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ORIGINAL RESEARCH

# Social Characteristics and Quality of Life of Portuguese Multiple Sclerosis Patients

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## ABSTRACT

***Introduction***: Few studies have analyzed the importance of socio-demographic variables on the perception of health-related quality of life (HRQoL) in patients with multiple sclerosis (MS).

***Methods***: The sample was composed of 150 patients with MS. Statistical analysis was performed using Mann–Whitney *U* and Kruskal–Wallis *H* non-parametric tests comparing socio-demographic items with HRQoL.

***Results***: We found statistically significant differences between age, education levels, employment status, disability and all dimensions of HRQoL.

***Discussion***: This study contributes to a more systematic knowledge about the relationship between social characteristics and HRQoL, which is important to improve the planning of health care in MS patients.

***Conclusion***: We found that younger patients, those with higher education level, those who were employed, and with lower disease progression and lower disability, had better HRQoL.

**Keywords:** Multiple sclerosis; Neurology; Quality of life; Social characteristics

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## INTRODUCTION

Multiple sclerosis (MS) is a chronic, inflammatory, immune-mediated demyelinating disease of the

central nervous system (CNS). Though the cause of MS is still unknown, there is a growing body of evidence demonstrating its multifactorial origin as a result of the interaction between environmental aspects in genetically susceptible individuals, triggering the immunological changes underlying the disease process [1, 2]. MS usually starts between 20 and 40 years of age, is more common among women (female:male ratio ≈2:1), and may progress via different evolutionary patterns. In most cases, it develops in a relapsing-remitting (RR) form, with clearly defined relapses separated by complete or partial recovery; some RR patients later present with a secondary progressive (SP) MS type accompanied by disease progression with or without further relapses [1]. A few patients have progressive evolution of their disease from the beginning without experiencing relapses; these patients have primary progressive (PP) MS or rarely, if they have occasional superimposed relapses, progressive relapsing MS [1, 2]. Depending on the actual diagnostic criteria, monosymptomatic forms of MS have also been recognized and termed clinically isolated syndromes [1].

Considering the clinical hallmarks of MS, such as its chronic and unpredictable course that usually begins in young adulthood, i.e., during the most productive phase of life on an individual, professional and societal level, the social aspects of MS appear to be very important. However, these aspects have been scarcely studied so far. In fact, similar to other chronic diseases, MS raises social issues beyond clinical changes, causing physical, psychological and social problems. Overall, the inter-relationship between the disease and all these problems will influence how the patient perceives their health and quality of life (QoL).

Health-related quality of life (HRQoL), defined as a multi-dimensional construct that includes physical, mental and social health [3], has been increasingly studied in MS, since the wellbeing of patients involves living and coping with a chronic neurological condition and incorporates social aspects, combining physical, mental and social health [4, 5]. In addition, HRQoL is also a measure of the effectiveness of interventions in health care at the clinical practice level and in planning public policies, supporting the view that health is the most important domain of QoL.

As far as we are aware, the first study of HRQoL in MS was published in 1992, and since 2002 more than three-dozen articles have appeared in the literature [4]. Overall, research has focused on the relationship between the clinical effects of the disease, such as disability, pain, fatigue, psychological and cognitive symptoms [5]. The methodology includes case–control and cross-sectional studies, which compare MS with other chronic diseases [6] or with the general population [7–9] to analyze the HRQoL of MS patients according to treatment and different forms of the disease [10–14]. These studies have demonstrated that MS patients have worse QoL than the general population [8, 9], their disabilities are a predictor of HRQoL [7, 15], they have a high incidence of pain [10, 16–21], and they suffer with more frequent depressive symptoms [7, 12, 16, 22–28], cognitive deterioration [11, 20, 21, 25–29] and fatigue [13, 19, 24, 28, 30].

However, few studies have focused on the relationship between patient social characteristics and HRQoL [7, 9, 22, 23, 30–32]. Studies that have analyzed the relationships between the social characteristics of MS patients and HRQoL [7, 9, 22, 30] have frequently presented limited results, since they only compare two or three social characteristics [9, 11, 30, 33], and have often not reached significance levels.

This study aims to evaluate the association between the social and clinical characteristics of MS patients and their HRQoL, addressing an issue scarcely discussed in the literature and raising the need for different health care professionals to pay more attention to these aspects to improve QoL in MS.

## MATERIALS AND METHODS

A cross-sectional study was conducted to analyze the association between the social characteristics and HRQoL of patients with MS. The research protocol was submitted and approved by the Hospital São João (Oporto, Portugal) Ethics Committee. This article does not contain any studies with human or animal subjects performed by any of the authors.

### Patients

The sample was composed of 150 consecutive patients attending the MS Outpatient Clinic of Hospital São João, with an MS diagnosis confirmed by the neurologists according to the McDonald criteria [1]. Written informed consent was obtained from each patient. Illiterate patients and those with physical and mental disabilities prior to MS were excluded.

### Procedures

An interview was conducted using a specifically designed questionnaire to collect socio-demographic data (gender, age, marital status, education level, occupation, employment status and number of persons in the household) and assess patient QoL. MS parameters (clinical course, duration and disability) were collected from medical records. Disability was assessed using the Expanded Disability Status Scale (EDSS).

All interviews were conducted by David C. Costa with the clinical assistance of Maria J. Sá.

### Instruments

The EDSS [34] is the most widely used scale for assessing disability in MS patients. It consists of an ordinal scale with a range of values from 0 (corresponding to a normal neurological examination) to 10 (death by MS). The EDSS has 0.5 increments between units, except for the range between 0 and 1. Scores from 0 to 3.5 are considered to represent mild disability, scores of between 4.0 and 6.0 represent moderate disability, while scores of $\geq$6.5 represent severe disability [29].

HRQoL was assessed using the Health Status Questionnaire (SF-36v2) [35, 36], which is the Portuguese version of the Medical Outcome Study 36-Item Health Survey Short Form (SF-36) [37]. This scale was adapted and validated for the Portuguese population, assessing HRQoL in two dimensions:

- Physical dimension [physical function (PF), physical role (PR), body pain (BP), general health (GH)];
- Mental dimension [vitality (VT), social function (SF), role limitations—emotional (ER), mental health (MH)].

The SF-36 scoring system covers all items and ranges from 0 to 100, so that a higher score represents better QoL [37].

### Statistical Analysis

Statistical analysis was performed using the Statistics Package for Social Sciences (version 19). Mann–Whitney *U* and Kruskal–Wallis *H* non-parametric tests, with a confidence interval (CI) set at 95%, for comparing the results of socio-demographic variables and the

clinical parameters of MS with HRQoL were used.

## RESULTS

Socio-demographic characteristics and the clinical parameters of MS patients are presented in Table 1. The mean age of the sample population was 41.7 years; 70.7% were females with a female:male ratio of 2.4. Sixty-six percent of the patients were married and 11.3% were divorced, while 6.0% were widowed. Regarding education level, the majority (38.7%) had finished primary education and 32% had completed secondary grade education. However, 12.7% of patients did not have a minimum education level. The majority of patients were non-qualified workers (52.7%), while 47.3% were qualified workers with technical skills. The majority of the patients (44.0%) were retired from work and 35% were currently employed. Thirty-eight percent of the patients lived in households with three persons and 32.0% lived in households with ≥4 persons. With regard to MS course, the RR, PP and SP forms of the disease were found in 85.3, 4.0, and 10.7% of cases, respectively. Participants had an average MS duration of 9.1 years [standard deviation (SD) 6.4, 95% CI 1–25], and the average disability score was 2.5 (SD 2.4, 95% CI 0–99).

Socio-demographic characteristics and the physical health aspects of HRQoL comparisons are presented in Table 2. No statistically significant differences were found between gender and any domain of the HRQoL in relation to physical health. Younger patients presented with higher scores in PF, PR, BP and GH variables than older patients, and these differences were statistically significant. Regarding the association between marital

**Table 1** Socio-demographic and clinical characteristics

| Characteristics and parameters of MS | *n* | % | Mean (±SD; range) |
|---|---|---|---|
| Age (years) | 150 | | 41.7 (±10.5; 18–70) |
| Gender | | | |
| Female | 106 | 70.7 | |
| Male | 44 | 29.3 | |
| Social status | | | |
| Married | 99 | 66.0 | |
| Single | 25 | 16.7 | |
| Widowed | 9 | 6.0 | |
| Divorced or separated | 17 | 11.3 | |
| Education level | | | |
| Less than basic school | 19 | 12.7 | |
| Basic school | 58 | 38.7 | |
| Secondary school | 48 | 32.0 | |
| Higher education | 25 | 16.7 | |
| Occupation | | | |
| Qualified worker | 71 | 47.3 | |
| Non-qualified worker | 79 | 52.7 | |
| Employment status | | | |
| Employed | 53 | 35.3 | |
| Unemployed | 12 | 8.0 | |
| Retired | 66 | 44.0 | |
| Student/housewife/ inactive | 19 | 12.7 | |
| Number of persons in the household | | | |
| 2 or less | 45 | 30.0 | |
| 3 | 57 | 38.0 | |
| 4 or more | 48 | 32.0 | |
| Clinical course of MS | | | |
| Relapsing remitting | 128 | 85,3 | |
| Primary progressive | 6 | 4.0 | |
| Secondary progressive | 16 | 10.7 | |

**Table 1** continued

| Characteristics and parameters of MS | *n* | % | Mean (±SD; range) |
|---|---|---|---|
| Duration of MS | 150 | | 9.1 (6.4; 1–25) |
| Incapacity | | | |
| Light | 103 | 68.7 | |
| Moderate | 29 | 19.3 | |
| Severe | 18 | 12.0 | |
| EDSS | 150 | | 2.5 (2.4; 0–9) |

*EDSS* Expanded Disability Status Scale, *MS* multiple sclerosis, *SD* standard deviation

status and HRQoL, single and married patients showed better scores than widowed and divorced/separated patients, but these differences were not statistically significant. Marital status was statistically significantly associated with PF and GH. In all other domains, no differences were observed between marital status and PR or BP. When education level was assessed in relation to PF, PR, BP and GH, statistically significant differences were observed. Patients with a higher education level had significantly higher scores in these variables than patients with a lower education level. Qualified workers had higher scores than non-qualified workers and this difference was statistically significant for PF, PR and BP. Patient employment status showed statistically significant differences in relation to all dimensions of physical health. Employed patients presented with higher scores than others (unemployed, retired and student/housewife/inactive) and this difference was also statistically significant.

Table 3 presents socio-demographic characteristics in relation to mental health HRQoL dimensions. No statistically significant differences were found between gender and any mental health domain of HRQoL. Age group, education level and employment status differed significantly among the groups in relation to VT, SF, ER and MH. Young, employed, high education patients had higher scores than old, unemployed, low education, retired, student or housewife patients. The scores referred were statistically significant for VT, SF, ER and MH.

Table 4 displays the results of comparisons between MS parameters and HRQoL dimensions. There was a statistically significant association between MS duration and PR. However, no statistical significance was observed for PF, BP and GH. Nevertheless, patients with MS for less than 10 years presented with better scores across all dimensions of the HRQoL. MS clinical course was statistically associated with PF, PR and GH. Patients who presented with the RR form of MS had better scores in all HRQoL domains than those with the PP and SP forms, and these differences were statistically significant for PF, PR and GH. When we considered mild, moderate and severe levels of disability and HRQoL variables, we identified a statistically significant association with all dimensions, except BP. Patients with a mild disability level had better HRQoL scores than those with moderate and severe disability. These differences were statistically significant for PF, PR and GH.

Comparing the results of MS with HRQoL dimensions and SF-36 mental health scores (Table 5), the duration of MS was statistically associated with VT, SF and ER. Patients who had MS for less than 10 years presented with better scores than those with longstanding MS across all dimensions of the HRQoL.

The clinical course of MS was statistically associated with SF and ER. Patients who presented with the RR form had better scores than those with RR and PP forms of the disease,

and these differences were statistically significant for SF and ER. Mild, moderate and severe disability levels were statistically associated with the VT, SF and ER domains of the HRQoL. Patients with a mild level of disability had slightly better HRQoL scores than those with moderate and severe disability; these differences were statistically significant for VT, SF and ER.

## DISCUSSION

Many studies in recent years have explored QoL in MS [6]; however, this topic has been of growing interest among researchers who have analyzed QoL in several settings [32]. The present study analyzed the social characteristics associated with the physical and emotional dimensions of the HRQoL in MS patients. With the exception of age and gender, few of the previous studies have analyzed socio-demographic characteristics, such as marital status, education level, occupation, employment status and the number of persons in the household, using bivariate analysis [9, 11, 30, 33]. Our study was innovative because it proposed a broader analysis of the relationship between socio-demographic characteristics and HRQoL dimensions.

Despite the different social contexts of the studies available in the literature, the socio-demographic characteristics of our sample were identical to those reported elsewhere with regard to age and gender, since the average age of our patients was similar to that reported in other studies, e.g., 48.0 years [11, 16] and 38.9 years [17].

The bivariate analysis performed did not find statistically significant relationships between gender and all dimensions of HRQoL, as was reported in other studies [9, 30, 33].

Patients in lower age groups (≤40 years) had better results in all SF-36 subscales in our study. This was consistent with the results of Gottberg and colleagues [9] who identified that age was negatively correlated with all HRQoL dimensions.

We found that among our sample, 66% of MS patients were married and only one other study had analyzed marital status in relation to HRQoL [9]. As in our study, the authors of this other study also observed that there was no statistically significant relationship between being single and HRQoL measures. However, our study found a statistically significant relationship between marital status and PF and GH. We believe it necessary to reapply this analysis in light of sociological literature stating that married persons have better HRQoL than single persons [31].

We found that education level was associated with all SF-36 subscales. Patients who had higher levels achieved better scores than those with lower education levels. These data are similar to those of other studies, such as the one by Gottberg and collaborators [9].

Turpin et al. [22] showed that 28.5% of MS patients lacked an occupation; however, none of the analyzed studies took into account occupation in relation to HRQoL. In our study, better educationally qualified patients presented with better scores on all SF-36 subscales than those with a lower education level. These differences were statistically significant in the PF, PR, BP and SF subscales.

The employment status of MS patients presents a statistically significant relationship with all HRQoL dimensions. Employed patients had better scores than those who were unemployed, retired and student/housewife/inactive, and these differences were statistically significant. These results are similar to those obtained by Gottberg et al. [9], Shawryn et al. [11], Aronson [30] and Pluta-Fuerst et al. [33]. These other studies clearly

**Table 2** Analysis of socio-demographic characteristics with SF-36 (Physical Health)

| | Physical function Mean (±SD) | *P* | Physical role Mean (±SD) | *P* | Body pain Mean (±SD) | *P* | General health Mean (±SD) | *P* |
|---|---|---|---|---|---|---|---|---|
| Gender | | | | | | | | |
| Female ($n = 106$) | 55.8 (±34.4) | | 57.5 (±33.1) | | 61.5 (±33.1) | | 42.5 (±20.7) | |
| Male ($n = 44$) | 57.2 (±32.7) | n.s. | 60.5 (±33.0) | n.s. | 71.8 (±33.0) | n.s. | 43.3 (±20.4) | n.s. |
| Age group | | | | | | | | |
| Less than 30 ($n = 24$) | 80.6 (±26.5)[a] | | 75.3 (±27.6)[a] | | 72.6 (±27.6)[a] | | 52.3 (±22.0)[a] | |
| 31–40 ($n = 49$) | 68.9 (±30.2)[a] | | 75.5 (±28.1)[a] | | 75.4 (±28.1)[a] | | 46.9 (±20.9)[a] | |
| 41–50 ($n = 42$) | 38.6 (±28.4)[b] | | 39.7 (±28.0)[b] | | 52.8 (±28.0)[b] | | 34.3 (±17.4)[b] | |
| More than 50 ($n = 35$) | 42.9 (±32.4)[b] | 0.000 | 45.4 (±31.0)[b] | 0.000 | 57.8 (±31.0)[b] | 0.000 | 40.4 (±18.6)[b] | 0.003 |
| Marital status | | | | | | | | |
| Married ($n = 99$) | 57.6 (±32.5)[a,b] | | 59.0 (±33.2) | | 64.0 (± 33.2) | | 42.9 (± 21.1)[a] | |
| Single ($n = 25$) | 71.6 (±23.7)[a] | | 67.0 (±26.4) | | 67.5 (± 26.4) | | 48.9 (± 17.8)[a] | |
| Widowed ($n = 9$) | 36.1 (±42.3)[b,c] | | 50.7 (±41.5) | | 44.0 (± 41.5) | | 28.7 (± 13.2[)b] | |
| Divorced or separated ($n = 17$) | 36.2 (±37.2)[c] | 0.006 | 46.7 (±34.3) | n.s. | 73.8 (± 34.3) | n.s. | 40.2 (± 21.5)[a,b] | 0.043 |
| School level | | | | | | | | |
| Less than basic school ($n = 19$) | 27.6 (±26.4)[b] | | 35.2 (±29.5)[b] | | 51.0 (±29.5)[b] | | 30.1 (±13.2)[b] | |
| Basic school ($n = 58$) | 52.9 (±33.5)[c] | | 54.0 (±32.7)[c] | | 59.7 (±32.7)[b] | | 41.1 (±21.0)[a] | |
| Secondary school ($n = 48$) | 63.8 (±32.0)[c] | | 66.9 (±32.5)[c] | | 72.3 (±32.5)[a] | | 47.3 (±19.8)[a] | |
| Higher education ($n = 2$) | 71.0 (±29.5)[a] | 0.000 | 70.0 (±27.2)[a] | 0.002 | 71.0 (±27.2)[a] | 0.011 | 47.4 (±21.5)[a] | 0.005 |

**Table 2** continued

| | Physical function Mean (±SD) | *P* | Physical role Mean (±SD) | *P* | Body pain Mean (±SD) | *P* | General health Mean (±SD) | *P* |
|---|---|---|---|---|---|---|---|---|
| Occupation | | | | | | | | |
| Qualified worker ($n = 71$) | 62.5 (±32.9) | | 64.6 (±33.6) | | 70.3 (±33.6) | | 45.4 (±20.5) | |
| Non-qualified worker ($n = 79$) | 50.6 (±33.9) | 0.036 | 52.9 (±31.8) | 0.030 | 59.0 (±31.8) | 0.019 | 40.3 (±20.4) | n.s. |
| Employment status | | | | | | | | |
| Employed ($n = 53$) | 80.0 (±23.2)[a] | | 77.7 (±30.0)[a] | | 74.8 (±30.0)[a] | | 51.4 (±21.7)[a] | |
| Unemployed ($n = 12$) | 46.3 (±27.5)[b] | | 49.0 (±15.0)[b] | | 52.1 (±15.0)[b] | | 39.5 (±10.5)[b] | |
| Retired ($n = 66$) | 37.0 (±28.8)[c] | | 45.0 (±31.2)[b] | | 59.5 (±31.2)[b] | | 36.6 (±17.9)[b] | |
| Student/housewife/inactive ($n = 19$) | 62.9 (±36.0)[a] | 0.000 | 57.2 (±30.8)[b] | 0.000 | 60.7 (±30.8)[b] | 0.013 | 42.1 (±23.0)[b] | 0.002 |
| Number of persons in the household | | | | | | | | |
| 2 or less ($n = 45$) | 52.7 (±38.7) | | 61.9 (±35.8) | | 64.4 (±35.8) | | 45.3 (±22.9) | |
| 3 ($n = 57$) | 52.8 (±33.0) | | 54.9 (±32.6) | | 64.5 (±32.6) | | 43.2 (±20.0) | |
| 4 or more ($n = 48$) | 63.5 (±29.0) | n.s. | 59.2 (±30.9) | n.s. | 64.6 (±30.9) | n.s. | 39.8 (±18.6) | n.s. |

*n.s.* not significant, *SF-36* short form 36, *SD* standard deviation

[a,b,c] Homogeneous groups according to the Mann–Whitney test, to 95% confidence interval

determined that patients with better employment status had better HRQoL measures than the unemployed or those who were not in paid employment. Although unemployment could not be exclusively associated with MS, which is also associated with a country's economic structure and occupation policy for the socially disadvantaged, this finding requires further analysis.

Household size was not statistically related to HRQoL measures. Patients who lived in larger households had better results than those living in smaller households, as expected, but this difference was not statistically significant. As a matter of fact, the sociological literature [31] indicates that the probability of getting help is greater in larger households. However, this relationship was not shown to be true according to the HRQoL results of our MS patients.

**Table 3** Analysis of socio-demographic characteristics with SF-36 (Mental Health)

| | Vitality Mean (±SD) | *P* | Social function Mean (±SD) | *P* | Emotional role Mean (±SD) | *P* | Mental health Mean (±SD) | *P* |
|---|---|---|---|---|---|---|---|---|
| Gender | | | | | | | | |
| Female ($n = 106$) | 42.9 (±25.6) | | 68.9 (±28.4) | | 61.7 (±32.9) | | 55.1 (±24.3) | |
| Male ($n = 44$) | 50.4 (±25.4) | n.s. | 73.6 (±30.0) | n.s. | 64.0 (±33.5) | n.s. | 59.3 (±25.1) | n.s. |
| Age group | | | | | | | | |
| Less than 30 ($n = 24$) | 58.3 (±22.6)[a] | | 79.7 (±22.7)[a] | | 79.9 (±27.5)[a] | | 66.2 (±19.3)[a] | |
| 31 to 40 ($n = 49$) | 57.7 (±25.2)[a] | | 80.9 (±25.1)[a] | | 79.9 (±23.8)[a] | | 65.1 (±25.0)[a] | |
| 41 to 50 ($n = 42$) | 29.6 (±19.3)[b] | | 60.1 (±30.8)[b] | | 44.6 (±30.1)[b] | | 45.0 (±23.0)[b] | |
| More than 50 ($n = 35$) | 37.1 (±22.1)[b] | 0.000 | 61.1 (±28.7)[b] | 0.000 | 47.1 (±33.0)[b] | 0.000 | 50.8 (±22.1)[b] | 0.000 |
| Marital status | | | | | | | | |
| Married ($n = 99$) | 44.1 (±26.8) | | 69.6 (±28.7) | | 60.4 (±33.2) | | 55.4 (±25.7) | |
| Single ($n = 25$) | 56.3 (±22.8) | | 76.0 (±25.7) | | 75.7 (±26.0) | | 62.9 (±24.3) | |
| Widowed ($n = 9$) | 31.9 (±16.4) | | 59.7 (±37.4) | | 50.0 (±41.5) | | 45.6 (±17.1) | |
| Divorced or separated ($n = 17$) | 41.5 (±23.1) | n.s. | 71.3 (±29.6) | n.s. | 60.8 (±33.8) | n.s. | 57.3 (±19.4) | n.s. |
| School level | | | | | | | | |
| Less than basic school ($n = 19$) | 28.9 (±18.5)[b] | | 55.3 (±27.7)[b] | | 34.2 (±29.9)[b] | | 43.8 (±19.5)[b] | |
| Basic school ($n = 58$) | 42.0 (±26.1)[b,c] | | 68.1 (±31.2)[a] | | 58.5 (±33.2)[c] | | 51.1 (±25.6)[b] | |
| Secondary school ($n = 48$) | 48.8 (±24.3)[c] | | 77.3 (±26.9)[a] | | 70.8 (±30.1)[c] | | 63.3 (±21.9)[a] | |
| Higher education ($n = 2$) | 57.5 (±25.5)[a] | 0.001 | 73.0 (±23.8)[a] | 0.023 | 76.7 (±26.0)[a] | 0.000 | 64.6 (±24.2)[a] | 0.000 |

**Table 3** continued

| | Vitality Mean (±SD) | *P* | Social function Mean (±SD) | *P* | Emotional role Mean (±SD) | *P* | Mental health Mean (±SD) | *P* |
|---|---|---|---|---|---|---|---|---|
| Occupation | | | | | | | | |
| Qualified worker ($n = 71$) | 47.8 (±25.6) | | 76.9 (±24.3) | | 66.9 (±33.3) | | 60.0 (±23.4) | |
| Non-qualified worker ($n = 79$) | 42.1 (±25.4) | n.s. | 64.1 (±31.5) | 0.016 | 58.4 (±32.7) | n.s. | 52.6 (±25.1) | n.s. |
| Employment status | | | | | | | | |
| Employed ($n = 53$) | 59.2 (±25.5)[a] | | 83.0 (±23.3)[a] | | 78.6 (±28.9)[a] | | 67.2 (±23.6)[a] | |
| Unemployed ($n = 12$) | 43.2 (±23.5)[b] | | 66.7 (±16.3)[b] | | 52.8 (±25.2)[b] | | 49.6 (±21.6)[b] | |
| Retired ($n = 66$) | 33.4 (±19.7)[b] | | 61.6 (±29.6)[b] | | 49.7 (±31.9)[b] | | 49.1 (±22.5)[b] | |
| Student/housewife/inactive ($n = 19$) | 47.7 (±27.5)[b] | 0.000 | 67.1 (±34.9)[b] | 0.000 | 67.1 (±33.4)[b] | 0.000 | 55.1 (±26.2)[b] | 0.000 |
| Number of persons in the household | | | | | | | | |
| 2 or less ($n = 45$) | 45.0 (±28.7) | | 69.2 (±31.0) | | 63.5 (±36.3) | | 58.7 (±25.2) | |
| 3 ($n = 57$) | 43.4 (±22.5) | | 71.9 (±28.7) | | 57.6 (±31.4) | | 55.8 (±21.5) | |
| 4 or more ($n = 48$) | 47.3 (±26.7) | n.s. | 69.3 (±27.4) | n.s. | 67.0 (±31.6) | n.s. | 54.7 (±27.4) | n.s. |

*n.s.* not significant, *SF-36* short form 36, *SD* standard deviation

[a,b,c] Homogeneous groups according to the Mann–Whitney test, to 95% confidence interval

MS parameters in our study referred to the duration and type of MS, and MS-associated disability. Our results were similar to those in the literature [3, 9, 21, 23] in which the relationship between these parameters and HRQoL was analyzed. The duration of MS was significantly associated with PR and all SF-36 mental health dimensions, such as VT, SF and ER. Patients with a shorter MS duration had higher scores on all HRQoL dimensions than those with a longer MS duration. These results are consistent with those of other studies [9, 16], highlighting the negative correlation between all HRQoL domains and MS duration when it lasts for more than 10 years [5, 11, 33].

The clinical course of MS was statistically related to PF, PR, GH, SF and ER. The score obtained by MS patients with the RR form of the disease was higher than the score obtained by MS patients with other forms of the disease (PP and SP). These results are similar to those obtained in other studies [5, 9, 11, 22].

**Table 4** Analysis of clinical characteristics with SF-36 (Physical Health)

| | Physical function Mean (±SD) | *P* | Physical role Mean (±SD) | *P* | Body pain Mean (±SD) | *P* | General health Mean (±SD) | *P* |
|---|---|---|---|---|---|---|---|---|
| MS duration | | | | | | | | |
| 10 years or less ($n = 95$) | 59.7 (±34.1) | | 63.0 (±34.1) | | 67.8 (±34.1) | | 44.2 (±22.6) | |
| More than 10 years ($n = 55$) | 50.2 (±32.6) | n.s | 50.5 (±29.6) | 0.019 | 58.7 (±29.6) | n.s | 40.3 (±16.1) | n.s |
| MS form | | | | | | | | |
| Relapsing remitting ($n = 128$) | 60.9 (±31.9)[a] | | 62.6 (±32.2)[a] | | 64.9 (±32.2) | | 44.4 (±20.5)[a] | |
| Primary progressive ($n = 6$) | 16.7 (±29.6)[b] | | 39.6 (±26.4)[a] | | 54.0 (±26.4) | | 26.2 (±21.7)[b] | |
| Secondary progressive ($n = 16$) | 33.4 (±32.6)[b] | 0.000 | 32.0 (±27.9)[b] | 0.001 | 65.4 (±27.9) | n.s | 36.0 (±16.9)[b] | 0.015 |
| EDSS | | | | | | | | |
| Light ($n = 103$) | 66.2 (±31.0)[a] | | 67.5 (±30.6)[a] | | 67.0 (±30.6) | | 46.7 (±21.0)[a] | |
| Moderate ($n = 29$) | 44.7 (±26.5)[b] | | 39.7 (±27.3)[b] | | 57.2 (±27.3) | | 36.9 (±16.5)[b] | |
| Severe ($n = 18$) | 17.8 (±26.5)[c] | 0.000 | 36.8 (±33.1)[b] | 0.000 | 61.9 (±33.1) | n.s | 29.8 (±16.1)[b] | 0.001 |

*EDSS* Expanded Disability Status Scale, *MS* multiple sclerosis, *n.s.* not significant, *SD* standard deviation
[a,b,c] Homogeneous groups according to the Mann–Whitney test, to 95% confidence interval

However, they differed on the results of a study by Aronson, which highlighted the relationship between RR clinical form and decrease in HRQoL. In this study, the author compares clinical forms with HRQoL as a whole [31]. In our study, we compare the clinical forms of MS with each dimension of HRQoL.

MS patients with high disability scores (EDSS 4–6 and ≥6.5) had lower HRQoL levels than those with lower scores (EDSS 0–3.5). The level of disability was statistically associated with HRQoL, particularly PF, PR, GH, VT, SF and ER. Patients with mild disability had higher HRQoL scores than those with severe levels of disability. These differences were statistically significant for these subscales. These results are similar to those of the majority of studies reviewed, as it indicates that disability is a predictor of HRQoL [9, 15, 33].

Although there are scales that are more specific to the MS setting, such as the MSQoL-54 [38], the generic SF-36 is the scale used mostly in studies of HRQoL in MS patients [7]. In addition, the only scale adapted and validated for a Portuguese population is the SF-36 [35, 36].

Finally, the authors could not identify publications entirely devoted to the comparison between the socio-demographic characteristics of MS patients and HRQoL

**Table 5** Analysis of clinical characteristics with SF-36 (Mental Health)

| | Vitality Mean (±SD) | *P* | Social functioning Mean (±SD) | *P* | Emotional role Mean (±SD) | *P* | Mental health Mean (±SD) | *P* |
|---|---|---|---|---|---|---|---|---|
| MS duration | | | | | | | | |
| 10 years or less ($n = 95$) | 48.8 (±26.9) | | 73.7 (±28.7) | | 66.9 (±34.7) | | 58.3 (±24.6) | |
| More than 10 years ($n = 55$) | 38.8 (±22.3) | 0.025 | 64.3 (±28.3) | 0.028 | 54.5 (±28.5) | 0.015 | 52.8 (±24.1) | n.s. |
| MS form | | | | | | | | |
| Relapsing remitting ($n = 125$) | 46.7 (±26.5) | | 72.1 (±29.1)[a] | | 65.8 (±32.4)[a] | | 57.8 (±25.3) | |
| Primary progressive ($n = 6$) | 28.1 (±14.7) | | 43.8 (±33.3)[b] | | 51.4 (±35.1)[a] | | 37.7 (±16.4) | |
| Secondary progressive ($n = 16$) | 39.1 (±19.2) | n.s | 65.6 (±20.2)[b] | 0.041 | 39.1 (±28.5)[b] | 0.009 | 51.6 (±16.3) | n.s. |
| EDSS | | | | | | | | |
| Light ($n = 103$) | 49.4 (±26.4)[a] | | 73.4 (±28.8)[a] | | 68.6 (±30.3)[a] | | 58.6 (±25.8) | |
| Moderate ($n = 29$) | 36.2 (±21.8)[b] | | 70.3 (±26.0)[b] | | 52.3 (±35.1)[b] | | 53.9 (±22.6) | |
| Severe ($n = 18$) | 35.1 (±21.3)[b] | 0.007 | 52.1 (±28.2)[b] | 0.009 | 43.1 (±34.8)[b] | 0.004 | 47.1 (±17.4) | n.s. |

*EDSS* Expanded Disability Status Scale, *MS* multiple sclerosis, *n.s.* not significant, *SD* standard deviation
[a,b] Homogeneous groups according to the Mann–Whitney test, to 95% confidence interval

measures. Some studies only analyzed one or other social characteristic Hrolf, because they are neglected relative to other factors that affect the HRQoL of MS patients.

## CONCLUSIONS

Our study illustrates the social characteristics of MS patients that impart a significant impact on their perception of HRQoL. The HRQoL concept is known to be multifactorial. Younger MS patients, those who have higher education levels, those who are employed and have a lower degree of MS progression and lower disability reported greater QoL than others. These results may contribute to more detailed knowledge concerning the importance of social characteristics in MS patients in relation to HRQoL to provide improved health care planning.

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