sciences (SPSS) 22 software for Windows software was used to analyze the data. Descriptive statistics, presented as mean ± standard deviation (X±SD) for continuous variables and percentages (%) for categorical variables, were used to summarize the variables. Spearman's correlation analysis was performed to examine the relationships between the parameters under study. The significance level was set at $p < 0.05$.

3. Results

A total of 63 participants provided sufficient data to be included in this study. The flowchart is shown in Figure 1. The demographic characteristics of the participants as well as the parameters for balance, anxiety, depression and quality of life are listed in Table 1.

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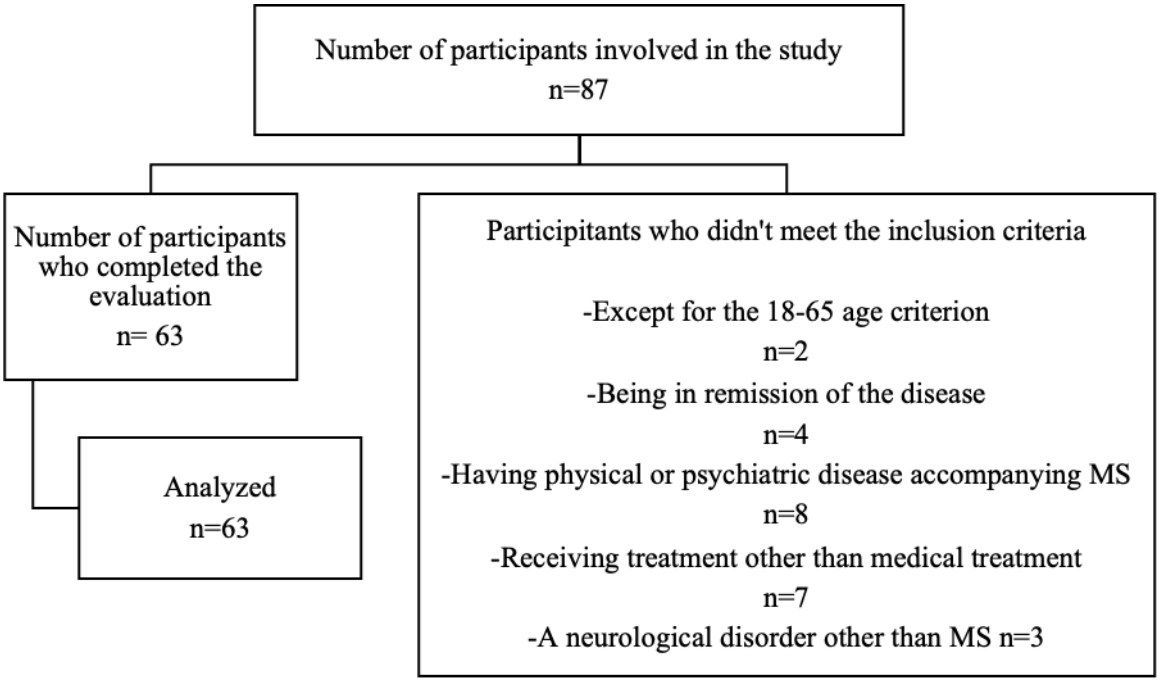

Figure 1. Flow chart

Table 1. Demographic characteristics of participants and parameters for balance, anxiety, depression and quality of life (n=63)

	n (%)
Gender	
Female	35 (55.6)
Male	28 (44.4)
	n (%)
Working Status	
Employed	18 (28.6)
Unemployed	45 (71.4)
	X ± SD
Age (years)	45.65 ± 11.04
Duration of Disease (years)	13.33 ± 5.95
Berg Balance Scale	37,51 ± 8,38
HADS: Hospital Anxiety and Depression Scale (HADS)	
HADS Anxiety	7,73 ± 4,16
HADS Depression	5,32 ± 3,61
Multiple Sclerosis Quality of Life-54 (MSQOL-54)	
MSQOL-54 Physical	57,80 ± 18,56
MSQOL-54 Mental	61,05 ± 18,29
MSQOL-54 Total	154,48 ±16,08

X mean, SD standard deviation.

The correlations between the parameters were evaluated using the Spearman correlation analysis method. The detailed results are shown in Table 2.

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A negative and significant correlation was observed between participants' duration of illness and balance (r =-0.362, p = 0.004), indicating that balance tends to decrease with increasing duration of illness.

No significant association was found between disease duration and anxiety, depression, and quality of life (p> 0.05), suggesting that disease duration may not be a significant predictor of these psychosocial aspects.

Negative correlations were found between balance and anxiety (r =-0.330, p = 0.008) and between balance and depression (r =-0.311, p = 0.013), meaning that lower balance is associated with higher levels of anxiety and depression.

Furthermore, a positive correlation was found between balance and both the MSQOL-54 Physical Composite (r = 0.604, p = 0.001) and the MSQOL-54 Mental Composite (r = 0.521, p = 0.001). This result suggests that an improvement in balance is associated with a concomitant improvement in both the physical and mental components of quality of life as measured by the MSQOL-54 instrument. Moreover, negative correlations were found between anxiety and the MSQOL-54 Physical Composite (r = -0.465, p = 0.001) and the MSQOL-54 Mental Composite (r = -0.574, p = 0.001). Similarly, negative correlations were observed between depression and the MSQOL-54 Physical composite (r = -0.631, p = 0.001) and the MSQOL-54 Mental composite (r = -0.739, p = 0.001). The results indicate that higher levels of anxiety and depression correlate with lower scores on both the physical and mental dimensions of quality of life.

Table 2. The relationship between age, disease duration, balance, anxiety, depression and quality of life parameters in participants (n=63)

		Duration of Disease	Berg Balance Scale	HADS Anxiety	HADS Depression	MSQOL-54 Physical	MSQOL-54 Mental	MSQOL-54 Total
Age	**r**	0,193	-0,003	-0,166	0,074	**-0,318***	-0,016	-0,024
	p	0,130	0,982	0,194	0,564	**0,011**	0,899	0,850
Duration of Disease	**r**	-	**-0,362****	0,045	0,213	-0,197	-0,169	-0,042
	p		**0,004**	0,727	0,094	0,122	0,186	0,744
Berg Balance Scale	**r**	-	-	**-0,330****	**-0,311***	**0,604****	**0,521****	**0,253***
	p			**0,008**	**0,013**	**0,001**	**0,001**	**0,045**
HADS Anxiety	**r**	-	-	-	**0,665****	**-0,465****	**-0,574****	**-0,507****
	p				**0,001**	**0,001**	**0,001**	**0,001**
HADS Depression	**r**	-	-	-	-	**-0,631****	**-0,739****	**-0,417****
	p					**0,001**	**0,001**	**0,001**
MSQOL-54 Physical	**r**	-	-	-	-	-	**0,821****	**0,582****
	p						**0,001**	**0,001**
MSQOL-54 Mental	**r**	-	-	-	-	-	-	**0,693****
	p							**0,001**

*A Spearman correlation analysis was conducted (r = correlation coefficient; p = statistical significance value). The asterisks (e.g., ***) indicate the level of significance, with more asterisks indicating higher significance. p<0.05; HADS: Hospital Anxiety and Depression Scale, MSQOL-54: Multiple Sclerosis Quality of Life-54*

4. Discussion

The current study investigated the relationship between disease duration, balance, anxiety, depression and quality of life. An important finding of the study is the link between anxiety and

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balance. The effect of anxiety, referred to as an invisible symptom, on balance is an interesting topic, especially in participants with multiple sclerosis.

This study found a negative correlation between disease duration and balance. In a study investigating the relationship between disease duration and balance in another neurological disorder, it was observed that balance worsened with increasing disease duration (Baumstarck et al., 2013). However, no significant correlation was found between the disease duration and anxiety, or quality of life. In another study, a direct correlation was found between the duration of the illness and the intensity of depressive and anxiety symptoms in the participants (Baumstarck et al., 2013). The research results indicated that as the duration of the illness progressed, the average depression and anxiety scores of the participants tended to increase. However, this upward trend did not reach statistical significance (Baumstarck et al., 2013; Patti et al., 2007). While a study similar to our current results found no significant relationship between disease duration and quality of life (Jamroz-Wiśniewska et al., 2007), a correlation between these two factors is often assumed in the literature when investigating the relationship between disease duration and quality of life (Baumstarck et al., 2013; Jones et al., 2013; Patti et al., 2007; Yamout et al., 2013). The patients examined in our study were those who were able to receive outpatient treatment in hospital, retained their mobility, and were not in an active attack phase. It can be assumed that this condition is related to better physical mobility of the patients.

In the current study, the researchers found a negative correlation between balance and anxiety. The results show that people with anxiety have an increased risk of having balance problems, which could increase their susceptibility to balance problems compared to people without anxiety. It seems that situations and conditions that trigger anxiety may influence the regulation and control of gait and balance performance in the broader population. Research has suggested that mood can affect the capacity to maintain balance control in individuals without health problems (Giovannetti et al., 2017; Margoni et al., 2023). These results are consistent with the existing literature. Furthermore, a negative relationship between balance and depression was observed in this study, which is consistent with the findings in the literature. However, it is noteworthy that the relationship between balance and anxiety and depression appears to be similar, with a tendency to emphasize the depression factor. Moreover, the researchers observed a negative correlation between depression and quality of life. This correlation is supported by the existing literature (Alghwiri et al., 2018; Hanna & Strober, 2020; Siegert & Abernethy, 2005). An important finding is the comparable association of depression with quality of life and balance, similar to anxiety.

The research findings suggest an inverse correlation between quality of life and levels of anxiety and depression. Moreover, another study emphasized the critical role of mood in influencing the quality of life of participants (Chwastiak & Ehde, 2007; Jones et al., 2013). However, treatment programs often tend to focus primarily on depression (Hanna & Strober, 2020). However, one particular study highlights that anxiety is an equally, if not more, important risk factor for worsening MS symptoms, impairing overall quality of life, and overall well-being (Margoni et al., 2023). This study's findings are consistent with and support this notion. A review examining the prevalence of depression and anxiety in participants with MS found rates of 31% and 22%, respectively. While depression has been

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extensively studied in the context of MS and its impact on various aspects of the disease, this particular study sheds light on the importance of anxiety in predicting negative outcomes in MS patients. The results of the previous study are consistent with these findings and underscore the importance of recognizing anxiety as a crucial factor in both coping with and understanding the impact of MS on participants' health and well-being.

Given the multitude of factors that influence a person's balance and quality of life, it would be prudent to evaluate a variety of parameters in studies of this type.

5. Conclusion

Our research highlights the relationship between disease duration, balance problems, anxiety and depression symptoms, and quality of life in people with MS. Apart from our study, which concludes that while physical parameters are emphasized in the literature, psychosocial status and quality of life should also be emphasized, comprehensive studies that include the assessment of the relationships between the cognitive status of affected people and these parameters are recommended for future studies. Such an approach ensures a comprehensive understanding of the participant and takes into account their lifestyle factors. Incorporating these considerations into rehabilitation practice is essential for more personalized and effective care for MS patients.

Authors Contributions

Topic selection: SB, GE; Design: SB, GE; Planning: SB, GE; Data collection: SB, GE; Data analysis: GE; Article writing: SB; Critical review: GE.

Conflict of Interest

We confirm that there is no conflict of interest.

References

Algahtani, H., Shirah, B., & Alassiri, A. (2017). Tumefactive demyelinating lesions: a comprehensive review. Multiple Sclerosis and Related Disorders, 14, 72-79. https://doi.org/10.1016/j.msard.2017.04.003

Alghwiri, A. A., Khalil, H., Al-Sharman, A., & El-Salem, K. (2018). Depression is a predictor for balance in people with multiple sclerosis. Multiple Sclerosis and Related Disorders, 24, 28-31. https://doi.org/10.1016/j.msard.2018.05.013

Baumstarck, K., Pelletier, J., Butzkueven, H., Fernandez, O., Flachenecker, P., Idiman, E., Stecchi, S., Boucekine, M., Auquier, P., & Group, M. S. (2013). Health-related quality of life as an independent predictor of long-term disability for patients with relapsing–remitting multiple sclerosis. European Journal of Neurology, 20(6), 907-e979. https://doi.org/10.1111/ene.12087

Cameron, M. H., & Lord, S. (2010). Postural control in multiple sclerosis: implications for fall prevention. Current neurology and neuroscience reports, 10, 407-412. https://doi.org/10.1007/s11910-010-0128-0

Cattaneo, D., De Nuzzo, C., Fascia, T., Macalli, M., Pisoni, I., & Cardini, R. (2002). Risks of falls in subjects with multiple sclerosis. Archives of physical medicine and rehabilitation, 83(6), 864-867. https://doi.org/10.1053/apmr.2002.32825

Corresponding author: fztgamze@yahoo.com

DOI: 10.56061/fbujohs.1456898:
ORIJINAL ARTICLE

Cavanaugh, J. T., Gappmaier, V. O., Dibble, L. E., & Gappmaier, E. (2011). Ambulatory activity in individuals with multiple sclerosis. Journal of neurologic physical therapy, 35(1), 26-33. https://doi.org/10.1097/npt.0b013e3182097190

Chwastiak, L. A., & Ehde, D. M. (2007). Psychiatric issues in multiple sclerosis. Psychiatric Clinics of North America, 30(4), 803-817. https://doi.org/10.1016/j.psc.2007.07.003

Comber, L., Galvin, R., & Coote, S. (2017). Gait deficits in people with multiple sclerosis: A systematic review and meta-analysis. Gait & posture, 51, 25-35. https://doi.org/10.1016/j.gaitpost.2016.09.026

Filippi, M., Rocca, M. A., Ciccarelli, O., De Stefano, N., Evangelou, N., Kappos, L., Rovira, A., Sastre-Garriga, J., Tintorè, M., & Frederiksen, J. L. (2016). MRI criteria for the diagnosis of multiple sclerosis: MAGNIMS consensus guidelines. The Lancet Neurology, 15(3), 292-303. https://doi.org/10.1016/s1474-4422(15)00393-2

Giovannetti, A. M., Brambilla, L., Torri Clerici, V., Antozzi, C., Mantegazza, R., Černiauskaitė, M., & Confalonieri, P. (2017). Difficulties in adjustment to multiple sclerosis: vulnerability and unpredictability of illness in the foreground. Disability and Rehabilitation, 39(9), 897-903. https://doi.org/10.3109/09638288.2016.1170212

Hainaut, J.-P., Caillet, G., Lestienne, F. G., & Bolmont, B. (2011). The role of trait anxiety on static balance performance in control and anxiogenic situations. Gait & posture, 33(4), 604-608. https://doi.org/10.1016/j.gaitpost.2011.01.017

Hanna, M., & Strober, L. B. (2020). Anxiety and depression in Multiple Sclerosis (MS): Antecedents, consequences, and differential impact on well-being and quality of life. Multiple Sclerosis and Related Disorders, 44, 102261. https://doi.org/10.1016/j.msard.2020.102261

Idiman, E., Uzunel, F., Ozakbas, S., Yozbatiran, N., Oguz, M., Callioglu, B., Gokce, N., & Bahar, Z. (2006). Cross-cultural adaptation and validation of multiple sclerosis quality of life questionnaire (MSQOL-54) in a Turkish multiple sclerosis sample. Journal of the neurological sciences, 240(1-2), 77-80. https://doi.org/10.1016/j.jns.2005.09.009

Jamroz-Wiśniewska, A., Papuć, E., Bartosik-Psujek, H., Belniak, E., Mitosek-Szewczyk, K., & Stelmasiak, Z. (2007). Validation of selected aspects of psychometry of the Polish version of the Multiple Sclerosis Impact Scale 29 (MSIS-29). Neurologia i Neurochirurgia Polska, 41(3), 215-222.

Jones, B. (2014). Patients' Perspectives in Multiple Sclerosis: Uncertainty and Anxiety Hinder Psychological Wellbeing. [Unpublished doctoral dissertation]..University of Surrey (United Kingdom).

Jones, K. H., Ford, D. V., Jones, P. A., John, A., Middleton, R. M., Lockhart-Jones, H., Peng, J., Osborne, L. A., & Noble, J. G. (2013). How people with multiple sclerosis rate their quality of life: an EQ-5D survey via the UK MS register. PLoS One, 8(6), e65640. https://doi.org/10.1371/journal.pone.0065640

Klevan, G., Jacobsen, C., Aarseth, J., Myhr, K. M., Nyland, H., Glad, S., Lode, K., Figved, N., Larsen, J., & Farbu, E. (2014). Health related quality of life in patients recently diagnosed with multiple sclerosis. Acta Neurologica Scandinavica, 129(1), 21-26. https://doi.org/10.1111/ane.12142

LaRocca, N. G. (2011). Impact of walking impairment in multiple sclerosis: perspectives of patients and care partners. The Patient: Patient-Centered Outcomes Research, 4, 189-201. https://doi.org/10.2165/11591150-000000000-00000

Margoni, M., Preziosa, P., Rocca, M. A., & Filippi, M. (2023). Depressive symptoms, anxiety and cognitive impairment: emerging evidence in multiple sclerosis. Translational Psychiatry, 13(1), 264. https://doi.org/10.1038/s41398-023-02555-7

McNicholas, N., Tubridy, N., Hutchinson, M., & McGuigan, C. (2021). Perceived and objective cognitive impairment in newly diagnosed versus established multiple sclerosis: impact of disease duration. Irish Journal of Medical Science (1971-), 190, 1149-1154. https://doi.org/10.1007/s11845-020-02404-2

Corresponding author: fztgamze@yahoo.com

DOI: 10.56061/fbujohs.1456898:
ORIJINAL ARTICLE

Middleton, A., Fritz, S. L., & Lusardi, M. (2015). Walking speed: the functional vital sign. Journal of aging and physical activity, 23(2), 314-322. https://doi.org/10.1123/japa.2013-0236

Nilsagård, Y., Lundholm, C., Denison, E., & Gunnarsson, L.-G. (2009). Predicting accidental falls in people with multiple sclerosis—a longitudinal study. Clinical rehabilitation, 23(3), 259-269. https://doi.org/10.1177/0269215508095087

Pacheco-Unguetti, A. P., Acosta, A., Callejas, A., & Lupiáñez, J. (2010). Attention and anxiety: Different attentional functioning under state and trait anxiety. Psychological science, 21(2), 298-304. https://doi.org/10.1177/0956797609359624

Paker, N., Bugdayci, D., Midik, M., Celik, B., & Kesiktas, N. (2013). Reliability of the Turkish version of the hospital anxiety and depression scale in the people with traumatic spinal cord injury. NeuroRehabilitation, 33(2), 337-341. https://doi.org/10.3233/nre-130964

Patti, F., Russo, P., Pappalardo, A., Macchia, F., Civalleri, L., Paolillo, A., & Group, F. S. (2007). Predictors of quality of life among patients with multiple sclerosis: an Italian cross-sectional study. Journal of the neurological sciences, 252(2), 121-129. https://doi.org/10.1016/j.jns.2006.10.017

Sahin, F., Yilmaz, F., Ozmaden, A., Kotevoglu, N., Sahin, T., & Kuran, B. (2008). Reliability and validity of the Turkish version of the Berg Balance Scale. Journal of geriatric physical therapy, 31(1), 32-37. https://doi.org/10.1519/00139143-200831010-00006

Siegert, R. J., & Abernethy, D. (2005). Depression in multiple sclerosis: a review. Journal of Neurology, Neurosurgery & Psychiatry, 76(4), 469-475. https://doi.org/10.1136/jnnp.2004.054635

Solomon, A. J., Arrambide, G., Brownlee, W. J., Flanagan, E. P., Amato, M. P., Amezcua, L., Banwell, B. L., Barkhof, F., Corboy, J. R., & Correale, J. (2023). Differential diagnosis of suspected multiple sclerosis: an updated consensus approach. The Lancet Neurology, 22(8), 750-768. https://doi.org/10.1016/s1474-4422(23)00148-5

Sosnoff, J. J., Socie, M. J., Boes, M. K., Sandroff, B. M., Pula, J. H., Suh, Y., Weikert, M., Balantrapu, S., Morrison, S., & Motl, R. W. (2011). Mobility, balance and falls in persons with multiple sclerosis. PLoS One, 6(11), e28021. https://doi.org/10.1371/journal.pone.0028021

Thompson, A. J., Banwell, B. L., Barkhof, F., Carroll, W. M., Coetzee, T., Comi, G., Correale, J., Fazekas, F., Filippi, M., & Freedman, M. S. (2018). Diagnosis of multiple sclerosis: 2017 revisions of the McDonald criteria. The Lancet Neurology, 17(2), 162-173. https://doi.org/10.1016/s1474-4422(17)30470-2

Tingey, J. L. (2020). Intolerance of uncertainty and resilience predict self-efficacy trajectories of individuals newly diagnosed with multiple sclerosis Seattle Pacific University]. https://doi.org/10.1037/rep0000487

Vickrey, B., Hays, R., Harooni, R., Myers, L., & Ellison, G. (1995). A health-related quality of life measure for multiple sclerosis. Quality of life research, 4(3), 187-206. https://doi.org/10.1007/bf02260859

Yamout, B., Issa, Z., Herlopian, A., El Bejjani, M., Khalifa, A., Ghadieh, A., & Habib, R. (2013). Predictors of quality of life among multiple sclerosis patients: a comprehensive analysis. European Journal of Neurology, 20(5), 756-764. https://doi.org/10.1111/ene.12046

Zigmond, A. S., & Snaith, R. P. (1983). The hospital anxiety and depression scale. Acta psychiatrica scandinavica, 67(6), 361-370. https://doi.org/10.1111/j.1600-0447.1983.tb09716.x

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