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Lumbar Pain in Patients with Multiple Sclerosis and Knowledge about Physiotherapeutic Methods of Combating

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Abstract: Background. The purpose of the study was to evaluate the intensity and frequency of low back pain (LBP) in people with multiple sclerosis (PwMS) and the patient's knowledge of physiotherapeutic methods of combating. **Methods.** In this study, patients with confirmed multiple sclerosis were selected. The study was carried out using an original survey questionnaire and a numerical pain intensity scale (Visual Analogue Scale). PwMS were divided into 3 age groups: 18-30 years, 31-50 years, and over 50 years. **Results.** Ninety PwMS (68 women and 22 men) aged 18 to 60 years were included in the study. The mean duration of the disease was 9.5±4.9 years, and the mean EDSS was 3.5±1.6. Most of the patients had a relapse-remitting form. 68.9% of PwMS felt lower back pain (n = 62). The relationship tested was statistically significant (p=0.0000012), and the strength of the relationship was high (r_c=0.695). The average level of low back pain among PwMS was 4.7 out of 10 on the VAS scale. The prevalence of LBP was higher in female patients (p<0.001), with a secondary progressive form (p<0.001) and with a longer duration of the disease (p=0.023). The most widely used methods of LBP therapy were kinesitherapy and manual therapy. **Conclusions.** LBP is common in multiple sclerosis. A female sex, a secondary progressive form of MS, and a longer duration of the disease increased the risk of LBP. It is important to implement properly planned physiotherapy activities and educate patients on how to combat LBP.

Keywords: low back pain (LBP); multiple sclerosis (MS); comprehensive rehabilitation; physiotherapy

1. Introduction

Spinal pain (dorsalgia) is a term that describes the feeling of pain along the spine and paraspinal muscles of chronic (long-term occurrence for 3 months) or acute (short-term, intense, lasting up to 3 months). They are one of the most common disorders of the musculoskeletal system in adults, and more than 3/4 of the population suffers or will suffer from them at least once in their lives. According to available epidemiological data, approximately 90% of cases involve pain of unknown aetiology, and the potential hypothesis is largely related to overload, for example, heavy physical work, other comorbidities, sedentary lifestyle, psychosocial disorders, or obesity. The problem can affect any of the five sections of the spine, but the vast majority of patients report problems in the lumbar-sacral and cervical areas. Furthermore, disorders in the spine area can be related to a lack of physical activity during the day (including the lack of spontaneous physical activity, for example choosing the elevator instead of stairs or using only the car instead of walking), but also to sedentary lifestyle and remote work, which significantly contributed to progressive pain [1–3].

Lumbar spine pain (LBP) is a multifactorial global disease and one of the three most common causes of disability in Poland (just after ischemic heart disease and stroke). According to 2017, a problem in the lower spine was reported in approximately 7.5% of the population (approximately 577 million people) [4]. The problem is estimated to have affected more than half of the people living

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in Poland in 2019, and pain was reported more frequently in men than in women (difference of approximately 7%). The problem was reported much more frequently by people aged 15 to 49 years (more than ¾ of the group) than by people over 50. This problem may be related to a greater workload than in the older group of respondents, but also to socioeconomic or health factors. It should be noted that older people have more time to see doctors and recover, which means that this problem is recognised faster and appropriate treatment is implemented to improve the functional condition of the patient and reduce pain [5,6].

A crucial issue worth mentioning in the context of analysing lower back pain is the number of hospitalisations for this problem. This problem is especially visible in women in retirement (over 60 years of age) and in men before retirement (below 65 years of age). Furthermore, for several years, there has been an increase in hospitalisations due to lumbar spine pain among rural residents, both among women and men. The reasons for this phenomenon can be found in difficult working conditions (lack of appropriate equipment, lack of training, lack of education in the field of physioprophylaxis) or socioeconomic conditions (lack of help from relatives, lack of money for treatment, lack of time to look for the causes of the disease due to duties). The hospitalisation rate for LBP in Poland is the lowest in Europe, but it should be noted that the average hospitalisation time is statistically longer than in other European and non-European countries. The early implementation of physical therapy and preventive methods should be important for the continued functioning of patients. A big problem in Poland is the lack of public health education and knowledge on the counteracting of spine pain. Half of the population with this problem is estimated to decide to seek the help of a specialist only when pain significantly prevents them from functioning in the professional and/or social environment [7].

Multiple sclerosis is a progressive and inflammatory demyelinating disease of the nervous system that affects a large number of young people, regardless of location (both in developed and developing countries), making it a global disease to a large extent [8]. The cause of its occurrence is still unclear, but the analysed literature shows the great diversity and influence of external factors on the development of the disease. Currently, the number of people suffering from multiple sclerosis in the world is approximately 2.900,000, and the majority of them live in European areas (incidence rate 133:100,000). The most frequently found information on multiple sclerosis is that the disease is more common in women (2:1 - developing countries or 3:1 for developed countries) than in men. Patients with multiple sclerosis learn about their disease more frequently between the ages of 25 and 35, and diagnosis is associated with numerous changes in their lives [9]. Symptoms of the disease that occur in people with multiple sclerosis can take different forms depending on the location of the lesions in the brain and/or spinal cord. Patients often struggle with problems in the upper and/or lower extremities in the form of paresis or spasticity. In addition, they experience changes in the perception of stimuli such as vibration, pain, touch, or temperature. Problems with double vision, nystagmus, or damage to the trigeminal nerve (V) and/or facial nerve (VII) often occur. On the other hand, patients report sphincter disorders (urinary and/or fecal incontinence) and sexual problems. The course of the disease varies in each person, so it is important to approach the problem individually and introduce appropriate therapy depending on the patient's functional status, abilities, and general motivation [8–11].

The purpose of the study was to evaluate the intensity and frequency of low back pain in patients with multiple sclerosis and to evaluate the knowledge of patients about physiotherapeutic methods of combating.

2. Materials and Methods

The study was conducted between March 2023 and May 2023 using an original survey questionnaire and a numerical pain intensity scale (the Visual Analogue Scale). Completion of the survey took 10 minutes and was completely voluntary. Informed consent was obtained from all study participants and consent was obtained for publication of the results. Multiple sclerosis was diagnosed according to McDonald's 2017 criteria. The degree of individual disability was assessed according to the *Extended Disability Status Scale.*

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The study was carried out according to the Declaration of Helsinki and in accordance with the applicable law in the Republic of Poland. The Ethics Committee did not seek consent because the study was not a medical experiment, but an observational study. For this reason, we did not seek the approval of the Commission. The results obtained were subjected to statistical analysis using the Statistica 13.3 programme, with particular emphasis on the percentage distribution in individual groups, the nonparametric chi-square test, and the evaluation of the strength of the above relationships. Statistical significance was established at $p < 0.05$.

The study involved 90 people with multiple sclerosis, aged 18 to 60 years (mean age 42.4± 12.6). The mean duration of the disease was 9.5±4.9 years, and the mean EDSS was 3.5±1.6. 74.4% of the patients had a relapse-remitting form and 17.8 % had a secondary progressive form. The respondents were divided into 3 age groups: 18-30 years old (57 people, 63.3%), 31-50 years old (23 people, 25.6%) and over 50 years old (10 people, 11.1%). The vast majority of the group were women (68 people, 75.6%) compared to a smaller group of men (22 people, 24.4%). Most of the respondents live in small or large cities (n=70, 77.8%) compared to a smaller group of people who live in rural areas (n=20, 22.2%). In both the women and men groups, the most common places were living in urban areas, 77.9% of the women group (n=53) and 77.3% of the men group (n=17), respectively. Rural areas are inhabited by 22.1% (n=15) of women and 22.7% (n=5) of men. When asked about the education of the respondents, most declare that they have completed secondary school (n=36, 40%) and higher education (n=32.2%). Demographic and clinical data are presented in Table 1.

Table 1. Demographic and clinical characteristics of patients.

Characteristics/group	**Male, *n* = 22**	**Female, *n* = 68**	**Total, n = 90**
Age (years) *n*, (%)			
18 – 30	15 (16.7)	42 (46.6)	57 (63.3)
31 – 50	5 (5.6)	18 (20.0)	23 (25.6)
50+	2 (2.2)	8 (8.9)	10 (11.1)
Place of residence, *n* (%)			
Small/big city	17 (18.9)	53 (58.9)	70 (77.8)
Village	5 (5.6)	15 (16.7)	20 (22.2)
Education, *n* (%)			
Primary	10 (11.1)	15 (16.7)	25 (27.8)
Secondary	8 (8.9)	28 (31.1)	36 (40.0)
University	4 (4.4)	25 (27.8)	29 (32.2)
Subtypes of disease course, *n* (%)			
Relapsing-Remitting	15 (16.7)	52 (57.8)	67 (74.4)
Primary Progressive	2 (2.2)	5 (5.6)	7 (7.8)
Secondary Progressive	5 (5.6)	11 (12.2)	16 (17.8)
EDSS score (mean ± SD)	3.2 ± 1.2	3.7 ± 1.8	3.5 ± 1.6
Duration of the disease (years, mean ± SD)	9.7 (5.1)	9.3 (4.8)	9.5 (4.9)

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3. Results

Most of the people who participated in the study reported pain in the lumbar spine. LBP was felt by 68.9% of the group (n=62), while no problem was observed in 31.1% of the group (n=28). Significant differences were visible depending on the gender of the respondent. Pain in the lumbar spine was reported more frequently by women (n=56, 82.4% of the group) than by men (n=6, 27.3% of the group). 17.7% (n=12) of the women's group and 72.7% (n=16) of the men's group did not report the problem. The relationship tested was statistically significant ($p=0.0000012$, $x^2=23.558 > x^2=10.828$, df=1), and the strength of the relationship was high ($r_c=0.695$). The prevalence of low back pain was higher in patients with a secondary progressive form ($p<0.001$), and with a longer duration of the disease ($p=0.023$). Detailed numerical data are presented in Table 2.

Table 2. Lumbar pain in patients with multiple sclerosis.

Patients	Patients with LBP *n* = 62	Patients without LBP *n* = 28	Total *n* = 90	*P*-value
Gender, *n* (%)				
Male	6 (9.7)	16 (57.1)	28 (31.1)	0.45
Female	56 (90.3)	12 (42.9)	62 (68.9)	< 0.001
Age (years, mean ± SD)	46.5 (13.4)	36.7 (10.4)	42.4 (12.6)	< 0.001
Duration of the disease (years, mean ± SD)	12.1 (4.4)	7.1 (3.2)	9.5 (4.9)	0.023
Clinical course, *n* (%)				
Relapsing-Remitting	42 (67.4)	24 (85.7)	66 (73.3)	0.085
Primary Progressive	4 (6.4)	3 (10.7)	7 (7.8)	0.595
Secondary Progressive	16 (25.8)	1 (3.6)	17 (18.9)	<0.001
EDSS score (mean ± SD)	4.6 (2.2)	2.4 (1.2)	3.5 (1.6)	0.015

Another crucial variable that was analysed in the study is the level of intensity of lumbar spine pain in people with multiple sclerosis depending on sex. In this case, a numerical pain intensity scale (the Visual Analogue Scale) was used, with the following intensity levels marked:

1. 0 - without pain;
2. 1-3 - mild pain;
3. 4 -7 - moderate pain;
4. 8-9 - strong pain;
5. 10 - unbearable pain.

In relation to the entire study group (n = 90, 100%), more than 31.11% (n = 28) of the study (n=90, 100%), more than 31.11% (n=28) of the people reported no recent pain in the lumbar spine. Mild and very severe pain was reported by the same number of people (n=16, 17.78%). Moderate pain was recorded in 26.67% of the group (n=24), and the most severe pain, preventing daily functioning and professional work, was recorded in 6.67% of the group (n=6). Significant differences in the intensity of lumbar spine pain are visible in the sex groups. Women (n=56, 82.35% of the female group) reported lumbar spine pain (from 1 to 10 on the VAS scale) lumbar spine pain much more frequently than men (n=6, 27.27%). Pain was not observed in 17.65% of the women's group (n=12) and 72.73% of the men's group (n=16). Women reported the most pain of moderate intensity (n=23, 33.82%) and mild intensity (n=15, 22.06%). Very severe pain and the most intense pain affected 19.12% (n=13) and 7.35% (n=5.56%) of the group of women, respectively. Men most often reported severe pain (n=3, 13.63%), and mild, moderate and very severe pain was observed by only one person in the group of men (n=1, 4.55%). The average level of low back pain among MS patients was 4.7 out of 10 on the

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VAS scale. The relationship tested was statistically significant (p=0.00005, x^2=24,919 > x^2=18,467, df=4), and the strength of the relationship was average (r_c=0.466). Detailed numerical data are presented in Table 3.

Table 3. Intensity of pain in the lumbar spine (visual analogue scale).

Intensity of pain	Female		Male		Total, n (%)
	n, % of the entire group	% of the female group	*n*, % of the entire group	% of the male group	
0	12 (13.33)	17.65	16 (17.78)	72.72	28 (31.11)
1-3	15 (16.67)	22.06	1 (1.11)	4.55	16 (17.78)
4 -7	23 (25.56)	33.82	1 (1.11)	4.55	24 (26.67)
8-9	13 (14.44)	19.12	3 (3.33)	13.63	16 (17.78)
10	5 (5.56)	7.35	1 (1.11)	4.55	6 (6.67)
Total, *n* (%)	68 (75.56)	100	22 (24.44)	100	90 (100)

The last part of the study was to evaluate the knowledge of patients with multiple sclerosis about the physiotherapeutic methods used to treat or reduce lumbar spine pain (multiple choice question). 65.55% of people with multiple sclerosis believe that the best and most effective method of physiotherapeutic treatment of lumbar spine pain is manual therapy. Kinesiotherapy also ranks very high with a score of 66.33%. Much less frequently, the respondents mentioned deep tissue massage (30.00%), trigger point therapy (26.67%) or kinesiotaping (24.44%). The respondents considered ultrasound treatment (2.22%) and heat therapy (8.89%) to be the least effective methods to combat lumbar spine pain. Electrotherapy (16.68%) and laser therapy (12.22%) also had low values. When it comes to the use of physiotherapy treatments for the lumbar spine pain, respondents most often used kinesitherapy (71.11%), manual therapy (46.67%), electrotherapy (43.33%) or laser therapy (36.67) at least once. The methods chosen least frequently were trigger point therapy (10.00%), kinesiotaping (14.44%) and deep tissue massage (16.67%). The least frequently chosen physical treatment was ultrasound (12.22%) and heat therapy (13.33%). The numerical data are presented in Table 4.

Table 4. The most effective physiotherapy methods used in the treatment of lumbar spine pain are used at least once in a lifetime.

Physiotherapy method	The most widely used method *n*, %	I have used at least once in my life. *n*, %
Manual therapy	59 (65,55)	41 (46,67)
Kinesitherapy	57 (63,33)	64 (71,11)
Deep tissue massage	27 (30,00)	15 (16,67)
Trigger-Point Therapy	24 (26,67)	9 (10,00)
Kinesiotaping	22 (24,44)	13 (14,44)
Electrotherapy	15 (16,68)	39 (43,33)
Laser therapy	11 (12,22)	33 (36,67)
Thermal therapy	8 (8,89)	12 (13,33)
Ultrasounds	2 (2,22)	11 (12,22)

4. Discussion

Lower back disorders are a civilised and global problem that affects the vast majority of the population at least once in their life, regardless of sex or age. Differences in the appearance of the problem are visible, especially in the group of professionally active people, and may be related to a sedentary lifestyle or lack of physical activity in daily life. A review of studies that included 33 separate cohorts and involved more than 11,000 participants showed that patients with acute or persistent low back pain improved in 4 to 6 weeks, but afterward the process slowed. It should also

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be mentioned that the study participants continued to report pain one year after the incident and the rate was much higher in the group of people with persistent pain [12]. When it comes to the presence of pain in patients with multiple sclerosis, research studies and clinical reports often show an inconsistent picture. Pain is often neuropathic in nature and the problem can affect more than 80% of patients, especially in the form of pain in the upper and/or lower extremities, neuralgia, spinal pain syndromes (especially cervical or lumbar) or head pain [13]. A review of the scientific literature shows that patients have back pain problems, and the incidence ranges from several percent to even 50%. During the literature analysis, a major problem was the lack of a clear indication of the location of the pain segment, which may significantly alter the test results obtained [14]. The research by Marck and coauthors [15] was carried out in a large number of respondents, and the main research tool was an online survey questionnaire. In the above work, the average age of the respondents was 45.5 years and more than 78% of the group were women, similar to our own research (75.56%). During the analysis of the results obtained, it was determined that 36.2% of the people reported pain problems in the spine, but the above analysis did not take into account the location of the pain in the spine, so it is difficult to compare the results obtained with our own results, which focused only on the analysis of lumbar spine pain. A different research technique was used in the study of patients in Lithuania, where the analysis was based on the characteristics of spine pain and its relationship with the quality of life of patients with multiple sclerosis. In the study, the control and study groups each consisted of 120 people, and the average age of people with multiple sclerosis was 44.0 years. This study revealed that lumbar spine pain was more common in people in the control group (40.0%) than in the study group (21.7%) [16]. Our own research was not supplemented with a control group, which may make it difficult to compare the results obtained and to perform a reliable analysis of the results obtained from the research. However, it is worth mentioning several publications that refer to the discussed topic. The same research results were carried out by other researchers, including Łabuz-Roszak and co-authors [17]. A group of 144 patients participated in the study, the vast majority of whom were women, which is a significant analogy to our own research, and the average age was 41 years (35.4 in our own research). Studies have shown that 50% of patients with multiple sclerosis struggle with spine pain and pain is most often moderate or severe (average value 5.6). Other studies carried out outside of Poland show the results collected in a group of 61 patients (44 women, 17 men) where 52% of people were observed to have lower back pain and the mean level of pain was 6.75 [18]. The authors of the above studies obtained similar research results, where the intensity of pain was assessed in a similar way (using The Visual Analog Scale). Lumbar spine pain was reported by 68.89% of the respondents, and the average intensity of pain was estimated at 4.7. Furthermore, the test results obtained were subjected to statistical analysis, which revealed a statistically significant relationship between multiple sclerosis and the intensity of pain. The team led by Kahraman adopted a different research technique, where the study was carried out in a group of 223 people, 67.23% of whom were women. The Nordic Musculoskeletal Questionnaire was used and lumbar spine pain was recorded in 52.4% of patients with multiple sclerosis; Additionally, people with lower spine musculoskeletal pain had a lower EDSS score than people diagnosed with pain. neuropathic [19]. In our own research, the EDSS scale was used, which averaged 3.2 ± 1.2 in women and 3.7 ± 1.8 in men. Importantly, the incidence of low back pain was higher in patients with secondary progressive form ($p<0.001$) and a longer duration of the disease duration ($p=0.023$). In this part of the work, it is also worth mentioning the research conducted in 2016, which presents the results of the research carried out in a group of 190 people (138 women, 52 men). The severity of lower back pain was assessed using the Numeric Rating Scale. Analysis of the test results obtained showed that more than 40% of the respondents reported problems in the lumbar-sacral part of the spine and much less in the thoracic (2.1%) or cervical (3.2%) part, which may indicate a much greater problem in its lower part [20]. When collecting information on lower back pain in people with multiple sclerosis, you can find information on the use of The Nordic Musculoskeletal Questionnaire supplemented with an original survey questionnaire and the Numeric Rating Scale. The same study involved 115 patients (88 women, 27 men) with multiple sclerosis with an average age of 30.4, where 38.3% of the respondents reported pain in the last year, of which 30.4% had pain in the last 7 days. Furthermore, the researchers

 doi:10.20944/preprints202311.0659.v1

noticed that women reported problems in the upper part of the spine much more frequently, while problems in the lower part were reported more frequently in men [21]. The results of the authors of the above article are in opposition to the above research, because in the group of women, lower back pain was reported in 82.35% of the group of women and only 27.27% of the group of men. However, older scientific articles confirm that lower back pain was more common in women and affected more than 15% of those who participated in the study [22]. Differences within groups may be due to different conditions identified in the research by Bento et al. Lower back pain was associated with older age, low education level, hypertension, and smoking in men. However, occupational and ergonomic factors were a more common cause of pain in women [6]. The authors and researchers of the research most often used numerous scales, questionnaires, and original survey questionnaires to assess lumbar spine pain in people with multiple sclerosis. The following were used, among others: a numerical pain scale (The Visual Analogue Scale), just like the authors of the above studies [17,18,22]. Furthermore, the research was expanded to include the EDSS scale [16–18,20,22], the Nordic Musculosceletal Questionnaire [19,21], the painDETECT [19], and the numerical rating scale [16,20,21]. A thorough analysis of the available scientific literature allowed us to find information on physiotherapeutic methods to treat lower back pain in people with multiple sclerosis. Al.-Smaidi's research involved 15 people who were divided into 3 groups and underwent appropriate therapy using TENS currents. The first group consisted of people who received low-frequency TENS currents (4 Hz, 200 μs), the second group, people who received high-frequency TENS currents (110 Hz, 200 μs) and the third group (control) where no electrotherapy stimuli were used. The patients were subjected to therapy for a maximum of 10 weeks, the frequency of treatments was established twice a week for 45 minutes. The test results obtained were measured using the Roland Morris Disability Questionnaire, the Short Form-36, the McGill Questionnaire, and the Visual Analogue Scale. Researchers concluded that TENS currents were more effective than the control group, particularly in reducing VAS scores. Despite the innovative approach, the results of the research obtained were statistically insignificant [23]. The above research model was recreated after 3 years by the same team (with minor personnel changes). To obtain reliable research results, the size of each group was increased to 30 people in each of them and the parameters used during TENS therapy did not change. Outcomes were measured using the Visual Analogue Scale, the McGill Questionnaire Visual, the Roland Morris Disability Questionnaire, the Barthel Index, and the Rivermead Mobility Index. As in previous work, the team again did not obtain statistically significant results [24]. However, it should be mentioned that physiotherapy, especially kinesitherapy, is important in the treatment of patients with multiple sclerosis and those with lumbar spine pain. Properly selected exercises and spontaneous physical activity are important in improving the patient's condition, most often in the form of aerobic exercises, resistance exercises, stretching exercises, or balance exercises. Exercises are one of the safest forms of rehabilitation and scientific evidence confirms their effectiveness in improving fitness, efficiency, and quality of life [25]. However, there are scientific studies that confirm the theory that a progressive type of multiple sclerosis and vision disorders can increase the risk of spinal pain. The results of these studies may be a breakthrough in the treatment of lower back pain and draw attention to the importance of preventing visual disorders in people with multiple sclerosis [26,27].

5. Conclusions

- Most (68.9%) of the PwMS participants in the study reported low back pain.
- LBP was four times more common in the group of women with multiple sclerosis.
- A secondary progressive form of MS and a longer duration of the disease increased the risk of LBP.
- The average level of pain in the lumbar spine was 4.7 on the VAS scale.
- 65.6% of PwMS believe that the best and most effective method of physiotherapeutic treatment of LBP is manual therapy.
- In the case of LBP, the respondents used kinesitherapy (71.11%), manual therapy (46.67%), electrotherapy (43.33%) or laser therapy (36.67%) at least once.

Analysis of the available literature and our own research allows us to conclude that there is a relationship between LBP and multiple sclerosis. However, more research is needed, including a control group. It is important to implement properly planned physiotherapy activities and educate patients on how to combat lumbar spine pain.

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Conflicts of Interest: W.B.: scientific advisory board for Biogen, Roche, Novartis, Merck; honoraria for lecturing from Biogen, Merck, Novartis, Sanofi Genzyme, and Roche. M.O. and J.O. report no disclosures.

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