



Report

Comparative Study of Individuals with and Without Multiple Sclerosis: Overall Profile of Quality of Life, Exercise, Health Behaviors

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Abstract: Multiple Sclerosis (MS) patients differ with healthy populations in quality of life parameters, physical activity participation and health behaviors. However, no research has been conducted yet comparing such differences, outlining an overall profile. The purpose of this study was to examine and compare the profile of Greek MS patients with healthy individuals, as regards to the quality of life, physical activity involvement, adoption of health behaviors, and levels of depression and anxiety. The sample consisted of 26 MS patients and 90 healthy individuals overall 116 participants. Instruments used included the GLTE Questionnaire, habitual physical activity questionnaire, the SF 36, the Fagerström Test for Nicotine Dependence, the Hospital Anxiety and Depression Scale, the Baecke and the Nutritional Behaviors questionnaire. T-test for independent variables was used to locate differences between individuals with or without MS and according to gender. Significance level was set at $p < .05$. The results showed MS patients as choosing light physical activity (PA) levels compared to healthy participants choosing moderate levels of PA. Healthy individuals also achieved higher scores in leisure time, sport and total physical activity index, exhibiting lower levels of anxiety and depression and better perceived quality of life compared to patients with MS. The profile of MS patients was associated with light PA, lower perceived quality of life, higher anxiety and depression as compared to healthy individuals. Future suggestions were made to examine application of exercise programs and their effect on psychological parameters of individuals with and without MS.

Keywords: Physical Activity, Psychological Parameters, Multiple Sclerosis

1. Introduction

Multiple sclerosis (MS), a chronic inflammatory demyelinating disease, is considered the third most common cause of serious disability [1] and one of the most representative and frequent neuromuscular conditions [2] characterized by degeneration of the central nervous system with various symptoms and unpredictable alternations of recession and aggravation periods. In Greece, the number of people affected ranges up to 7,000 people, with 27 years

corresponding to the average age of appearance and women exhibiting a higher incidence of the disease [3, 4].

MS seriously affects nerve conduction of both motor and sensory nerves, causing varying degrees of disability related with motion and sensation. During the acute phase of the disease, the nerve conduction becomes slower or more obstructed causing muscle weakness, loss of movement, instability, blurred vision or diplopia, speech disorders, fatigue, and in more severe situations partial or complete paralysis [5].

The severity of MS symptoms varies greatly from person to

person depending on which nerves are affected and how many "attacks" of the disease the person has suffered during his life, making MS a purely personal issue experienced by each patient differently [6]. In general, MS sufferers may experience four different states progression of the disease, which may be mild, moderate or severe, depending on the causing symptoms [7], that in turn affect mental and physical state of patients [8] and lead to family dependence and a continuous decrease of their quality of life [9, 10].

In addition to psychosocial factors, MS patients often present sleeping problems, lack of interest, eating disorders and suicidal ideation at some point in their lives [11]. As myelin and white matter areas of the brain that are responsible for emotional expression are destroyed [12], these symptoms are probably due to the disease itself. Furthermore, MS patients experience intense anxiety due to the threat imposed by the disease, with stress symptoms influenced either by a sense of fear, lack of social support and different residential placement [13]. These negative feelings affect and in turn aggravate relative symptoms. According to Tsungou, Tzinalis & Bellali, knowing and accepting such symptoms is only a part of proper disease treatment that could also include physical activity and a balance diet as additional means to provide important support to MS patients [1].

Indeed, recent research has shown that an organized, systematic and well targeted form of exercise helps MS patients to improve their mood state [14], quality of life and functionality level [15, 16] and to reduce fatigue [17], compared to patients who do not exercise [15]. According to Garopoulou, MS patients is important to exercise frequently so as to maintain or improve their health condition and socialization, increase their energy and resistance to the disease and reduce rehabilitation costs [18].

Smoking has also linked with environmental factors and MS occurrence [19], reported that smokers are more likely to develop MS than non-smokers, while in a research confirmed smoking as a serious risk factor for MS appearance [20]. However, studies have not yet been conducted to examine the effect of diet and smoking on the quality of life of MS patients.

In Greece, studies so far have focused on examining the individual factors that shape the profile of MS patients [21], noted that MS patients feel generally exhausted and face difficulties in their daily activities, exhibiting emotional instability, voraciousness, irritability or even mental illness mainly in the form of manic depression. All these psychological reactions cause dissatisfaction especially in the case of patients with high intellectual awareness who often appear pessimistic and unable to set goals in life [22].

As regards to the quality of life of MS patients, Theofilou identified female gender, old age, married life, low education and most years of treatment as the main factors associated with better mental health and better quality of life [23]. Researchers found that marital status and place of residence are also factors that affect cognitive functioning, anxiety, physical health and general quality of life of MS patients [13]. In addition, since the decline in cognitive function and retrospective memory affects quality of life regardless of

depression and the severity of MS [24], improving quality of life and slowing the progression of the disease can be achieved by adopting healthy eating habits [25].

However, reviewing the literature it seems that no research has been conducted yet comparing MS patients with healthy populations in terms of participation in physical activity and adoption of appropriate health behaviors, outlining an overall profile of Greek MS patients. The recording of knowledge and attitudes of MS patients especially when compared with those with no MS concerning their activity during leisure time and the extent to which they adopt a healthy lifestyle, represents the first systematic attempt to create a comprehensive picture of habits prior implementing interventional health, diet and exercise programs in Greek MS patients, which in itself is a strong argument of the research importance.

The purpose of this study was to examine and compare the profile of Greek MS patients with healthy individuals, as regards to the quality of life, physical activity involvement, adoption of health behaviors, and levels of depression and anxiety. This research is in fact the first step of a doctoral study aiming to examine and compare the effect of exercise on psychological parameters of trainees with and without MS, after first outlining an overall profile of all participants so as to create a fixed point of reference prior exercise intervention.

2. Method

2.1. Sample

The sample consisted of 26 MS patients (8 men, 18 women) and 90 healthy individuals (26 men, 64 women), overall 116 participants coming from the wider Thessaly region who have agreed to participate voluntarily. Data collection date was set at 15/03/17. MS individuals were also members of the Larissa MS club as well as patients of the General University Hospital of Larissa under close medical supervision and medication. All patients had confirmed diagnosis of MS and did not have any accompanying problems that would exclude them from participating in exercise, as evaluated by a neurologist and ranked in the EDSS range from 0 to 4 (fully ambulatory without assistance).

2.2. Procedure

The participants were initially informed about the purpose, the process and the voluntary basis of the study and they were ensured that all questionnaires were confidential and anonymous. Researchers were present during their completion to answer any questions posed by participants, without otherwise being involved during the process. Prior completion of questionnaires, the study and its procedures was evaluated and approved by the DPESS University of Thessaly Ethics Committee Board (approval number: 1-5/5-10-2016).

2.3. Instruments

The questionnaires administered to all individuals with and without MS for research purposes, were:

- i) The Godin Leisure-Time Exercise Questionnaire [26] a

self-explanatory and brief four item query, measuring (light, moderate or strenuous) intensity of weekly leisure-time exercise habits, as used in the study of Theodorakis & Hassandra [27].

- ii) The Baecke [28] habitual physical activity questionnaire, as previously used by Theodoropoulos, Kartelliotis, Gelada & Nasis [29] and Blatsis [30], that asks questions and provides indexes regarding occupational, leisure and sport activities, based on frequency and perceived intensity of exercise during the last month.
- iii) The Greek version [31] of SF-36 quality of life questionnaire [32], a self-assessment tool designed to examine individual's perceptions regarding quality of life in relation to eight different areas, that is, physical functioning, role limitations due to physical problems, bodily pain, general health, social functioning, energy/vitality, role limitations due to emotional problems and mental health. These 8 domains are grouped into two main areas of physical and mental component scores, with higher values indicating a higher quality of life.
- iv) The "Nutritional Behaviors" questionnaire [33] that examines the extent to which the patient feels confident enough to replace unhealthy eating habits with healthy ones. The responses of the 13 questions constituting a single factor are given at a 10-degree Likert scale, ranging from (1) not at all confident to (10) very confident.
- v) The Fagerström Test for Nicotine Dependence [34], a standard instrument for assessing the intensity of physical addiction to nicotine (very low to very high) per day, with six items evaluating the quantity of cigarette consumption, the compulsion to use and dependence.
- vi) The Greek version [35] of the hospital anxiety and depression scale [36], a reliable and easy to use instrument for detecting states of depression and anxiety and measuring severity of emotional disorder in patients who may need additional psychological evaluation and support.

2.4. Statistical Analysis

Statistical analysis was conducted using the 19.00 SPSS version and included t test for independent variables to locate differences between individuals with or without MS and according to gender. Significance level was set at $p < .05$. The questionnaires used in this study had all acceptable psychometric characteristics.

3. Results

As regards to the level of physical activity (PA) between individuals with and without MS, statistically significant differences were observed with MS patients choosing light physical activity levels compared to healthy participants choosing moderate levels of PA. Similarly significant differences were also observed for each gender separately

(male - female) with and without MS (Table 1).

Table 1. Physical activity level of individuals with and without MS.

Variable	N	Mean	SD	T	Df	P
Exercise Intensity						
Total						
Healthy	90	2.1	.90	-5.17	114	.000
MS	26	3.08	.63			
Male						
Healthy	26	2.04	.87	-3.75	32	.001
MS	8	3.25	.46			
Female						
Healthy	64	2.13	.92	-3.76	80	.000
MS	18	3.00	.69			

In relation to depression and anxiety experienced, statistically significant differences were observed between men with and without MS, with male patients experiencing more intense anxiety and depression symptoms compared to healthy ones, whereas no differences were observed in women (Table 2).

Table 2. Anxiety and depression on individuals with and without MS.

Variable	N	Mean	SD	T	Df	P
Anxiety						
Total						
Healthy	90	5.77	3.37	-2.29	114	.012
MS	26	7.66	4.68			
Depression						
Total						
Healthy	90	4.80	3.20	-2.97	114	.002
MS	26	6.92	3.26			
Anxiety						
Male						
Healthy	26	4.85	4.03	-3.12	32	.002
MS	8	10.13	4.73			
Female						
Healthy	64	6.14	3.02	-.47	80	.643
MS	18	6.56	4.34			
Depression						
Male						
Healthy	26	4.42	4.05	-3.13	32	.002
MS	8	9.13	2.17			
Female						
Healthy	64	4.95	2.81	-1.28	80	.102
MS	18	5.95	3.23			

As for quality of life, healthy participants demonstrated higher score than MS patients in their perceptions regarding quality of life in the two main areas of physical and psychological health as expressed by physical functioning, role physical, general health, vitality, social functioning, role emotional and mental health. MS patients exhibited higher values only in the 'negative' factor of bodily pain (Table 3).

Table 3. Quality of life between individuals with and without MS.

Variable	Mean	SD	T	Df	P
Role physical					
Healthy	7.27	1.07	6.329	114	.000
MS	5.58	1.58			
General Health					
Healthy	18.31	3.27	7.519	114	.000
MS	12.85	3.26			

Variable	Mean	SD	T	Df	P
Vitality					
Healthy	16.95	3.85			
MS	12.31	3.50	5.514	114	.000
Mental health					
Healthy	22.52	4.37			
MS	19.08	4.80	3.463	114	.001
Physical Functioning					
Healthy	27.02	2.82	12.70	114	.000
MS	17.50	4.84	2		
Role emotional					
Healthy	5.18	1.16			
MS	4.69	1.12	1.896	114	.030
Bodily pain					
Healthy	3.21	1.32			
MS	5.27	2.09	-6.073	114	.000
Social Functioning					
Healthy	8.38	2.23			
MS	6.23	1.99	4.423	114	.000
Physical Health					
Healthy	55.81	5.33	11.64	114	.000
MS	41.19	6.63	2		
Psychological Health					
Healthy	53.36	10.22			
MS	42.31	9.02	4.977	114	.000

Statistically significant differences were also observed in relation to index related to participation in leisure and sport activities and total PA between people with and without MS, with healthy individuals having exhibiting higher score, whereas no differences on occupational PA index were noted (Table 4).

Table 4. PA Index during last month between participants with ($N = 26$) and without ($N = 90$) MS.

Variable	Mean	SD	T	Df	P
Leisure Index					
Healthy	2.96	.76			
MS	1.94	.67	6.178	114	.000
Sport Index					
Healthy	2.34	.72			
MS	1.55	.30	5.508	114	.000
Total PA					
Healthy	7.67	1.54			
MS	5.40	1.10	7.011	114	.000

Furthermore, healthy individuals portrayed higher scores in educational level as compared to participants with MS with similar statistically significant differences observed between men and women separately, with and without MS (Table 5). Finally, no statistically significant differences were observed between participants with and without MS, as regards to smoking habits and their intention to adopt a healthier diet in the future.

Table 5. Educational level differences between participants with and without MS.

Variable	N	Mean	SD	T	Df	P
Educational Level						
Total						
Healthy	90	2.79	.44			
MS	26	2.23	.77	4.76	114	.001
Male						
Healthy	26	2.81	.40			
				2.53	32	.009

Variable	N	Mean	SD	T	Df	P
MS	8	2.25	.89			
Female						
Healthy	64	2.78	.45			
MS	18	2.22	.73	3.99	80	.000

4. Discussion

The purpose of the study was to examine and compare quality of life, physical activity and adoption of health behaviors between individuals with and without MS, in an effort to outline an overall profile of MS patients and to provide a fixed point of reference of these patients prior exercise intervention.

As a first finding, MS patients seemed to choose light physical activities compared to moderate intensity activities selected by people without MS, probably due to muscle weakness, fatigue, loss of movement, and instability that MS patients usually experience, resulting in a more 'careful' approach to participate in exercise or recreation during leisure time [5]. Common barriers related to less participation in exercise apart from the health factors often referred to by MS patients, concern environmental factors such as lack of relative infrastructure available to people with disabilities, type of exercise and support by peers, as well as psychological parameters related to feelings of internal disruption, concern and fear of loss of control [37].

The negative physiological effect of the disease and the higher physical pain experienced by people with MS along with and their lower comparative educational attainment, did not, however, seemed to have any impact on their physical effort during work, as their occupation index was equivalent with the effort put by participants without MS. This best illustrates the ongoing effort and professional zeal of people with MS to cope with their working role, despite the limitations often imposed by the disease.

Overall, participants without MS in this study have shown a more positive attitude to their quality of life as this was expressed through their more optimistic perception concerning their general health and vitality, functionality level, social function, psychological well-being and their role in all aspects of their everyday life.

Previous studies have similarly reported people with MS as having lower perceived quality of life compared to healthy populations [38, 39] with many factors contributing to this result. For example, the lower educational level of people with MS compared to people without MS reported in this study, has been previously found to be a factor influencing perceived quality of life, since people with a higher level of education tend to exhibit a stronger perceived ability to cope with the disease and its challenges [8, 40, 41] much as the lack of interest in life caused by the disease [11].

In research efforts to understand and record behavioral, psychological, and social factors, exercise has been found to indirectly and positively affect the quality of life of MS patients, through the reduction of depression, anxiety, pain and fatigue [42, 43] and the improvement of perceived

self-efficacy and disease control [16]. The fact that MS patients in this study tended to choose light levels of physical activity compared to moderate exercise intensity selected by participants without MS, may be indirectly related to the lowest perceived quality of life also reported by this sample of MS patients.

The purpose of the research was, however, to outline an overall profile of people with MS and not to examine the extent in which participation in exercise affects their perceived quality of life. However, the results of the research further highlight the need for the forthcoming doctoral study to examine the effect of an intervention exercise program on psychological parameters of MS participants.

Anxiety, depression and fatigue are common features in MS with a tendency to interfere with each other [44]. Exercise can be a promising method either to prevent depression in the future or to reliably reduce the already existing symptoms of depression and anxiety that MS patients often experience [45], although more future research is needed for definitive conclusions [46]. In this sample, the difference observed between depression and anxiety levels among people with and without MS is due to the corresponding statistically significant difference detected solely between men with and without MS, and not between women with and without MS. This finding is in agreement with Casetta [47] study examining gender differences in health-related quality of life in multiple sclerosis. The results showed that the impact of disability was higher for men than women especially in relation to parameters reflecting mental health and emotional well being.

Furthermore, no differences were observed between the participants with and without MS of this study, regarding smoking habits and their intention to adopt a healthier diet in the future probably due to the lack of information on nutrition and smoking issues and their impact on the disease, an issue that is internationally lacking scientific integration, both as regards the recording of patient habits and complete nutrition suggestions [48]. Only recently, researcher [49] showed that MS progression is consistently associated with low vitamin D diet while smoking is associated with a rapid increase in the degree of disability, even mortality, caused by the disease [50].

The results of the study highlight the essential need for future researches using larger samples to examine and compare the overall effect of factors such as exercise, nutrition and smoking cessation on the improvement of physical and psychological health parameters and the perceived quality of life of patients with MS.

5. Conclusion

The examination and comparison of MS patients with healthy individuals as regards to the physical activity involvement, adoption of health behaviors, and levels of depression and anxiety constitutes a necessity in the quality of life determination and creation of a comprehensive picture of habits concerning diet and exercise programs for both

populations, especially when outlining an overall profile of Greek individuals with and without MS for the first time. Result differences illustrated in this study, showing MS patients as choosing light physical activity levels compared to healthy participants who choose moderate levels of PA and healthy individuals achieving higher scores in leisure time, sport and total physical activity with lower levels of anxiety and depression and better perceived quality of life compared to patients with MS, exhibit the need to examine future application of modified exercise programs adapted according to the needs of MS patients. An organized, systematic and well targeted form of exercise will help MS patients to improve their perceived quality of life, mood state and functionality level.

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