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Perceived health status in multiple sclerosis patients

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Perceived health status as measured by the SF-36 in patients with multiple sclerosis: a review¹

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Abstract

This review of literature gives an overview of recent studies about perceived health status as measured by the SF-36 Health Survey in patients with multiple sclerosis. The SF-36 is one of the tools measuring health status in patients used in international research and clinical practice. It measures two main health concepts - physical and mental. The SF-36 represents a valid instrument able to detect differences in perceived health status in patients. A computer-aided search in Medline and PsycINFO resulted in 504 articles in English published from 1996 to August 2006. After the screening process on the basis of abstracts, 8 articles consisting of empirical studies remained in which perceived health status was evaluated using the SF-36 Health Survey. Seven studies focused on disability and perceived health status in the SF-36. Two studies focused on the relationship between depression and perceived health status. These studies showed that multiple sclerosis patients with low disability and minor depression scored significantly better than patients with high disability and major depression in the SF-36 health dimensions. Gender seems to have no influence on perceived health status in multiple sclerosis patients. The longer the disease duration and the more severe the disease, the lower the patients scored in perceived health status. The more disabled, the more depressive and the older the patients, the poorer their perceived health status was. Health providers supporting appropriate treatment might pay more attention to more disabled and more depressive patients, with longer disease duration. Perceived health status can be a predictor of prognosis and intervention outcomes. The study shows the importance of measuring perceived health status in multiple sclerosis patients with implications for their quality of life and provision of care.

Introduction

Previous studies report that Multiple Sclerosis (MS) patients have reduced quality of life compared with groups from the general population. A large number of studies show that MS has negative effects on both the physical and mental dimensions of health and quality of life (1-3).

MS is a chronic autoimmune disease with an uncertain course, characterized by recurrent patches of inflammation in optic nerves, brain and spinal cord. Symptoms begin between ages 20 and 50 years in 90% of cases, with the peak onset at age 33 years. It is the most common cause of neurological disability in young adults. It is thought to affect over 2 million people worldwide (4, 5).

Perceived health status reflects a complex of internalized calculations based on life experience and knowledge of disease causes

and consequences (6, 7). The concept of perceived health status represents the influences of chronic disease, disability and functional limitations (7). There is uncertainty in definitions in the studies focusing on health status. The researchers study the physical, mental and social domains of health and refer to “quality of life” (1, 2, 8-10), “well-being” (11, 12) or “self-rated health” (13, 14). Despite these interchangeable terms, perceived health status has been identified as the closest in meaning to the self-assessment of health by patients, which allows measurement of the effect of treatment on their overall health-related quality of life, and prediction of other outcomes, including survival in patients with chronic diseases (15, 16).

The SF-36 is evaluated as an appropriate instrument for measuring general health, and is not specific for any age, disease or treatment group (17). The SF-36 assesses 4 physical health domains and 4 mental health domains. This generic indicator allows comparison of the health status of chronic patients with different conditions, and can be a predictor of prognosis and intervention outcomes (17, 18). The benefits of using the SF-36 dimensions in clinical practice could be substantial, e.g. assessment of vitality may indicate exhaustion in MS patients (19).

Perceived health status in MS patients might be affected by disease duration (9). The study by Riazi et al (20) focused on using the SF-36 in patients with MS or Parkinson’s disease, and in the normal population. They found that cross-sectional studies could not define changes in health status according to disease duration (20).

Many neurological scales associated with impairment and disability can measure perceived health status in MS patients (8). When MS patients are compared to controls, they score significantly lower than the general population controls in measures of disability (16, 21, 22). With progression in disability, physical functioning scales show decreases in perceived health status. As previous studies report, a higher level of disability has negative consequences on perceived health status in MS patients (8, 16, 21, 22).

Patients with depression usually suffer from sadness, reduced vitality and fatigue. The symptoms include lower interest, less concentration, insomnia, less appetite, low self-evaluation and self-esteem with feelings of nothingness. Depression is often associated with anxiety in somatic patients. Anxiety often involves obsessive symptomatology, with tension, shakiness, exudation and distraction (23, 24). High depression and anxiety as well were found to be negatively associated with physical and mental health status (25-27). High rates of depression have been found more frequently in MS patients than in comparable groups in some studies. It is suggested that MS patients on average are more depressed than comparable groups (28, 29), but the literature is inconclusive (30, 31). In some studies depression shows one of the strongest links with lower scores in self-reported questionnaires, independent of the clinical course

or disability status of MS patients (1, 32). Patients may develop depression later as an understandable reaction to learning they have a chronic disease and having to live with its consequences (25, 33). Statistically, as many as 60% of patients with MS experience major depression with a suicide rate 7.5 times that of the age-matched general population (33). The negative impact of depressive symptoms on perceived health status in MS patients has been demonstrated (34).

Aims

The aim of this study was to review the literature focusing on the associations between disease duration, disability and perceived health status as measured by the SF-36, as well as the psychological well-being related to perceived health status in MS patients. Since SF-36 has been widely used in clinical and epidemiological studies, the benefits of using the SF-36 and its eight dimensions could be substantial indicators for assessing the physical, mental or social domains in MS patients.

Methods

Search strategy and selection criteria

The computer-assisted literature search covered the years 1996 - August 2006. This search focused on the Medline databases and PsycINFO psychological abstracts, and was performed with a combination of the keywords "multiple sclerosis", "self-reported", "self-evaluation", "self-perception", "self rated", "patient rated", "patient perceive". Our search resulted in 504 hits.

Of these 504 hits, the studies meeting the following inclusion and exclusion criteria are mentioned. Inclusion criteria were: primary studies focusing on perceived health status in MS patients, written in English, published in journals during the search span. The second step was to exclude, on the basis of their abstracts, publications focusing only on the psychometric properties of the measures. Studies with irrelevant content on the basis of their abstracts (focusing on health care services, treatment and biomedical background, and studies comparing MS patients with other chronic diseases) were excluded as well. Furthermore, case studies were omitted. Finally, one study was eliminated in which a self-rating scale on perceived health status was used, but not the SF-36. The reference list of reviewed articles resulted in 8 relevant publications (Table 1).

Table 1 Results of the screening process

Screening steps	Result	Final Result
1 Medline and PsycINFO retrieval	+ 504	504
2 Excluded articles about measures	- 32	472
3 Excluded for irrelevant content (health care services, treatment and biomedical background, and studies comparing MS patients with different chronic diseases)	- 459	13
4 Excluded case studies	- 4	9
5 Excluded study not using SF-36	- 1	8

Instruments

Health measures

Within this review we concentrated on 8 studies measuring perceived health status in MS patients. All studies used as their main measure the Short Form-36 Health Survey (SF-36). This was originally designed as a generic indicator of health status for use in population surveys and evaluative studies of health policy. The SF-36 includes eight multi-item scales to measure the following eight dimensions: physical functioning (ten items), role limitation due to physical health (four items), bodily pain (two items), social functioning (two items), general mental health, covering psychological distress and well-being (five items), role limitations due to emotional problems (three items), vitality, energy or fatigue (four items) and general health perceptions (five items). In addition, one question covers change in health status over the past year (one item). All item scores are coded and transformed into a scale of 0 (poor health) to 100 (optimal health). The SF-36 may be self-administered or used in personal or telephone interviews (8, 17). SF-36 correlations with similar measures are generally consistent with the predictions. Physical function, social function, role limitation-physical, current health and health distress scales distinguish between normal subjects and patients with varying symptom severity (35).

Apart from the SF-36, four of the eight studies used various measures of perceived health status. They include: the European Quality of Life Scale (EuroQoL-5D) which defines health in terms of five dimensions (mobility, self-care, usual activities, pain/discomfort, anxiety/depression); the Sickness Impact Profile (SIP) where higher scores represent greater disease-related dysfunction; the Multiple Sclerosis Quality of Life 54 Questionnaire (MSQoL-54); and finally the Subjective Estimation of Quality of Life (SQoL) (16, 22, 36, 37).

Disability

The Kurtzke Expanded Disability Status Scale (EDSS) is the most frequently used measure of disability in MS patients. Each measured functional system is graded to the nearest possible grade, where 0 means normal grade, 6 means loss of function and V indicates an unknown abnormality. Disability caused by MS is measured on a continuum of 0 (normal neurologic examination) to 10 (death due to MS) according to Kurtzke (38). The Office of Population Census and Surveys (OPCS) presents a disability scale used by a non-medically qualified assistant in the study by Rothwell et al (16). OPCS presents a disability questionnaire based upon a national survey of disability in Great Britain. The scale is used to assess disability in thirteen areas. For each area, a severity score is recorded based on a series of judgements by people with disabilities and those caring for them. The severity categories range from 1 (least severe) to 10 (most severe) (39). The last checklist in the study by Isaakson et al (37), the Self Reported Impairment contains 15 signs of impairment, and patients report if they have no symptoms, moderate or severe, and if the symptoms are constant or fluctuating (37).

Psychological well-being

The Beck Depression Inventory (BDI) is used with patients to explore feelings and attitudes relating to general depressive status and to verify the influence of depression on health status in disabled people. It evaluates 21 symptoms of depression (36, 40). The Center for Epidemiological Studies-Depression Scale (CES-D) is a 20-item self-report measure that yields a numerical estimate of depression severity (36, 41). In the both depression measures, higher scores indicate greater depression (36, 40, 41).

Statistics

Correlation analyses examining the relationships between the study variables were used in all reviewed studies (3, 16, 21, 22, 34, 36, 37, 42). Unpaired t-tests were used to compare MS patients with the general population in one study (42). Univariate analyses were performed using the chi-square test for the proportions (22), and one-way ANOVA (22, 34, 42), the Wilcoxon rank-sum test (22, 37) and Kruskal Wallis test (22) for continuous data. Linear regression analyses were used in three studies (3, 21, 36), and logistic regression analysis in one study (22).

Ethical issues

The reviewed studies were previously approved by the research ethics committees of the universities or institutes where they were performed (3, 16, 21, 22, 34, 37, 42). Information is lacking only for one study (36).

Results

Participants, sample size and measures

A total of 8 studies were found to meet the criteria for inclusion (Table 2). The number of subjects varied between 42 and 261 MS patients. Six surveys were conducted in Europe and two in the USA. In one study data were obtained by postal questionnaires (22) and in one by telephone (36). In the six remaining studies data were collected during the patients' clinic visits (3, 16, 21, 34, 37, 42). Selected studies were grouped into three categories according to the influence on perceived health status: the SF-36 and disease duration, the SF-36 and disability, and finally the SF-36 and psychological determinants (Table 2).

Table 2 Description of the eight studies grouped into three categories

Disease duration & SF-36			
Author	Study aim	Sample, Measures and Study design	Results
Patti et al. 2003 (ref 34)	<ul style="list-style-type: none"> - To describe the self-assessed burden of MS, to compare these results with those in a general healthy population, to correlate HRQoL of MS patients with disease duration disability and depression. 	<ul style="list-style-type: none"> - 180 patients diagnosed at least 4 years before 1998, in South Italy - SF-36 Health Survey, the Kurtzke Expanded Disability Status Scale EDSS, Beck Depression Inventory BDI - Cross-sectional study 	<ul style="list-style-type: none"> - PF & EDSS $r = -.76^{***}$ - D & SF-36 from $r = -.38^{***}$ to $-.65^{***}$
Pittock et al. 2004 (ref 42)	<ul style="list-style-type: none"> - To measure the prevalence of the dimensions of SF-36 in a cohort with MS and compare it with the general population. 	<ul style="list-style-type: none"> - 185 MS patients from Olmsted County, Minn, USA - The Kurtzke Expanded Disability Status Scale EDSS, SF-36 Health Survey and additional 18 items - Cross-sectional 	<ul style="list-style-type: none"> - MS patients had worse scores than the general US population with respect to physical functioning, vitality and general health dimensions of the SF-36. The majority of MS patients were mostly satisfied or delighted with their quality of life. - PF & Dis Dur $r = -.37^{***}$ - PF & EDSS $r = -.87^{***}$ - PRL & EDSS $r = -.45^{***}$ - BP & EDSS $r = -.15^*$ - GH & EDSS $r = -.31^{***}$ - V & EDSS $r = -.26^{**}$ - SF & EDSS $r = -.37^{***}$
			<p style="text-align: center;">Main Findings</p> <ul style="list-style-type: none"> - The patients showed significant lower mean score for all SF-36 health dimensions compared with sex- and age-adjusted scores in a healthy general Italian population. - EDSS scores correlated only with physical functioning. - BDI showed high partial correlations with all SF-36 health domains. - MS patients with short time since diagnosis scored worse than the general population in all dimensions of the SF-36.

Disability & SF-36

Author	Study aim	Sample, Measures and Study design	Results	Main Findings
Nortvedt et al. 1999 (ref 21)	<ul style="list-style-type: none"> - To compare EDSS and perceived health status as measures of disease impact in a representative sample of patients. 	<ul style="list-style-type: none"> - 194 MS patients diagnosed before 1995 in Hordaland County, Norway - The Kurtzke Expanded Disability Status Scale EDSS, SF-36 Health Survey - Cross-sectional 	<ul style="list-style-type: none"> - PF & EDSS $r = -.86^{***}$ $R^2 = .73$ - GH & EDSS $r = -.46^{***}$ $R^2 = .21$ - PRL & EDSS $r = -.33^{***}$ $R^2 = .11$ - V & EDSS $r = -.26^{***}$ $R^2 = .07$ - SF & EDSS $r = -.48^{***}$ $R^2 = .23$ 	<ul style="list-style-type: none"> - The patients had lower mean scores for all eight SF-36 health dimensions compared with sex- and age- adjusted scores in the general population. This difference was especially high for physical functioning: general health; role limitation, physical; vitality, and social functioning.
Nortvedt et al. 2000 (ref 5)	<ul style="list-style-type: none"> - To investigate the predictive value of SF-36 like measure of quality of life on changes in disability. 	<ul style="list-style-type: none"> - Data from 97 relapse-remitting patients with MS from randomised, double-blind, placebo-controlled clinical trial of recombinant human interferon & 2a, Norway - The Kurtzke Expanded Disability Status Scale EDSS, SF-36 Health Survey, gadolinium-enhanced MRI - Longitudinal; follow-up 1 year later 	<ul style="list-style-type: none"> - After 1 year: <ul style="list-style-type: none"> - MH & EDSS $r = -.29^{**}$ - ERL & EDSS $r = -.22^*$ 	<ul style="list-style-type: none"> - Low scores on SF-36 mental health scale were correlated with increased EDSS scores 1 year later; the results were not altered by adjusting for disease activity at baseline, which was measured by the number gadolinium-enhanced MRI lesions, relapse rate for the preceding 2 years, and baseline EDSS score. - A high score of self-rated health (1st question in the SF-36) at baseline was correlated with the decreased EDSS score after 1 year.

Disability & SF-36			
Author	Study aim	Sample, Measures and Study design	Results
Solari & Radice 2001 (ref 22)	- To assess the perceived health status of people with MS.	- 400 people with MS, 261 respondents, randomly selected in Province of Milan and Lombardy Regional Health Service, Italy - Postal questionnaires - the Multiple Sclerosis Quality-of-Life 54 Questionnaire (MSQOL-54), SF-36 Health Survey, structured demographic and clinical questionnaire - Cross-sectional study	- PF ($z=-1.3$) and PRL ($z=-.9$) most distinguished the groups
Isaksson et al. 2005 (ref 37)	- To describe quality of life in MS patients given immunological treatment & non-immunological treatment, to investigate the relationship between impairment and quality of life.	- 29 MS patients with immunological treatment were matched with 29 MS patients not given such treatment, Sweden - Self-reported impairment checklist, SF-36 Health Survey, the Subjective Estimation of Quality of Life SQuL - Cross-sectional study with matched pairs	- EDSS & PF $r=.62$ - EDSS & BP, GH, SF, PRL $r=.28$, $r=-.35$
			<p>Main Findings</p> <ul style="list-style-type: none"> - The three MS groups (EDSS<4.0; 4.0-6.5; >6.5) differed significantly for all domains except cognitive and sexual functions. - Comparisons between the general population SF-36 scales and the EDSS 4.0-6.5 and the EDSS > 6.5 groups are highly significant for all SF-36 scales. Patients had lower scores than the general population. - The EDSS <4.0 group differs significantly in a positive way only for general health and social function. MS population scored worse than the general population in all domains.
			<ul style="list-style-type: none"> - In the whole group of MS patients, statistically significant correlation between EDSS and 6 variables of the SF-36 were found. - Physical functioning was associated with walking problems, spasticity and balance. - The physical role limitations were associated with walking, fatigue, concentration/poor memory. - Pain, fatigue, and concentration had the highest impact on vitality, social functioning and mental health in the whole group.

Psychological determinants & SF-36				
Author	Study aim	Sample, Measures and Study design	Results	Main Findings
Rothwell et al. 1997 (ref 16)	- To compare the perceptions of MS patients (and clinicians) as to the relative importance of the 8 different domains of the Short Form 36	- 42 MS patients (28 - 68 years) and control data from survey of health related quality of life in over 6000 people in 1993, UK - SF-36 Health Survey, EuroQoL-5D; Kurtzke Expanded Disability Status Scale EDSS; the Office of Population Census and Survey `s (OPCS) disability status scale	- V & EuroQoL r= .57*** - GH & EuroQoL r= .49*** - MH & EuroQoL r= .44**	- Patients` assessment of their physical disability was highly correlated with the clinicians` assessment and the non-clinical assessment. Quality of life (EuroQoL-5D) correlated with vitality, general health, and mental health in the SF-36, each of which patients rated as more important than clinicians; each patient scored lower than the controls.
Schwartz & Kraft 1999 (ref 36)	- To assess MS patients` disability behaviour and its impact on patient psychological and physical functioning in association with spouse responses to patient disability behaviours and family environment	- Cross-sectional study - 44 individuals with MS and their spouses, USA - The Kurtzke Expanded Disability Status Scale EDSS, Sickness Impact profile SIP, SF-36 Health Survey, Centre for Epidemiological Studies-Depression Scale CES-D, Family Measures - Cross-sectional study	- MH & family conflict r= -.40** - MH & D r= -.37** - MH & independence in the family r= .44**	- Solicitous spouse responses to patient disability behaviour were significantly associated with greater MS related physical disability. Poorer psychological functioning was found in patients with families who were reported to have higher conflict and/or who were more controlling.

Note:

* $p < .05$; ** $p < .01$; *** $p < .001$; SF-36 subscales mentioned in Table: V=vitality, MH=mental health, ERL=emotional role limitation, SF=social functioning, PF=physical functioning, GH=general health, PRL=physical role limitation; BP=bodily pain, higher scores indicate "better functioning"; Dis Dur=disease duration; EuroQoL=quality of life, higher scores indicate "better health"; D=depression measured with BDI or CES-D, higher scores indicate "greater depression"; EDSS=Kurtzke Expanded Disability Status Scale, 0=normal neurologic examination to 10=death due to MS

Disease duration and perceived health status

Health dimensions in SF-36 were negatively correlated with the time since diagnosis. The longer the disease duration, the more severe the disease, and the lower the patients scored in perceived health status (34). Patients with an intermediate time since diagnosis (6-10 years) scored worse than patients with the shortest time since diagnosis (<6 years) for physical functioning, role limitation, bodily pain, vitality, emotional role and mental health. There was no significant difference between the patients with disease duration of over 10 years and those with the disease lasting 6-10 years (34) (Table 3). Compared to the general population and a group of MS patients with whatever disease duration, the patients with a short time since diagnosis (<6 years) already scored worse in all health dimensions in SF-36, except for bodily pain (34) (Table 3). Physical functioning in the SF-36 negatively and significantly correlated with duration of MS from onset ($r = -0.37$; $p < 0.001$) (42) (Table 2).

Disability and perceived health status

Four studies examined the association between disease severity groups and the dimensions of the SF-36. The scores on both the EDSS and the OPCS were highly correlated with physical functioning measured by MS patients on the SF-36 (16). The MS patients with the least disability had a lower mean score than the general population in all health dimensions of the SF-36 (34), except for mental health in the study by Nortvedt et al (21), and explicitly for general health and social functioning in the study by Solari & Radice (22). Similarly, the MS groups with higher disability differed highly significantly for all SF-36 scales compared with the general population (22, 42) (Table 2).

The MS patients in the study by Nortvedt et al (21) were categorized into three EDSS severity groups (Table 3). The patients with low EDSS results scored significantly better than the two groups with higher EDSS scores in all SF-36 dimensions. The SF-36 scores were higher in the groups with EDSS scores between 3.0 and 6.0 than in patients with the highest EDSS scores for physical functioning and social functioning. The EDSS score explained 73% of the variation in physical functioning, 23% in social functioning, and 21% in general health (21).

The study by Patti et al (34) showed that patients with lower EDSS scores scored significantly better than the two groups with higher EDSS scores in all dimensions. The patients with EDSS scores of 3.0 - 6.0 had higher scores on the SF-36 than the patients with the highest EDSS score only for physical functioning (34) (Table 3).

In the study by Pittock et al (42) the dimensions of physical functioning, physical role, general health, social functioning and vitality were significantly correlated with the EDSS score (42). Isaksson et al (37) found almost the same results. In their study a group of MS patients given immunological treatment was compared to a group not given this treatment. Between the two groups no significant differences were found with regard to perceived health status. However, significant correlations were found between disability and six subscales of the SF-36. As they expected, physical functioning, but also bodily pain, general health, social functioning, physical role limitation and emotional role limitation were correlated with the EDSS in the whole group (37) (Table 2).

With regard to change in disability, the change in EDSS score one year later reflects a more progressive disease at baseline among the patients with low scores on the mental health scale. All other subscales were not significantly correlated in this respect (3) (Table 2).

Psychological well-being and perceived health status

Rothwell et al (16) focused on the dimensions in EuroQoL-5D questionnaires where the depression/anxiety subscale was related to perceived health status as measured by the SF-36. The anxiety and depression scale, moreover, correlated significantly with vitality, general health, mental health, and physical role limitation in the SF-36 (16) (Table 2).

Schwartz & Kraft (36) examined the relationship between patients' ratings of their spouses' responses to disability behaviors of MS patients and the impact on patients psychological and physical functioning. Depression was measured using CES-D, and no significant relationship was found between depression and the physical dimension of SF-36, although depression was related significantly with physical functioning as measured by the SIP (36) (Table 2).

Patti et al (34) investigated the relationship between the SF-36 and depression as well. MS patients with lower BDI scores had a lower SF-36 mean score in all dimensions except for bodily pain. These patients with lower scores on depression scored significantly better than the two groups with higher BDI scores in all SF-36 health dimensions. The patients with BDI scores from 11-17 had higher SF-36 scores than the patients with the highest BDI scores for physical functioning, role emotional and mental health, and they had lower scores in all SF-36 health dimensions than the patients with the lowest BDI scores. BDI showed high partial correlations with all SF-36 health dimensions. The highest coefficient was for mental health as measured by the SF-36 (34) (Table 3).

Table 3 Disease duration, disability and depression related to SF-36

Disease duration	Shortest time	Intermediate time	Longest time
Patti et al. 2003 (ref 34)	<6 years	6 - 10 years	> 10 years
In MS patients		Worse than patients < 6 years, for 6 out of 8 dimensions	Worse than patients < 6 years, for 6 out of 8 dimensions
In MS patients compared to the general population	Worse in all health dimensions, except bodily pain	No significance	No significance
Disability	Lowest score	Higher score	Highest score
Nortvedt et al. 1999 (ref 21)	≤ 2.5	3.0 - 6.0	≥ 6.5
SF-36	Better in all dimensions compared with both other groups	Better in physical functioning and social functioning compared with ≥ 6.5	The worst mean scores in all dimensions compared with both other groups
Solari & Radice 2001 (ref 22)	< 4.0	4.0 - 6.5	> 6.5
SF-36	Worse in general health and social function compared with general population	Worse in all dimensions compared with general population	Worse in all dimensions compared with general population
Patti et al. 2003 (ref 34)	< 3.0	3.0 - 6.0	> 6.0
SF-36	Better in all dimensions compared with both other groups	Better in physical functioning compared with > 6.0	Worse in all dimensions compared with both other groups
Depression	Lowest score	Higher score	Highest score
Patti et al. 2003 (ref 34)	≤ 10	11 - 17	> 17
SF-36	Better in all dimensions compared with both other groups	Better in physical functioning, role emotional, and mental health compared with the group with BDI > 17	The worst scores in all dimensions compared with both other groups

Note:

SF-36=Short Form-36 Health Survey; EDSS=Kurtzke Expanded Disability Status Scale; BDI=Beck Depression Inventory

Discussion

The objective of this study was to review and summarize existing literature regarding perceived health status in MS patients measured with the SF-36 Health Survey, with the focus on disability, disease duration and psychological well-being.

The SF-36 was selected as the key measure in this review. Although it was originally designed as a generic measure in population surveys, the reviewed studies confirmed the SF-36 as an appropriate and useful measure of perceived health status in MS patients (3, 16, 21, 22, 34, 36, 37, 42). As most of the instruments in the reviewed studies used ordinal scales, statistics in these studies were mainly performed with using correlation analyses, while some of them used ANOVA and others regression analyses. Causal relationships would need to be confirmed in an intervention study. It follows that these studies' findings should be used for evaluation of health status in MS patients in the treatment process (3).

The results of our review show that time since diagnosis negatively influences perceived health status measured with the SF-36 in patients with MS. After some time from baseline, patients' perceived health status worsens, possibly as a consequence of increasing disability. MS patients with longer disease duration have more physical difficulties than patients with short time from diagnosis. Worsened disability interlocks the mental and other growing symptoms after some time (40). It might be assumed that longer disease duration would be associated with worsening of physical functioning, although only a few studies focus on the association between disease duration and perceived health status in MS patients (34, 42).

A majority of the studies in this review investigated the relationship between disability and perceived health status as measured with the SF-36. Those patients with higher scores in disability assessed their health status as worse, especially in physical functioning. Disability influenced mostly perceived physical health, but determined other dimensions of perceived health status in MS as well. Disability usually changed after some time. EDSS change correlated with the mental health subscale of SF-36 after one year and it was potentially predictive. This may be important in comparing physical health status of MS patients with different conditions or in comparing the same patients after some time. The outcomes in the physical health status domains may predict disease severity and the following intervention. In the report by Hauptz et al (43) the reductions in the eight subscales of SF-36 were even more pronounced in persons with gait impairments. In their study the SF-36 scales only modestly correlated with physical disability. In contrast to Nortverdt et al (21) this indicates that perceived health status does not depend on the physical symptoms of MS (43).

Patti et al (44) demonstrate that disability can be improved by using short outpatient physiotherapy treatment. Treatments in MS are directed at resolving acute attacks, reducing the number of exacerbations, treating the sequels of previous attacks, and preventing progression of disability (44).

Regarding psychological well-being and perceived health status, the latter was better in the patients with less depression (34). MS-depressed patients scored worse on the energy, mental health, cognitive function, overall quality of life, sexual and emotional function dimensions than non-depressed MS patients (10). The study by Benito-Leon et al (45) showed that MS patients currently experiencing depression would give a more negative evaluation of their well-being than those who were not depressed, whether or not a physical illness was also present. There will be some overlap between ratings of low mood and quality of life (45). According to Lamberg (33), depression shows little correlation with deficits in cognitive function, suggesting that it may be an independent indicator of neurological damage. Lamberg (33) complements treatments with cognitive-behavioural, group and family therapy, and the use of antidepressant medications that improve mood and whole perceived health status. MS patients in the study by Schwartz & Kraft (36) who rated their spouses as more negative in response to their disability behaviours had more symptoms of depression. Those MS patients who reported their spouses as more encouraging of "well" behaviours were significantly less depressed. Spousal support had a buffering effect against depression in MS patients. MS patients' depressive symptoms were found to have a moderating affect on the relationship between patients' ratings of spouses' responses and patients' physical functioning (36). Regarding these findings Rudick (4) sees comprehensive MS centers as being extremely helpful to MS patients and their families.

The results of this review may identify potential targets for practice interventions in MS patients. Perceived health status is like a mirror of the way the patient feels about and copes with the disease. Findings from the subscales of SF-36 can be used for observation of MS patients' health status, especially of their disability, as time passes, or psychological symptoms when they are more depressed, anxious or stressed. Sometimes physicians evaluate MS patients as suffering from a handicap from the loss of motor function. But the patients can be distressed more from the cognitive impairment, bad emotional functioning or the loss of social relationships. Assessments of the health professionals do not have to agree with the internal information from MS patients about their health status. For the patients their own perceptions are of higher importance (46). It may be useful to determine the impairments of MS patients using this measurement, and based on its results to recommend appropriate interventions in the practice of nurses, psychologists or physiotherapists.

The SF-36 profile improved for those patients who underwent physiotherapy (10, 34). Nursing care should be part of a continuum of care involving the physiotherapy environment and community and social services sectors.

Conclusions

This study is a review of previous studies examining the association of perceived health status with disability, disease duration and psychological well-being in cohorts of MS patients. We assumed that disease duration, disability and psychological well-being would be significantly associated with perceived health status in MS patients measured with the SF-36 in the eight reviewed studies. This review provided evidence for this hypothesis. The more disabled the patients, the poorer their perceived health status. One study showed MS patients already reporting poorer health status than the general population after very short duration of MS. Perceived health status also significantly correlated with depression: the more depressed the patients, the worse their perceived health status was. Further research should focus on strategies to improve perceived health status in MS patients. Our findings may be useful for evaluating the impairments of MS patients, and for determining the appropriateness of treatment in the practice of nurses, psychologists or physiotherapists. Health care, looking for appropriate treatments, could pay more attention to perceived health status in MS patients by focusing on improved quality of life in these patients. The SF-36 data could be useful, if its results were validated in relation to findings from other specific self-reported instruments used not only in MS, but in other chronic diseases. So the SF-36 outcomes can be important when compared with data from other self-reported measures used in clinical practice.

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Author contributions

Martina Krokavcova, Jitse P. van Dijk, Iveta Nagyova and Jaroslav Rosenberger was responsible for study design and data collection and analyses. Martina Krokavcova, Jitse P. van Dijk, Iveta Nagyova, Jaroslav Rosenberger and Johan W. Groothoff was responsible for drafting of manuscript preparation. Jitse P. van Dijk, Iveta Nagyova, Jaroslav

Rosenberger, Zuzana Gdovinova and Johan W. Groothoff was responsible for supervision. Jitse P. van Dijk, Truus van Ittersum-Gritter and Miriam Gavelova was responsible for material and technical support.

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Ethics Committee approval

Permission for this study was obtained from the local Ethics Committee organized and operated according to ICH Good Clinical Practice.

Conflict of interest

None.

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