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Back Pain and Musculoskeletal Disorders in Multiple Sclerosis

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Abstract

Introduction: Musculoskeletal disorders and back pain can occur as a result of irregular, asymmetric movement patterns and postures due to muscular weakness, spasticity or imbalance in Multiple Sclerosis (MS).

The aim was to investigate musculoskeletal disorders and risk factors of low back pain in MS patients.

Methods: In this study, patients followed in our large MS centre with confirmed MS with an EDSS score between 4 to 7 were selected. Data of MS history, pain, musculoskeletal disorders, muscle strength and spasticity in lower limbs were collected.

Results: 190 patients were included. The mean age of the patients was 54.9 ± 9.2 years and 32.1% participants were man. The mean disease duration was 19.3 ± 9.9 years, and the median EDSS score was 6. 48.9% of patients had a secondary progressive form and 27.4% had a relapse remitting form. The most common musculoskeletal disorders were: knee osteoarthritis (7.9%), claw toe (6.8%) and genu recurvatum (6.3%). The prevalence of low back pain was 41.6% and was higher in patients with a progressive form (secondary: OR=2.96 (p=0,0079) and primitive OR=2.63; p=0.0398)) or a visual dysfunction at EDSS score (OR=1.41 (p=0.0124)) and decreased in male patients (OR= 0.31 (p=0.0014)).

Conclusions: A progressive form of MS and visual dysfunction increased the risk of low back pain in these patients.

Keywords: Back pain; Multiple sclerosis; Musculoskeletal; Osteoarthritis

Abbreviations: MS: Multiple Sclerosis

Introduction

Multiple Sclerosis (MS) is an inflammatory demyelinating chronic disease of central nervous system [1]. It's the most common cause of severe non traumatic disability in young adult. Spasticity is a common symptom of MS. Indeed, 80% of patients report spasticity [2,3]. This symptom could induce abnormal pattern of ambulation, gait impairments, or pain [4-8]. The prevalence of pain in MS has ranged from 29 to 86% [9]. Two different definitions of pain were used in studies: neuropathic and nociceptive pains. Etiologies of nociceptive pain haven't been identified. Several authors suggested that asymmetric posture, walking impairments, spasticity could induce nociceptive pain [10,11].

In general population, osteoarthritis and back pain are very common condition. The prevalence of back pain is in the range of 5 to 22% [12], and significantly limits work and daily activity. Osteoarthritis is one of the most common disease in adults, and concerns 22.7% of population [13]. 25% of patients with osteoarthritis are restricted in major activities of daily living.

Musculoskeletal disorders and their causes are not well understood in MS. The prevalence of back pain is ranged from 10 to 16% [9]. The most common cause is low back pain, with a prevalence of 21.4% [14]. Asymmetric posture, walking impairment, muscle weakness, sensitive dysfunction and spasticity could cause these pains and musculoskeletal disorders [15]. Azar study's showed in 115 MS patients that knee, ankle, and wrist pains were the most frequent during the past 6 months [16]. Men experienced more shoulder pain than women, and ankle and back pain were significantly higher in women compared with men. In addition, this study showed that the mean disease duration was a risk factor of intensive pain.

The aim of this study was to determine the prevalence of musculoskeletal disorders in patients with MS with an EDSS score from 4 to 7, and to evaluate risk factors of low back pain in these patients.

Methods

This study was designed as a single center retrospective study in a large medical MS center in Saint Philibert Hospital in Lomme, France. We included all patients who had an established diagnosis of MS with Mc Donald criteria, with an EDSS score from 4 to 7, from November 2013 to April 2014. The project was reviewed and approved by local ethical committee.

Data were collected by interviews and clinical exams of patients, which were realized by a rehabilitation physician. Socio demographic data, orthopaedic disorders, history of MS, medical treatments, physiotherapy, and if patient used a walking aid were collected. The Numeric Rating Scale (NRS) was used to measure pain severity (from 0 to 10). 0 represents no pain, and 10 represent the worst painful sensation. Clinical exam was performed for each patient, and included lower limbs muscle testing with Medical Research Council Scale, and with Lower Extremity Manual Muscle Test score [17]. Spasticity was evaluated with modified Ashworth scale in lower limbs [18]. Musculoskeletal disorders were noted. Diagnosis of osteoarthritis was confirmed by a radiological exam that patient has done before our study. Tendinotis and sprain were diagnosed at the clinical exam. Patients who had a meniscus injury had done a scan to confirm the damage. Functional parameters of EDSS score were evaluated by a neurologist.

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Statistics

All data analysis was performed using sofware R [19]. Descriptive statistics were used to evaluate medians, inter-quartile ranges for continuous variables and frequencies for non-contiguous measures. Then, we compared MS patients with low back pain against MS patients without low back pain. Significance level was set at p=0.05. Variables that were lower than 0.2 in the univariate analysis were included in the logistic regression model examining factors associated with low back pain in patients with MS. Conditional forward and backward models were performed on Akaike Information Criterion. These criteria estimate the quality of each model, relative to each of the other models. The model with a lowest Akaike Information Criterion value indicates a higher quality. Receiver Operating Characteristic curves of the forward and backward models were performed. Significance level was set at p=0.05.

Results

200 patients were recruited. 190 patients were included. 10 patient's files were incomplete and were excluded. Among 190 patients with a mean age of 54.9 ± 9.2 years, 32.1% were males, with a median EDSS score at 6 [1]. 27.4% of patients had a relapsing remitting from of MS, 23.7% had a primary progressive form and 48.9% had a secondary progressive form. The mean disease duration was 19.3 ± 9.9 years. 29.5% of patients practiced a regular physical activity and 84.7% had a physiotherapy session. 27.9% of patients used a single walking stick, 53.7% used a wheelchair, a walker or more than one walking aid.

Among 190 patients, 90 of them were fallen at least one during 6 months.

50% of patients were painful at the moment of the clinical exam, and 40% of them had a NRS score upper than 5, 6.8% had radiculopathy, 6.3% had knee pain, 3.2% had shoulder pain, 3.2% had hip pain.

Table 1 summarizes the prevalence of musculoskeletal disorders. Prevalence of history of rheumatologic or orthopaedic diseases was very low: 3 patients had a spinal canal stenosis, 1 patient had ankylosing spondylitis. 8.5% of patients had a history of upper limb fracture, 17% a lower limb fracture and 4.5% had spine fracture.

Variables	Prévalence (%)
Musculoskeletal disorders	
Knee recurvatum	6.3
Knee flexion deformity	1.1
Equinus foot	5.3
Valgus foot	1.1
Varus foot	3.2
Toe claw	6.8
Hallux valgus	1.1
Hand claw	0.5
Scoliosis	1.1
Osteoarthrisis	
Lumbar spine osteoarthrisis	3.2
Cervical Spine osteoarthrosis	3.2
Thoracic spine osteoarthrosis	2.1
Hip osteoarthrosis	3.7
Knee osteoarthrosis	7.9
Tendinitis	
Elbow	1.1
Hip muscle flexor	0.5
Knee muscle flexor	0.5
Hip muscle abductor	1.1
Rotator cuff	5.8
Sprain	
Knee	2.1
Ankle	5.3

Table 1: Prevalence of musculoskeletal disorders.

Variables	Prevalence (%)
Hip	3.2
Knee	6.3
Shoulder	3.2
Ankle	0.5
Radiculopathy	6.8
Low back pain	41.6
Thoracic back pain	2.1
Cervical pain	3.2

Table 2: Prevalence of musculoskeletal and back pains at the moment of the clinical exam.

Variables	Without low back pain (n=111)	With low back pain (n=79)	*p*
EDSS	6 (1)	6 (1)	0.9194
Functional parameters			
Pyramidal function	3 (1)	3 (1)	0.5585
Cerebellar function	1 (2)	1 (2)	0.4686
Cerebral trunk function	1 (2)	2 (1.5)	0.9252
Sensitive function	2 (3)	3 (1)	0.0607
Bowel and urinary disorders function	2 (2)	2 (1)	0.1304
Visual function	0 (1)	1 (2)	**0.0182**
Cerebral function	0 (2)	1 (2)	0.5594
LEMMT Score			
Right	4 (1.5)	3.9 (1.3)	0.8088
Left	4.1 (1.6)	4.1 (1)	0.613
Ankle	4.2 (1.3)	4.2 (0.8)	0.8073
Knee	4.4 (1.1)	4.4 (0.6)	0.919
Hip	3.7 (1.6)	3.7 (1.1)	0.9892
NA (%)		1.3	
Spasticity (%)			
Knee extensor muscle			
Left	14.4	12.7	0.8942
Right	18	15.2	0.7514
Ankle extensor muscle			
Left	36.9	41.8	0.6012
Right	52.3	49.4	0.8066
Hip adductor muscle			
Left	11.7	10.1	0.9134
Right	18	11.4	0.2951

Note: values are mean ± SD, n, median (IQR) or otherwise indicated.
Abbreviations: EDSS: Expanded Disability Status Scale; LEMMT: Lower Extremity Manual Muscle Test; IQR: Interquartile Range; NA: Not Applicable.

Table 3: Clinical exam data of MS patients.

The prevalence of back pain and musculoskeletal pains are described in Table 2.

Then, we compared MS patients with low back pain against MS patients without low back pain. There was no difference between groups for socio demographic data, mean disease duration, and walking aid. MS patients with low back pain take more painkillers (p=0.0414), and had more a progressive MS form (p=0.0304) than patients without low back pain. Female patients presented more significant low back pain than male patients (p=0.0052). Clinical exam data are summarized in Table 3. In term of localisation and pain intensity, MS patients with low bak pain were more painful ($p < 0.0001$) and had more radiculopathy than patients without low back pain (p=0.036).

Variables	Estimate (β)	SE	*p*	OR
Male	-1.185	0.372	0.0014	0.306
MS form				
Primary progressive	0.967	0.47	0.0398	2.629
Secondary progressive	1.085	0.408	0.0079	2.958
EDSS visual function	0.345	0.138	0.0124	1.411
EDSS bowel and urinary disorders	0.228	0.152	0.1322	1.257
AIC = 238,72				

Note: MS: Multiple Sclerosis; AIC: Akaike Information Criterion; EDSS: Expanded Disability Status Scale

Table 4: Results of multivariate analysis.

Multivariate analysis

The results of the multivariate analysis found risk factors of low back pain in MS patients were a progressive form of MS and altered visual function at EDSS score. Table 4 summarizes the results of multivariate analysis. No difference was observed between forward and backward stepwise models. Low bak pain was higher in patients with a progressive form (secondary: OR=2.96 (p=0.0079) and primitive OR=2.63; p=0.0398)) or a visual dysfunction at EDSS score (OR=1.41 (p=0.0124)) and decreased in male patients (OR=0.31 (p=0.0014)).

Discussion

To our knowledge, this is the first study reporting the prevalence of musculoskeletal disorders in patients with MS. Knee osteoarthritis (7.9%), toe claws (6.8%), knee recurvatum (6.3%), rotator cuff tendinitis (5.8%) were most common.

In the literature, only two clinical cases were reported for knee osteoarthritis in MS patients. In this observational study, 2 MS patients had a severe osteoarthritis and a total knee replacement was performed and improved walking impairments [20]. In our study, we observed a low prevalence of knee osteoarthritis. This result could explain because only patients with a history of knee osteoarthritis were collected. Asymmetric posture, difficulty in ambulation can be predisposing factors of knee osteoarthritis in these patients.

Moreover, osteoarthritis can induce neuropathic pain too, and it can participate to under-diagnosed and under-treated knee osteoarthritis.

In compared of spinal cord injury population or patients with a stroke history, prevalence of musculoskeletal disorders seemed very low in our study. This result could be explained because patients in our study weren't very spastic, and they had a moderate muscle weakness.

We can hypothesize that MS patients with walking impairments could be a population at risk of osteoarthritis and tendinitis, and it could be important to prevent these complications. Indeed, these patients use one or more walking aids, according to their state of fatigue. With growing use of walking aids during the evolution of the disease, they could improve osteoarthritis and tendinitis. The low rate of tendinitis in our study may be related to the partial use of wheelchair, unlike the spinal cord injury patient [21]. In addition, motor impairment of the upper limb was not evaluated in our study. Severe muscle weakness could improve lesions of the rotator cuff, as in stroke patients [22].

50% of patients were painful at the moment of the clinical exam. Several studies found similar prevalence of pain at the moment of the exam (43-54%) [9,23,24]. In our finding, the pain was moderate to severe in 40% of patients. The systematic review of literature of O'Connor for pain in patients with MS showed that patients had an average of pain intensity ranging from 4.8 to 5.8 with NRS [9]. Greater pain severity has been found to be associated with female sex, increased age and disability score, progressive disease [9].

Our finding suggests that low back pain in MS patients was very common with a prevalence of 41.6%. This prevalence was higher than several studies in literature. In fact, in these studies, only 10 to 21.4% of patients reported low back pain [11,14,23-25]. These differences could be explained by using different definitions and methods to collect this information. In a recent study, 30.4% of patients 7 days preceding interview and 38.3% of patients 12 months preceding interview reported back pain [16]. The higher prevalence of low back pain in our study could explain by an older population, longer mean disease duration and a more disability score. Compared to general population, the prevalence of low back pain was higher too. This result suggests that there are specific factors which induce or could induce low back pain in patients with walking impairments, in MS.

It would be interesting to do a radiological exam in MS patients with back pain. Indeed, motor and sensory disturbances may induce static spinal disorders. These changes may improve pain in these patients.

Only radiculopathy were associated with low back pain in our finding. Neuropathic pains are common in MS patients, and represent one third of type of pain [9]. Nonetheless, MS patients with low back pain and radiculopathy could present discal hernia or nerve compression.

Moreover, musculoskeletal pains could induce or increase neuropathic pain. Several studies showed neuropathic pain in musculoskeletal disorders such as osteoarthritis [26].

In the present study, we found risk factors of low back pain in MS patients. A progressive form and altered visual function at EDSS score increased the risk of low back pain. Patients with a progressive form are more at risk than others to have neuropathic or nociceptive pains [9]. Visual dysfunction is common in patients with MS [27]. It's well known that human upright posture depends of integration and organization of spatial references. One of them is vision. In MS, optic neuritis, contrast sensitivity and colour perception are the most common ocular manifestation [28]. These symptoms could affect stereoscopic vision. Moreover, neck posture and oculomotor system are associated. A visual dysfunction could induce asymmetric posture of the neck [29]. Modification of muscle activation of the neck occurs a result of changes in thoraco-lumbar postures, and could increase pain in low back pain in MS patients [30].

Study Limitations

There are several limitations of our study, due to its nature. Osteoarthritis diagnose was performed in patients who had done an X-ray before the exam. Moreover, our population was specific, only patients with walking impairments were included.

Conclusion

Musculoskeletal disorders are common in MS patients with walking impairments. Risk factors of low bak pain are a progressive form of MS and altered vision at EDSS score.

Disclosure of Interest

None declared. No financial support was received for any part of this study. We have no conflict of interest.

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