

Selected factors determining the failure to undertake physical activity in patients with multiple sclerosis in Poland

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Background: The main aim of the study was to identify selected factors that determine patients with multiple sclerosis (MS) failure to take home therapeutic exercises (HTE) and other physical activity (OPA). **Materials and Methods:** The study was conducted using a self-completed online survey that was aimed at adult people diagnosed with MS, registered on the portal TacyJakJa.pl. In total, 335 persons were involved. **Results:** Almost half of all people who completed the survey (49.9%), reported that no one encouraged them to use HTE, and only 16.1% were encouraged by their doctor. As many as 51% of the respondents reported also that no one encouraged them to undertake OPA, and only 18.5% were encouraged by their doctor. As the most important reason for not using HTE, the respondents chose fear that exercises may worsen their condition (47.3%). However, the most important reason for not using the OPA was high fatigue (61.9%). The number of people exercising at home increased with age ($P = 0.013$). Those surveyed with relapsing–remitting MS significantly more often ($P = 0.002$) took up OPA (60.7%) than the respondents with a secondary progressive MS (10.0%) and a primary progressive (4.4%). **Conclusion:** Physicians relatively rarely encourage patients with MS to undertake HTE and OPA. The patients do not perform HTE primarily because of fears of health deterioration or fatigue. Undertaking HTE is influenced by age but undertaking other forms of physical activity by the type of MS. Actions should be taken to popularize HTE and OPA, especially HTE among young patients.

Keywords: Motor activity, multiple sclerosis, patients' attitudes

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INTRODUCTION

Multiple sclerosis (MS, sclerosis multiplex) is a chronic, slowly progressive, inflammatory demyelinating disease of the central nervous system of complex and not fully understood etiology.^[1] The first symptoms of MS usually appear in people aged 20–40 years, arguably the years of the highest activity.^[2] There is a wide variety of symptoms in the clinical picture of MS, leading to significant and progressive damage to the central nervous system leading to an increasing physical disability.^[3] This disease is one of the most common causes of nontraumatic disability in young people in their 20s and 30s.^[4,5]

In the course of MS, chronic fatigue, depression, sleep disorders, and cognitive and emotional problems are also often observed. In combination with the increasing disability, they have a negative impact on the functioning of MS patients in both the personal and vocational spheres. They lead to the loss of independence, exclusion from social and vocational life, and result in decreased quality of life.

Fully effective pharmacological treatment for MS does not exist, and the main goal of the therapy is to enable patients to maintain their independence as long as possible. However, the condition of patients is affected not only by the disease-related neurodegenerative

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process in the central nervous system but also by reduced motor activity.^[6,7] Concerning MS and physical activity, a peculiar vicious circle arises: patients feel unwell, so they do not exercise, which further reduces their fitness and makes them feel worse, resulting in even greater discouragement to take up an activity. Therefore, MS patients are at risk of the same diseases caused by lack of physical activity, as the healthy population (e.g., type 2 diabetes, cardiovascular disease, osteoporosis, and obesity).^[8]

The results of an increasing number of studies indicate that the use of physical activity brings clear benefits in the case of people with MS. Exclusive use of physical activity has not been proven to stop the disease progression or significantly reduce the frequency of its exacerbations.^[9] However, the use of physical activity in people undergoing pharmacotherapy affects a better physical performance,^[9] improved motor capacity (which is associated with less spasticity of the muscles and better motor coordination),^[10] reduction of chronic fatigue,^[11] depression,^[12] improved quality of sleep,^[13] and overall quality of life.^[14] Some reports attribute reduction in brain atrophy in MS and neuroprotective or neuroregenerative effects to exercises.^[15]

However, that despite the abovementioned advantages of physical activity, patients with MS, even with a minimal degree of physical disability, are less active than healthy population which is already not so active.^[16]

Aim

The main aim of the study was to identify selected factors that determine patients with MS' failure to take home therapeutic exercises (HTE) and other forms of physical activity (OPA).

Specifically, for this purpose, answers were sought to the following questions:

- How often doctors encourage HTE and OPA?
- What is the most common reason for not taking HTE/OPA?
- Is there a relationship between the place of residence, the form of MS, the worsening of neurological symptoms, and not taking HTE/OPA?

The aim of the study is also to formulate clinical implications related to the dissemination of HTE and OPA among patients with MS.

MATERIALS AND METHODS

Study design and participants

The research project "Selected factors determining the failure to undertake physical activity in patients with MS in Poland" was approved by the Bioethics Committee functioning at the University of Rzeszów (Resolution

No. 32/06/2016). The study was addressed to 858 people with MS, registered on the TacyJakJa.pl portal. This website is aimed at people suffering from chronic diseases, which was intended to educate patients in the field of self-assessment of their health. The portal has approximately 12,000 registered users, including 858 people with MS (100% registered members of the MS community). Criteria for inclusion in the study were as follows: an adult, registered as a user of the TacyJakJa.pl portal suffering from MS. Criteria for exclusion from the study were as follows: no legal age and no consent to the study. People participating in the study were informed that completing and returning the questionnaire was tantamount to consenting to participate in the study. The survey was completely anonymous and participation was voluntary. It was completed by 335 (39%) registered members of the MS community. The remaining 523 (61%) people did not answer the invitation and did not complete the survey.

Instrument and data collection

The study was conducted using the Computer-Assisted Web Interview method, a direct interview technique collected via the Internet. A self-completed online questionnaire aimed at adult people diagnosed with MS was available between March 21, 2017, and April 4, 2017, on the website TacyJakJa.pl in Polish in the section MS.

The author's questionnaire consisted of several questions [the first columns of Tables 1-4 contain questions and possible answers], one or multiple answer, regarding the participants' taking up physical activity; in addition, in 4 questions, the respondents could add their own answers. The focus was primarily on two types of activity: HTE and OPA independently initiated by the patient and performed outside home (walking, swimming, etc.). Only one question concerned the rehabilitation conducted by a therapist in the medical facility, because it considered the availability of such services is still too low in Poland, so the burden of caring for physical activity should rest on the patients themselves supported by doctors and physiotherapists.

The questionnaire included, among others, questions about whether the respondents use HTE/OPA, and if so, what kind. In the case of not taking up HTE/OPA, they were asked to give reasons. They were also asked if the subjects were informed by the doctor about the importance of home exercises and other physical activity (OPA) in MS and what factors could constitute an incentive for such a physical effort for a person with MS. In addition, the subjects were asked about the type of MS, the duration of the disease, as well as the severity of clinical symptoms. Basic demographic data were also collected.

Each of the respondents independently determined the severity of clinical symptoms according to the guidelines presented: without symptoms or minimal neurological symptoms – I am fully independent, I go without limitations or with a limited distance limit; moderate neurological symptoms – I am independent, I move without the help of a walking stick, but I have problems with self-overcoming a distance of over 500 m or precise movements of the limbs; intensified neurological symptoms – I constantly require a cane or a two-way support for the passage of even a few steps; very severe neurological symptoms – I ride a wheelchair, I require partial help in everyday activities; and severe neurological symptoms – I am lying, I require constant help in everyday activities [Table 1G].

Table 1: Demographic data and the course and form of multiple sclerosis

A. Sex	335 (100.0)
Man	89 (26.6)
Woman	246 (73.4)
B. Age (years)	335 (100.0)
18-25	27 (8.1)
26-30	38 (11.3)
31-40	114 (34.0)
41-50	103 (30.7)
Over 50	53 (15.8)
C. Education	335 (100.0)
Primary	7 (18.5)
Secondary	123 (36.7)
Higher	205 (61.2)
D. Place of residence	335 (100.0)
Village	54 (19.1)
City with <50,000 residents	80 (23.9)
City with 50,000-200,000 residents	87 (26.0)
City with >200,000 residents	104 (31.0)
E. Forms of MS	335 (100.0)
Known forms of MS	
Relapsing–remitting	204 (60.9)
Secondary progressive	44 (13.1)
Primary progressive	22 (6.6)
Progressive relapsing	8 (2.4)
“I do not know what”	57 (17.0)
F. Duration of MS (years)	335 (100.0)
≤1	17 (5.1)
>1 and ≤3	43 (12.8)
>3 and ≤5	50 (15.0)
>5 and ≤10	106 (31.6)
>10	119 (35.5)
G. Degree of neurological symptoms severity	335 (100.0)
No symptoms or minimal neurological symptoms	167 (49.9)
Moderate neurological symptoms	87 (26.0)
Intensive neurological symptoms	56 (16.7)
Very intensive neurological symptoms	22 (6.6)
Severe neurological symptoms	3 (0.9)

MS=Multiple sclerosis; n=Numbers of patients

Statistical analysis

The data gathered on the Internet portal were subject of a retrospective analysis. They were evaluated using descriptive statistics methods [Tables 1A-E, G and 2Ab, Ac]. Chi-square Pearson test was used in statistical calculations. The significance level was assumed at $P < 0.05$. The calculations were made using the IBM SPSS Statistics for Windows, Version 25.0 (2017). Armonk, NY, USA.

RESULTS

The survey was completed by 335 adults diagnosed with MS. The questions were answered by 246 (73.4%) women and 89 (26.6%) men [Table 1A], at different ages, most frequently represented age 31–50 years (64.7%) [Table 1B], mainly with higher education (61.2%) [Table 1C], and living mainly in cities with over 200,000 residents (31.0%) [Table 1D]. Nearly sixty-one percent of the respondents (60.9%, $n=204$) indicated that relapsing–remitting MS was present [Table 1E], 35.5% ($n = 119$) had MS for more than 10 years, and 31.6% ($n = 106$) from 5 to 10 years [Table 1F]. As many as 49.9% ($n = 167$) of the respondents claimed that they do not have neurological symptoms or experience them only to a minimal degree [Table 1G].

Fifty-four percent of the respondents ($n = 181$) attend or attended physical therapy (paid or free) in medical facilities [Table 2Aa]. 74.9% of the respondents ($n = 251$) used OPA [Table 2Ab], above all walking and marching (61.8% of people in this group, $n = 155$) [Table 2Ad]. 61.5% of the respondents ($n = 206$) perform HTE [Table 2Ac]. They are mainly stretching exercises, which are performed by 83.5% ($n = 172$) of the exercising persons [Table 2Ae].

As the most important reason for not using HTE, the respondents chose fear that exercises may worsen their condition (47.3%, $n = 61$ nonexercising people). However, the most important reason for not using the OPA was high fatigue (61.9%, $n = 52$ inactive people). Detailed data are presented in Table 2Ba-b.

Almost half of all people who completed the survey (49.9%, $n = 167$) reported that no one encouraged them to use HTE. As many as 51% of the respondents ($n = 171$) reported also that no one encouraged them to undertake OPA [detailed information in Table 3A].

Over 48% of the respondents (48.4%, $n = 162$) were informed by the doctor about the importance of the physical activity in MS, 31.3% ($n = 105$) were not, and 20.3% ($n = 68$) did not remember if they received such information [Table 3B].

Most of the respondents are aware of the benefits of physical activity for people with MS. This is more evident in the case

Table 2: Motor activity of patients with multiple sclerosis and reasons for not taking up home therapeutic exercises and other physical activity by people with multiple sclerosis

	<i>n (%)</i>
A. Motor activity of patients with MS	
Aa. Attending physical therapy to medical facilities	335 (100.0)
Yes, under health insurance	107 (31.9)
Yes, for a fee	74 (22.1)
No	154 (46.0)
Ab. Practice of OPA	335 (100.0)
Yes	251 (74.9)
No	84 (25.1)
Ac. Practice of HTE	335 (100.0)
Yes	206 (61.5)
No	129 (38.5)
Ad. OPA (possibility of multiple response, the indications>9% have been presented)	251 (100.0)
Walk, march	155 (61.7)
Swimming pool	63 (25.0)
Physical exercises systems: Yoga, pilates...	40 (16.0)
Sports team games	40 (16.0)
Gym exercises	40 (16.0)
Cycling	28 (11.2)
Ballroom dancing	23 (9.2)
Other	25 (10.0)
Ae. HTE (possibility of multiple response, the indications>9% have been presented)	206 (100.0)
Stretching exercises	172 (83.5)
Coordination exercises	111 (53.9)
Balancing exercises	105 (51.0)
Breathing exercises	58 (28.2)
Other	58 (28.2)
B. Reasons for not taking up HTE and OPA by people with MS	
Ba. OPA (possibility of multiple response)	251 (100.0)
Great fatigue	52 (61.9)
No help	22 (26.2)
Low mood	20 (23.8)
Fear that exercise can worsen the condition	19 (22.6)
Pain resulting from spasticity	14 (16.7)
Nobody said what exercises to do	14 (16.7)
Nobody mentioned that exercises are important	8 (9.5)
No time	6 (7.1)
The conviction that the exercises will not help	4 (4.8)
Bb. HTE (possibility of multiple response)	206 (100.0)
Fear that exercise may worsen the condition	61 (47.3)
Great fatigue	52 (40.3)
Nobody mentioned that exercises are important	35 (27.1)
Nobody said what exercises to do	29 (22.5)
Low mood	28 (21.7)
No time	12 (9.3)
No help	11 (8.5)
Pain resulting from spasticity	6 (4.7)
The conviction that the exercises will not help	6 (4.7)

OPA=Other physical activity; HTE=Home therapeutic exercises; MS=Multiple sclerosis; n=Numbers of patients

of general benefits, similar to those that concern a healthy population: 83.6% ($n = 280$) of the respondents agree or rather agree with the statement that physical activity improves the fitness to the extent possible; 83.6% ($n = 280$) that it reduces emotional tension and improves mood; 80.3% ($n = 269$) that it reduces the risk of cardiovascular disease; and 78.8% ($n = 264$) that it reduces the risk of obesity and diabetes [Table 3C].

Fewer respondents are convinced or rather convinced that physical activity alleviates the course of MS (62%, $n = 208$ of the respondents), improves memory and concentration (50.4%, $n = 169$), or reduces the feeling of fatigue (46.6%; $n = 156$) [Table 3C].

The respondents who do not perform OPA also indicated what could encourage them to do so. In the first three places, the respondents mentioned the advice of a physiotherapist (82.2% of inactive/surveyed, $n = 69$), information on which activity was indicated for a given person, and what was not (79.7%, $n = 67$) and 70.3% ($n = 59$) getting help during the exercises [Table 3D].

Nearly 64% of those surveyed who do not perform HTE (63.6%, $n = 82$), reported that they do not know what it is [Table 3E].

A statistically significant difference was not found ($P > 0.05$) in the case of age [Table 4C], sex [Table 4A], education [Table 4E], or size of the inhabited city [Table 5A] and taking up/not taking up OPA. However, in the age group above 50 years, the percentage of people using OPA to nonusers compared to others decreases – $P = 0.049$ [Table 4A*]. Regarding the differences in terms of demographic parameters between people exercising/not exercising at home, a statistically significant difference was found in the case of age ($P = 0.013$) [Table 4D], but not in relation to sex [Table 4B], education [Table 4F], or size of the inhabited city [Table 5B] ($P > 0.05$). In the group of taking up/not taking up HTE, subjects in the age group above 50 years were doing home exercises three times more often ($P = 0.023$) – differently than in others [Table 4D*]. The difference also concerned the age of 31–40 years ($P = 0.009$ – a comparable percentage of people practiced and did not HTE) [Table 4D**].

There were no differences in the taking up HTE among the people with known form of the disease ($P = 0.716$), whereas those surveyed with relapsing–remitting MS significantly more often ($P = 0.002$) took up OPA ($n = 164$, 60.7%) than the respondents with a secondary progressive MS ($n = 27$, 10.0%) and a primary progressive ($n = 12$, 4.4%) [Table 5C–D].

The severity of the neurological symptoms in the respondents also significantly affected taking up HTE

Table 3: Encouraging people with multiple sclerosis to take up home therapeutic exercises and other physical activity

	<i>n (%)</i>		
A. Who encouraged to undertake			
Aa. HTE (possibility of multiple response)	335 (100.0)		
No one	167 (49.9)		
Family/friends	103 (30.7)		
Physiotherapist	90 (26.9)		
Doctor	54 (16.1)		
Information from the media	43 (12.8)		
Ab. OPA (possibility of multiple response)	335 (100.0)		
No one	171 (51.0)		
Family/friends	113 (33.7)		
Physiotherapist	89 (22.6)		
Doctor	62 (18.5)		
Information from the media	42 (12.5)		
B. Information by the doctor about the importance of the physical activity in MS (<i>n</i>=335)			
Yes	162 (48.4)		
No	105 (31.3)		
Did not remember	68 (20.3)		
	Not agree/rather not agree	Hard to say	Agree/rather agree
C. Statement of the benefits of physical activity for people with MS (<i>n</i>=335)			
Physical activity improves the fitness to the extent possible	12 (3.6)	43 (12.8)	280 (83.6)
It reduces emotional tension and improves mood	15 (4.5)	40 (11.9)	280 (83.6)
It reduces the risk of cardiovascular disease	15 (4.5)	51 (15.3)	269 (80.3)
It reduces the risk of obesity and diabetes	31 (9.3)	40 (11.9)	264 (78.8)
It alleviates the course of MS	26 (7.9)	101 (30.1)	208 (62.0)
It improves memory and concentration	43 (12.8)	123 (36.8)	169 (50.4)
It reduces the feeling of fatigue	75 (22.4)	104 (31.0)	156 (46.6)
D. Persons who do not perform OPA claimed that they would rather or definitely undertake OPA (<i>n</i>=84)			
If someone told me which activity was indicated for me, and what was not	5 (6.0)	12 (14.3)	67 (79.7)
If someone would help me during the exercises	12 (14.3)	13 (15.4)	59 (70.3)
If the doctor explained me the benefits of physical activity in MS	12 (14.3)	16 (19.0)	56 (66.7)
If I had a better mood	12 (14.3)	21 (25.0)	51 (60.7)
If I listened to the advice of a physiotherapist	3 (3.5)	12 (14.3)	69 (82.2)
If I watched an instructional video	12 (14.3)	27 (32.1)	45 (53.6)
If I read the leaflet	26 (30.9)	26 (30.9)	32 (38.1)
If I listened to a lecture	27 (32.1)	32 (38.1)	25 (29.8)
	<i>n (%)</i>		
E. Persons who do not perform HTE (<i>n</i>=129)			
Therapeutic exercises – I do not know what it is	82 (63.6)		
Therapeutic exercises – I know what it is	47 (36.4)		

OPA=Other physical activity; HTE=Home therapeutic exercises; MS=Multiple sclerosis; *n*=Numbers of patients

and OPA. Another physical activity took up as many as 42.8%, *n* = 142 of the people without symptoms or with minimal neurological symptoms, and only 2.1%, *n* = 7 with very severe neurological symptoms ($P < 0.001$) [Table 5E]. The majority of people without symptoms or with minimal neurological symptoms exercised at the home (23.8%, *n* = 79), while the least (1.2%, *n* = 4) with very severe neurological symptoms ($P = 0.001$) [Table 5F].

DISCUSSION

The latest recommendations of the Polish Neurological Society put a lot of emphasis on the early inclusion of MS patients in motor therapy programs: soon after the diagnosis or even if MS is suspected.^[17] Despite such important recommendations, almost half of all people who completed the survey, reported that no one encouraged

Table 4: Demographic data, course and form of multiple sclerosis, and practice of other physical activity/home therapeutic exercises: Part I

	Sex		Chi-square Pearson test (P)				
	Man, n (%)	Woman, n (%)					
A. Sex and practice of OPA							
Practice of OPA			0.845				
No	23 (6.9)	61 (18.2)					
Yes	66 (19.7)	185 (55.2)					
Total	89 (26.6)	246 (73.4)					
B. Sex and practice of HTE							
Practice of HTE			0.180				
No	29 (8.6)	100 (29.9)					
Yes	60 (17.9)	146 (43.6)					
Total	89 (26.5)	246 (73.5)					
C. Age (years) and practice of OPA							
	Age (years)						
	18-25, n (%)	26-30, n (%)	31-40, n (%)	41-50, n (%)	Over 50, n (%)		
Practice of OPA							
No	3 (0.9)	6 (1.8)	29 (8.7)	27 (8.0)	19 (5.7)	0.095	
Yes	24 (7.1)	32 (9.6)	85 (25.4)	76 (22.7)	34 (10.1)		
Total	27 (8.0)	38 (11.4)	114 (34.1)	103 (30.7)	53 (15.8)		
C*. Age (years) and practice of OPA				Over 50, n (%)	Other, n (%)		
Practice of OPA							
No				19 (5.7)	65 (19.4)	0.049	
Yes				34 (10.1)	217 (64.8)		
Total				53 (15.8)	282 (84.2)		
D. Age (years) and practice of HTE				Age (years)		χ^2 Pearson test (P)	
	18-25, n (%)	26-30, n (%)	31-40, n (%)	41-50, n (%)	Over 50, n (%)		
Practice of HTE							
No	11 (3.3)	18 (5.4)	55 (16.4)	32 (9.6)	13 (3.9)	0.013	
Yes	16 (4.8)	20 (6.0)	59 (17.7)	71 (21.1)	40 (11.9)		
Total	27 (8.1)	38 (11.4)	114 (34.1)	103 (30.7)	53 (15.8)		
D*. Age (years) and practice of HTE				Over 50, n (%)	Other, n (%)		
Practice of HTE							
No				13 (3.9)	116 (34.6)	0.023	
Yes				40 (11.9)	166 (49.6)		
Total				53 (15.8)	282 (84.2)		
D**. Age (years) and practice of HTE				31-40, n (%)	Other, n (%)		
Practice of HTE							
No				55 (16.4)	74 (22.1)	0.009	
Yes				59 (17.7)	147 (43.8)		
Total				114 (34.1)	221 (65.9)		
E. Education and practice of OPA				Education		χ^2 Pearson test (P)	
				Primary, n (%)	Secondary, n (%)	Higher, n (%)	
Practice of OPA							
No				2 (0.6)	37 (11.0)	45 (13.3)	0.253
Yes				5 (1.5)	86 (25.7)	160 (47.8)	
Total				7 (2.1)	123 (36.7)	205 (61.2)	
F. Education and practice of HTE							
Practice of HTE							
No				3 (0.9)	52 (15.5)	74 (22.1)	0.523
Yes				4 (1.2)	71 (21.2)	131 (39.1)	
Total				7 (2.1)	123 (36.7)	205 (61.2)	

OPA=Other physical activity; HTE=Home therapeutic exercises; MS=Multiple sclerosis; n=Numbers of patients; P=Probability value calculated by Chi-square Pearson test of independence

Table 5: Demographic data, course and form of multiple sclerosis, and practice of other physical activity/home therapeutic exercises: Part II

	Place of residence				χ^2 Pearson test (P)
	Rurals	City with residents			
		<50,000, n (%)	50,000-200,000, n (%)	>200,000, n (%)	
A. Place of residence and practice of OPA					
Practice of OPA					
No	16 (4.8)	20 (6.0)	23 (6.9)	25 (7.5)	0.987
Yes	46 (13.7)	61 (18.2)	65 (19.4)	79 (23.6)	
Total	62 (18.5)	81 (24.2)	88 (26.3)	104 (31.1)	
B. Place of residence and practice of HTE					
Practice of HTE					
No	23 (6.9)	25 (7.5)	38 (11.3)	43 (12.9)	0.359
Yes	39 (11.6)	56 (16.7)	50 (15.0)	61 (18.2)	
Total	62 (18.5)	81 (24.2)	88 (26.3)	104 (31.1)	
	Known form of MS			χ^2 Pearson test (P)	
	Relapsing–remitting, n (%)	Secondary progressive, n (%)			
		Primary progressive, n (%)			
C. Known forms of MS and practice of OPA:					
Attention: Not analyzed progressive relapsing – 8 persons “I do not know what” – 57 persons					
Practice of OPA					
No	40 (14.8)	17 (6.3)	10 (3.7)		0.002
Yes	164 (60.7)	27 (10.0)	12 (4.4)		
Total	204 (75.6)	44 (16.3)	22 (8.1)		
D. Known forms of MS and practice of the:					
Attention: not analyzed progressive relapsing – 8 persons “I do not know what” – 57 persons					
Practice of HTE					
No	83 (30.7)	18 (6.7)	7 (2.6)		0.716
Yes	121 (44.9)	26 (9.6)	15 (5.5)		
In all	204 (75.6)	44 (16.3)	22 (8.1)		
	The degree of neurological symptoms severity				χ^2 Pearson test (P)
	No symptoms or minimal, n (%)	Moderate, n (%)	Intensive, n (%)		
			Very intensive, n (%)		
E. Degree of neurological symptoms severity and practice of OPA					
Attention: Not analyzed severe neurological symptoms – 3 persons					
Practice of OPA					
No	25 (7.5)	20 (6.0)	21 (6.3)	15 (4.5)	<0.001
Yes	142 (42.8)	67 (20.2)	35 (10.6)	7 (2.1)	
Total	167 (50.3)	87 (26.2)	56 (16.9)	22 (6.6)	
F. Degree of neurological symptoms severity and practice of HTE					
Attention: Not analyzed severe neurological symptoms – 3 persons					
Practice of HTE					
No	79 (23.8)	34 (10.2)	11 (3.3)	4 (1.2)	0.001
Yes	88 (26.5)	53 (15.9)	45 (13.6)	18 (5.4)	
Total	167 (50.3)	87 (26.2)	56 (16.9)	22 (6.6)	

OPA=Other physical activity; HTE=Home therapeutic exercises; MS=Multiple sclerosis; n=Numbers of patients; P=Probability value calculated by Chi-square Pearson test of independence

them to use HTE, and only 16.1% were encouraged by their doctor. As many as 51% of the respondents reported also that no one encouraged them to undertake OPA, and only 18.5% were encouraged by their doctor. Yousif *et al.*, based

on a cross-sectional study conducted among 216 medical students at Al-Neelain University, showed that the attitude of a future doctor toward physical activity and its promotion has a significant impact on society.^[18]

Unfortunately, a large number of MS patients do not perform any physical activity. This applies to people who completed the questionnaire: 61.5% undertook HTE (stretching, balance, coordination, breathing, and other exercises), while 75% undertook OPA (yoga, dance, walking, and swimming). More than half of the respondents (54%) attended rehabilitation program covered by the National Health Fund or paid by a patient. Similar conclusions were obtained by Obara *et al.* after a study involving 30 MS patients, 37% of whom used professional rehabilitation at least once a year.^[19] Block *et al.* conducted a systematic review of studies using remote monitoring of physical activity. They showed that the levels of physical activity in people with MS are low.^[20] A study conducted among 78 people with MS and 46 families of patients with MS allowed to establish that the reimbursement and the affordability of physiotherapy in a medical facility are conducive to undertaking physical activity.^[21]

Considering the undoubted benefits resulting from the use of physical activity by MS patients, it is extremely important to learn about the factors influencing its taking up by patients. In the case of people who completed the questionnaire, a significant relationship was found between undertaking of HTE and OPA and factors, such as the severity of neurological symptoms and age. The severity of clinical symptoms of MS was very important. HTE and OPA took the majority of people without symptoms or with minimal neurological symptoms, and the least with very severe neurological symptoms. Similar conclusions were also obtained in another study, stating that patients with less advanced MS are more active than people with more severe disease.^[22] Decreased outpatient activity, as assessed by remote monitoring, is also associated with greater disability.^[20] The age of the respondents also affected undertaking the physical effort, both HTE and OPA. In the case of HTE, a significant difference was found in groups aged 31–40 and above 50 years of age. In the first age group, the proportion of nonpracticing HTE persons was larger. Note that the HTE program has a positive effect on the health of MS patients: Reduced some aspects of fatigue and improved some aspects of quality of life.^[23] However, home isolation during the coronavirus pandemic has reevaluated the approach to home exercise.^[24] In the age group above 50 years, the percentage of people using OPA to nonusers compared to others decreases. In promoting physical activity, the “one size fits all” approach is not appropriate. Doctors must determine individually what barriers prevent or hinder the initiation of HTE and OPA.^[21] In the case of OPA (but not HTE), there was also a connection with the form of the disease: People with relapsing–remitting type significantly more often undertook physical activity than the responders with a secondary progressive type and primary progressive MS. In the study by Plowa and Golding, the

respondents reported mobility problems as the reason for lack of physical activity, which indicated that the disease was exacerbated.^[25]

Although most of the respondents knew that physical activity reduced the risk of developing obesity and diabetes and cardiovascular diseases, the most common reasons for their inactivity were conviction that exercise can worsen the condition of a person with MS (47.3% of those who did not use HTE and 22.6% of those who did not use OPA). At the root of this mistaken belief may lie the so-called Uhthoff’s phenomenon: A temporal vision disorder described in 1889 by a German ophthalmologist in MS patients caused by an increase in body temperature, e.g., during physical activity,^[26] which until the 1990s affected the negative attitude of both physicians and patients to performing exercises in MS.

The second significant reason for avoiding physical effort given by the respondents was fatigue, which concerned 40.3% of the people who did not use HTE and 61.9% of the people who did not take up OPA. Similar conclusions have been drawn by the authors of another study, stating that the factors that make it difficult for MS patients to exercise are first of all the degree of disability and fatigue.^[27] Furthermore, in the study conducted by Stroud *et al.*, patients with MS knew that regular exercise would improve their physical condition, but they did not do it primarily because of fatigue during and after exercise.^[28]

Concerns about undertaking physical activity could be dispelled if MS patients knew the purposefulness and manner of exercise. For people who did not take up OPA, the most important thing that could change this behavior would be advice on what kind of activity is indicated for them, and explain what the benefits of using it are in terms of the course of the disease. Learmonth and Motl also drew the same conclusions after analyzing 19 studies. Learmonth and Motl, after analyzing 19 studies, came to conclusion that one of the most frequently quoted reasons for nonexercising and nonparticipating in physical activity among people suffering from MS are minimal or even contradictory recommendations of physicians in this area.^[29]

The results of the survey show, therefore, how important is the role of the doctor in the process of rehabilitation of MS patients. He makes the patient aware of the importance of physical activity and encourages to undertake HTE and OPA. The following practical tips have been proposed: physicians treating MS patients should be obliged to encourage patients to undertake HTE and OPA; the fear of MS patients that HTE will worsen health or fatigue should be rationalized by the attending physician, and the attending physician should encourage patients at all age groups to do HTE.

CONCLUSIONS

HTE and OPA took the majority of people without symptoms or with minimal neurological symptoms, and the least with very severe neurological symptoms. Physicians relatively rarely encourage MS patients to undertake HTE and OPA.

Patients with MS do not perform HTE primarily because of fears of health deterioration or fatigue, and OPA due to high fatigue.

The social milieu, rural or urban residence, did not differentiate undertaking HTE and OPA. There is a difference between other factors affecting HTE and OPA. Undertaking HTE is influenced by age while undertaking OPA by the type of MS. There is a relationship between age and HTE: younger patients do not perform exercises at home. Patients with relapsing–remitting MS practice OPA more often. The severity of neurological symptoms has an impact on undertaking HTE and OPA.

Clinical implications of the study performed

Physicians should be encouraged to promote HTE and OPA among patients with MS. People with MS should be made aware that HTE will not worsen their health. Actions should be taken to popularize OPA and HTE, especially HTE among young patients.

Limitations

No direct contact with the person surveyed, which makes it impossible to dispel doubts when completing the survey. The strength of the study is that although great progress has been made in understanding the benefits of physical activity in patients with MS, it is rarely recommended by physicians, and patients with MS believe that home therapy can be harmful.

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Conflicts of interest

There are no conflicts of interest.

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