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Self-reported health promotion and disability progression in multiple sclerosis

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ABSTRACT

Background: Health behavior may be associated with disability progression in multiple sclerosis (MS).
Objectives: To investigate health-promoting behavior as measured by the Health-Promoting Lifestyle Profile II, which includes the subscales of health responsibility, physical activity, nutrition, spiritual growth, interpersonal relationships and stress management.
Methods: We conducted a cross-sectional survey among individuals with MS, registered by the Flemish MS society, Belgium. Scores for the total scale and subscales were categorized into quintiles. A time-to-event analysis and Cox proportional hazard regression were performed with time to Expanded Disability Status Score (EDSS) of 6 (requires a cane) as an outcome measure. Hazard ratios for the time from onset and the time from birth were adjusted for gender, age at onset and immunomodulatory treatment. The first category was the reference group (first quintile).
Results: Data on 1372 respondents with definite MS were collected. Subjects with relapsing onset MS and higher scores for overall health-promoting behavior, and the subscales of physical activity, nutrition and spiritual growth, had a reduced risk of reaching EDSS 6 compared to the reference group. No associations were found for the subscales of health responsibility, stress management and interpersonal relations. In progressive onset MS, no significant associations were obtained.
Conclusion: Our study shows an association of self-reported health promoting behavior with disability progression in subjects with relapsing onset MS.

1. Introduction

Multiple sclerosis (MS), a multifocal inflammatory and neurodegenerative disease of the central nervous system, is the result of a complex interaction between genetic and environmental factors. The clinical picture is characterized by an impressive variability in type of onset, symptoms, course and severity of MS. Walking impairment is the most visible feature of MS and results in loss of independence and quality of life [1]. Other possible MS symptoms include fatigue, sensory, visual, oculomotor and cognitive impairment and depression. Although factors such as gender, age at onset and the initial course partly predict the long term disability in MS [2], it is impossible to define the prognosis when dealing with a given patient.

Compared to matched controls, persons with MS are less physically active, even when only mildly disabled [3]. Frequent adverse health behaviors, increasing the risk of other chronic diseases, have been reported among participants in the North American Research Committee on MS Registry [4]. With increasing levels of disability, the intensity of physical activity was lower and the frequency of overweight or obesity was higher. Smoking and vascular comorbidity have been associated with an increased risk of disability progression in persons with MS [5–7], whereas higher levels of consumption of fish, coffee and alcoholic beverages have been associated with reduced disability progression, at least in relapsing onset MS [7]. The available literature on dietary interventions is extensive but data are insufficient to assess a real benefit or harm [8].

There is an evidence to suggest that engaging in healthy behaviors, such as physical activity, may reduce functional limitations and improve quality of life in MS [9]. It has been suggested that physical activity might also have an impact on disease progression in MS. In studies using patient-reported measures of physical activity and disease activity, more physical activity was associated with some protective effects [10]. Cross-sectional f-MRI studies suggested a positive effect of cardiorespiratory fitness on brain function in persons with MS [11,12]. Aerobic activity also has the potential to influence the clinical disease course of the animal disease model of MS [13]. However, whether structured exercise interventions affect disease progression in MS remains to be elucidated [10].

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The question whether a health promoting lifestyle might result in positive health outcomes, including walking impairment, has not been answered yet [1]. Nonetheless, interventions aimed at obtaining higher levels of health promoting activities in MS as measured with the Health-Promoting Lifestyle Profile II (HPLP II) via wellness [14], telephone counselling [15] or an educational program [16] are feasible and effective in MS.

In view of these findings, we studied self-reported health promoting behavior in relation to self-reported progression of disability in relapsing onset and progressive onset MS. The self-reported time to reach the irreversible milestone of requiring aid to walk was used as measure of disability progression.

2. Methods

2.1. Study population

The ethics committee of the Universitair Ziekenhuis Brussels, and the local ethics committee of the National MS Center Melsbroek, Belgium, approved the study.

A request to participate in this study was sent by mail to all 3320 individuals with MS, registered by the Flemish MS society in September 2009. The invitation letter explained study goals and instructions. Persons with MS were asked to sign a consent statement if they decided to participate.

Based on regional MS prevalence data in Flanders, Belgium [17] and the North–East part of France [18], we estimate about half of the total Flemish MS population is registered by the Flemish MS Society. A document of the MS diagnosis, written by a neurologist is requested.

Participation consisted of completing a questionnaire with questions on demographics, health promotion and personal weight and length. Participants were asked whether they had a definite, probable or possible diagnosis of MS. MS characteristics included the year of first MS symptoms, whether onset was relapsing or progressive, and whether immunomodulatory drugs were used.

We used the self-assessment scale of disability developed for the European study on costs and quality of life in MS [19]. It is based on the original validated description in the EDSS [20], and on the Patient Determined Disease Steps instrument [21]. Subjects were asked to select from a series of statements describing limitations and walking disability. The self-assessment scale of disability allowed participants to be categorized into 11 steps of disability, from 0 to 10 corresponding to an EDDS score of 0, 1–1.5, 2–2.5, 3–3.5, 4–4.5, 5–5.5, 6, 6.5, 7–7.5, 8–8.5 and 9–9.5. The year of reaching step 6 (using a cane or support to walk for a distance of 100 m) was recorded separately.

Health promotion behavior was assessed via the HPLP II. The validity and reliability of this questionnaire have been established in 712 community-residing adults (http://www.unmc.edu/nursing/Health_Promoting_Lifestyle_Profile_II.htm). The HPLPII measures the frequency with which individuals report engaging in activities that are directed at maintaining and/or increasing their level of health of well-being. The 52-item scale is composed of six subscales: health responsibility, physical activity, nutrition, spiritual growth, interpersonal relationships and stress management. The respondents are asked to rate how often they undertake activities from 1 = Never, 2 = Sometimes, 3 = Often, and 4 = routinely. A score for overall promoting lifestyle is obtained by calculating a mean of the individual's responses to all 52 items. The HPLP II is a revision of the original 48-item HPLP [22,23]. Selected items were revised to reflect more up-to-date health information (e.g. food pyramid, integration of varied levels of physical activity) and items were more evenly distributed across subscales [24]. Although formal validity and reliability studies in MS are lacking, evidence supports the use of the HPLP as a measure of health behavior in patients with MS [25,26]. When compared to the normative, mean scoring differs in MS patients with small effect sizes for three of the four subscales and a moderate effect size for the subscale of physical activity (2.34 ± 0.71 in normative group versus 1.88 ± 0.66 in MS patients) [27].

Upon receipt, the questionnaires were checked. When incomplete, participants were contacted whenever possible. Only data from subjects with a definite MS diagnosis were used.

2.2. Outcome variables

The outcome measure was the time from onset and from birth to reach irreversible EDSS 6 in the self-assessment scale of disability. Because this step, signifying the use of a cane or support to walk for a distance of 100 m, relies upon objective evaluation and is easy to assess in retrospect, it is considered a reliable milestone during the course of MS [28]. Both time from disease onset and time from birth to EDSS 6 were calculated using the year of MS onset, the year of birth and the year of reaching the irreversible disability step of EDSS 6.

2.3. Statistical analysis

All analyses were stratified according to relapsing onset or progressive onset.

Predictive variables included the total HPLP II, the six subscales of the HPLP II, health responsibility, physical activity, nutrition, spiritual growth, interpersonal relationships and stress management.

The total HPLP II and the six subscales of the HPLP II, health responsibility, physical activity, nutrition, spiritual growth, interpersonal relationships and stress management were categorized into quintiles. Quintiles are values that divide a sample of data into five groups containing (as far as possible) equal numbers of observations. The first quintile represents the lowest fifth of the data (1–20%); the second quartile represents the second fifth (21%–40%) etc.

When participants had reached EDSS 6 without indicating the year of reaching that milestone, these data as well as other missing data were handled as missing values.

MS variables included gender, age at onset and current immunomodulatory treatment (yes or no).

Time-to-event plots using time from disease onset and time from birth to reach EDSS 6 were constructed by the Kaplan–Meier method, with differences in survival analysis assessed by the log rank test. From these Kaplan–Meier curves, the median time-to-event and 95% CI were calculated.

Cox proportional-hazard regression modelling adjusting for gender, age at onset, and immunomodulation was used to estimate hazard ratios for time from onset to EDSS 6 and for time from birth to EDSS 6, for each predictive life style variable. The first category was the reference group (first quintile).

Data were analyzed using PASW version 17.0 for windows (SPSS Inc., Chicago, IL).

3. Results

We received 1431 questionnaires (response rate of 43.1%). After taking into account the exclusion criteria, 1372 questionnaires were included in the final analysis.

The characteristics of our study population are shown in Table 1.

Compared to the age-group distribution of the members of the Flemish MS society, our study sample showed a mild shift towards younger age groups: 30.3% of respondents were 60 years or older compared to 34.8% of the persons with MS registered by the MS society. Fourteen percent of the respondents were 40 years or younger compared to 12.2% of the registered subjects with MS (data not shown). After a mean disease duration of 19.7 years, 704/1372 (51.3%) had reached EDSS 6. Time to EDSS 6 was specified by 78% (549/704) of these responders. Mean values for the total HPLP II and the subscales in our study sample are in the range of what has been described in other studies with lower values for physical activity and