

The relationships between depression and life activities and well-being of multiple sclerosis patients

Research Article

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Abstract: Multiple sclerosis (MS) is one of the most disabling neurodegenerative disorders. Depression is the most frequent psychiatric disorder accompanying MS. Although much attention is given to correlations between depression and MS clinical factors, analysis of correlations between depression and life activities (social, household, professional activities and family life) and the well-being of MS patients' is insufficient. However, improvement of these functions could positively influence the outcomes of MS treatment. The aim of this study was to evaluate relationships between depression, life activities of MS patients, and their proposals how to improve the well-being. Materials and methods. The study lasted three years with 270 adult MS patients involved in it. ICD-10 criteria were used to diagnose depression. Original questionnaire was used to measure life activities and the well-being of the patients. Results. Prevalence of depression was 20.7% with no difference regarding the gender. Almost 84% of depressed respondents indicated, that MS disturbs their family life, 71.4% recommended to assign more attention to MS in general and 64.3% - to include more medications into reimbursement list. Conclusions. MS patients diagnosed with depression significantly more often than non-depressed indicate that MS disturbs their family life; recommend to assign more attention to MS in general and to include more medications into reimbursement list.

Keywords: *Multiple sclerosis • Depression • Life activities • Well-being • Proposals*

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1. Introduction

Multiple sclerosis (MS) is an inflammatory demyelinating and neurodegenerative disease of the human CNS that affects more than 2 million individuals around the globe and more than 500,000 people in the USA. MS remains a significant cause of neurological disability in young adults and places a heavy medical, psychological and financial burden on human society [1,2]. Despite major attempts to unravel the etiology of MS, its' causes and cure remain elusive. The pathogenesis of MS consists of two arms: an inflammatory arm, which is associated with a potent cellular and humoral immune response against potential CNS antigen(s), and a neurodegenerative arm, which promotes neuronal loss and translates into brain atrophy [3,4]. The development of physical disability depends on MS clinical course, gender, race and age of patient, initial symptoms of MS, secondary disorders, and treatment. Although it's likely

their life span is practically the same as the MS-free people, MS significantly reduces their well-being [5]. The most compelling reason to investigate psychiatric disorders among persons with MS is that reported rates of completed suicide in MS populations are high, and psychiatric disorders appear to be the major risk factor for suicidality. Death certificate-based reviews indicate that suicide may be the cause of death for MS clinic patients in as many as 15% of all cases. In retrospective analysis of completed suicides in MS populations, depression has been the most important risk factor for suicide [6,7]. Depression may be more common in MS than in other chronic neurological conditions. The 12-month prevalence of depression among persons with MS is 15.7%, nearly double the prevalence of depression in persons without MS (7.4%) [8]. Reports of the lifetime risk for depression in MS populations have ranged from 27% to 54% [9,10]. People with MS experience lower quality of life (QoL) and well-being levels than

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people from the general population in health-related QoL domains [11,12] and compared to those diagnosed with other chronic illnesses, such as epilepsy, diabetes, rheumatoid arthritis, and inflammatory bowel disease [13,14].

In order to improve the well-being of these people, timely diagnose and treatment of MS is actively sought: new treatment methods limiting disability are introduced, different MS-related complications are treated (pneumonia, disorders of urinary and digestive tract, sexual dysfunction). Physical and mental disability, worsened QoL and well-being determine high treatment costs of this disease. Sobocki *et al.* estimated the total cost of MS in Europe. The study was based on actual cost data from nine countries and published epidemiological evidence. The epidemiological data were reported as 12 months prevalence estimates and cost data calculated as annual cost per patient at given levels of disease severity. Cost data were extrapolated to the rest of Europe based on a model, using economic indexes adjusting for price level differences in different sectors between countries. The aggregated annual cost estimates were presented in Euro for 2005. In 28 European countries with a population of 466 million, 380,000 individuals were estimated to be affected by MS. The total annual cost of MS in Europe was estimated to be 12.5 billion in the year 2005, corresponding to a cost of 27 per European inhabitant. Direct costs represented slightly more than half of the total cost (6.0 billion). Informal care was estimated at 3.2 billion and indirect costs due to morbidity at 3.2 billion. Thus, the largest components of costs were found outside the formal health care sector. Although the model appeared to predict costs reasonably well, when comparing to previous national studies not included in the estimates, there were considerable uncertainties when extrapolating cost data across countries even within Europe. These shortcomings can be overcome by collecting primary data [15].

Standardized quality of life questionnaire (SF-36) [16], physical disability scale (Expanded Disability Status Scale, EDSS) [17] are usually applied in the studies analyzing quality of life in patients with MS. Hamilton Rating Scale for Depression, Beck Depression Inventory [18], Zung Self-Rating Depression Scale [19], Hospital Anxiety and Depression Scale [20], are most frequently applied measures for the symptoms of depression. However, studies assessing personal attitudes of MS patients regarding which life activities are most affected by the illness, what interventions should be taken to improve their well-being and how it is related with depression are still lacking. However, this knowledge could increase the effectiveness and decrease the expenses related to the treatment of MS.

The aim of this study was to evaluate relationships between depression, life activities (social, household, professional activities and family life) of MS patients and their proposals how to improve the well-being.

2. Material and Methods

The study was performed from June 2006 until June 2009 in Psychiatric and Neurological Departments of Kaunas University of Medicine Hospital (KUMH) (Lithuania). Study was approved by Regional Biomedical Research Ethics Committee (Biomedical Research Authorization 2006-04-13 N. BE-2-18/006). Sample of the study included 270 patients undoubtedly diagnosed with MS by the neurologists. All participants of the study were older than 18 years. 135 participants were inpatients in the Neurological Department of KUMH (50%) and 135 outpatients in MS Center of KUMH (50%). 69.3% of the participants were female and 30.7% male. Total age distribution was normal in the range 18-69 years with average 42.42 ± 11.71 years. The age distribution of patients at onset of MS was normal in the range 13-64 years with average 36.03 ± 11.15 years. The distribution of MS duration of participants in the range 0-28 years was not considered as normal with median 5 years. No significant difference between females and males regarding total age average, age average at MS diagnosis, and median of MS duration were found ($p > 0.05$).

Prevalence of depression was assessed by the psychiatrist using diagnostic criteria of the ICD-10 classification [21]. The study was carried out as cross-sectional survey. The main questionnaire of the survey was developed using Arnett *et al.* [22], Galeazzi *et al.* [23] and McGuigan *et al.* [24] questionnaires for the assessment of socio-demographic characteristics and quality of life components. 49.5% were married, 51.5% - single, divorced or widowed. Education - 38.5% <12 years, 61.5% ≥ 12 years. Employment - 35.2% unemployed, 64.8% - employed (fully or partly). Work capacity - 76.3% - limited, 23.7% - not limited.

Patients were asked to answer the questions regarding influence of the illness on their life activities: 'Does MS disturb social activities?', 'Does MS disturb household?', 'Does MS disturb professional activities?', and 'Does MS disturb family life?' Patients were then asked to choose between twelve proposals what should be done to improve the well-being of MS patients (without limitation for the number of positive answers). The proposals were as follow: 'to pay more attention to MS in general', 'to get more assistance from government', 'to establish more MS Diagnostic and Treatment Centers',

Table 1. Prevalence of depression in multiple sclerosis patients according gender.

Prevalence of depression	Females		Males		Total	
	n	%	n	%	n	%
Depression presented	38	20.3	18	21.7	56	20.7
Depression absent	149	79.7	65	78.3	214	79.3
Total:	187	100	83	100	270	100

$\chi^2=0.065$; $df=1$; $p>0.05$

Table 2. Relation between depression and socio-demographic and clinical factors.

Independent factors	OR Exp. B	95% CI for Exp. B		
		Lower	Upper	
Age	<50 years	3.22	1.360	7.623
	≥50 years	1.00		
Marital status	Other	2.494	1.134	5.487
	Married	1.00		
Limited work capacity	Limited	3.583	1.438	8.925
	Not limited	1.00		
Constant	0.003			

Dependent factor was 'depression – presented/absent' (0/1)

'to provide more information for society about MS', 'to solve MS related economical problems', 'to improve early diagnostic of MS', 'to simplify MS treatment conditions', 'to include more medications related to MS into reimbursement list' (except immunomodulators (IM), because all IM were already included), 'to improve social rehabilitation', 'to improve physical rehabilitation', 'to improve psychological rehabilitation', and 'to improve nursing'.

2.1. Statistical methods

The data analysis was performed at Information Technologies Center of Kaunas University of Medicine using SPSS 15.0 version for Windows (license number 9582494). The Komogorov-Smirnov test was used for distribution analysis. When the distribution of the samples was considered as 'normal' the statistical analysis methods for parametric data had to be used. When the distribution of all the samples could not be considered as 'normal' the analysis methods for non-parametric data had to be used. The Student's test and ANOVA analysis were applied for parametric data. The Mann-Whitney U and Kruskal-Wallis tests were applied for comparison of non-parametric data. The difference of distribution was assessed with chi-square criterion. The 95% confidence interval was calculated using the formula. Multifactor logistic regression analysis was performed to weight the impact of depression on the independent factors. Values with $p<0.05$ were considered as significant.

3. Results

Almost 21% of patients were diagnosed with depression according to ICD-10 criteria (Table 1).

The average age of depressed participants was 40.96 ± 10.96 years. The average age of depressed patients at onset of MS was 34.05 ± 10.75 years. The median of MS duration of depressed participants was 5.5 years. There were no significant differences between depressed and non-depressed respondents regarding their average age, average age at onset of MS, and median of MS duration ($p>0.05$). No statistically significant differences by gender were found between depressed and non-depressed patients in above mentioned average age, average age at MS diagnosis, and median of MS duration ($p>0.05$).

To determine the independent demographic factors associated with depression, multifactor logistic regression was used. Dependent factor was 'depression – presented/absent' (0/1). Into a series of independent factors were included: gender, age, age at onset of MS, MS duration, marital status, education, limited work capacity, employment (Table 2).

No relations between independent factors like gender, age at onset of MS, MS duration, education, employment and depression were found ($p>0.05$).

The study analyzed the answers to questions' data: 'Does MS disturb social activities?', 'Does MS disturb household?', 'Does MS disturb professional activities?', and 'Does MS disturb family life?' The analysis data

Table 3. Relation between depression and answers to questions regarding life activities.

Independent factors	OR Exp.B	95% CI for Exp. B		
		Lower	Upper	
Does MS disturb family life?	Yes	7.195	3.355	15.432
	No	1.00		
Constant		0.073		

Dependent factor was 'depression – presented/absent' (0/1)

Table 4. Review of proposals evaluation data.

Proposals	Indications of respondents	Depression presented	Depression absent	χ^2	p
		N (%)	N (%)		
To pay more attention to MS in general	Yes	40 (71.4)	111 (51.9)	6.889	<0.01
	No	16 (28.6)	103 (48.1)		
To get more assistance from government	Yes	35 (62.5)	100 (46.7)	4.416	<0.05
	No	21 (37.5)	114 (53.3)		
To establish more MS Diagnostic and Treatment Centers	Yes	19 (33.9)	95 (44.4)	1.992	>0.05
	No	37 (66.1)	119 (55.6)		
To provide more information for society about MS	Yes	26 (46.4)	126 (58.9)	2.796	>0.05
	No	30 (53.6)	88 (41.1)		
To solve MS related economical problems	Yes	42 (75.0)	150 (70.1)	0.520	>0.05
	No	14 (25.0)	64 (29.9)		
To improve early diagnostic of MS	Yes	31 (55.4)	109 (50.9)	0.348	>0.05
	No	25 (44.6)	105 (49.1)		
To simplify MS treatment conditions	Yes	37 (66.1)	146 (68.2)	0.094	>0.05
	No	19 (33.9)	68 (31.8)		
To include more medications related to MS into reimbursement list	Yes	36 (64.3)	92 (43.0)	8.073	<0.01
	No	20 (35.7)	122 (57.0)		
To improve social rehabilitation	Yes	30 (53.6)	82 (38.3)	4.254	<0.05
	No	26 (46.4)	132 (61.7)		
To improve physical rehabilitation	Yes	39 (69.6)	125 (58.4)	2.348	>0.05
	No	17 (30.4)	89 (41.6)		
To improve psychological rehabilitation	Yes	45 (80.4)	158 (73.8)	1.013	>0.05
	No	11 (19.6)	56 (26.2)		
To improve nursing	Yes	40 (71.4)	137 (64.0)	1.079	>0.05
	No	16 (28.6)	77 (36.0)		

showed: 182 (67.4%) patients indicated that MS disturbs social activities; 184 (68.1%) patients noted that MS disturbs household, 204 (75.6%) patients pointed that MS disturbs professional activities, and 137 (50.7%) - that MS disturbs family life. Depressed MS patients (47 patients, 83.9%) significantly more often than non-depressed (135 patients, 63.1%) indicated, that MS disturbs their social activities (chi-square=8.778, $p<0.01$). Significantly more often patients with depression (49 respondents, 87.5%), compared with non-depressed (135 respondents, 63.1%) indicated, that MS disturbs their household (chi-square=12.19, $p<0.001$). The difference between depressed (51

respondent, 91.1%) and non-depressed MS patients (153 respondent, 71.5%), who indicated, that MS disturbs their professional activities, was significant as well (chi-square=9.21, $p<0.01$). The study data showed, that depressed patients (47 patients, 83.9%), compared with non-depressed (90 patients, 42.1%), significantly more often indicated, that MS disturbs their family life (chi-square=31.135, $p<0.001$).

To determine the independent factors associated with depression, multifactor logistic regression was used. Dependent factor was 'depression – presented/absent' (0/1). Into a series of independent factors were included positive answers to questions: 'Does MS

Table 5. Relation between depression and proposals.

Independent factors (proposals)		OR Exp.B	95% CI for Exp. B	
			Lower	Upper
To pay more attention to MS in general	Yes	2.182	1.115	4.270
	No	1.00		
To include more medications related to MS into reimbursement list	Yes	2.085	1.108	3.924
	No	1.00		
Constant		2.758		

Dependent factor was 'depression – presented/absent' (0/1)

disturb social activities?', 'Does MS disturb household?', 'Does MS disturb professional activities?', and 'Does MS disturb family life?'. The analytical results showed, that patients who indicated that MS disturbs family life, compared with patients who didn't indicated, had higher odds ratio to be diagnosed with depression (Table 3).

Independent factors - positive answers to questions - 'Does MS disturb social activities?', 'Does MS disturb household?', and 'Does MS disturb professional activities?' were not related to diagnosis of depression.

The data of patients' answers to twelve proposals regarding most effective positive influence to well-being was analyzed. The study had to ascertain which of proposals were most often indicated by patients and how they were related to depression. Analysis showed that significantly more often depressed respondents, compared with non-depressed, indicated following proposals: 'to pay more attention to MS in general', 'to get more assistance from government', 'to include more medications related to MS into reimbursement list', and 'to improve social rehabilitation' (Table 4).

In order to determine independent factors (proposals) associated with depression, multifactor logistic regression was used. Dependent factor was 'depression – presented/absent' (0/1). Into a series of independent factors all above mentioned proposals in sequence were included. The analytical results showed that patients, who indicated to pay more attention to MS in general, and who indicated to include more medications related to MS into reimbursement list (except IM), compared to respondents, who didn't, had higher odds ratio to be diagnosed with depression (Table 5).

The logistic regression showed that independent factors 'to get more assistance from government', 'to establish more MS Diagnostic and Treatment Centers', 'to provide more information for society about MS', 'to solve MS related economical problems', 'to improve early diagnostic of MS', 'to simplify MS treatment conditions', 'to improve social, physical, psychological rehabilitation and nursing' were not related with diagnosis of depression ($p > 0.05$).

4. Discussion

Prevalence of depression is widely investigated internationally. However, data highly differs between the countries. One of the reasons for this difference is application of different criteria to diagnose the depression (DSM-IVTR, ICD-10) and different scales to measure the symptoms of depression (Beck, Hamilton, Zung, Montgomery-Asberg, HAD and other scales), also differences in the populations studied. Most likely due to the different methodologies used the lifetime, 1-year, and current prevalence of depression takes approx. 17.1%, 10.3%, and 4.9%, respectively. Taking into account other depression related disorders (depressive episode in bipolar disorder, depression due to general medical condition, depressive episode in adjustment disorders) these data will be much higher and would take respectively 20-25% lifetime prevalence, 10-15% 1-year prevalence, and 5-10% current prevalence of depressive episode [25,26]. Females suffer from depression twice as frequent as males. The scientific data shows that in Canada 1.35 billion and in USA 14 billion of population every year suffers from depression [27].

Findings of our study showed that prevalence of depression in MS patients in Lithuania was 20.7% and was in line with the findings in other countries and other clinical populations [28-30]. However, it does not mean that depression is less of the problem in patients with other chronic diseases.

Similar diversities of the results are found in the studies on the prevalence of depression in Alzheimer's disease (AD). Prevalence of depression in AD patients varies from 1.3-1.5% to 20%. Researchers getting lower prevalence and incidence of depression in these patients suggest that for the period of time the patients were followed up, AD did not predispose to major depression. However, depression may predispose to the earlier onset of dementia. Depression in dementia should perhaps be diagnosed using different criteria [31]. Prevalence of depression in Parkinson's disease (PD) varies widely across studies as well, ranging from

2.7% to more than 90%. Tandberg *et al.* found that 7.7% (n=245) of the patients with PD met the criteria for depression [32]. Reijnders *et al.* provided systematic review to calculate average prevalence of depression taking into account the different settings and different diagnostic approaches used in the studies. The weighted prevalence of depression was 17% for PD patients. Clinically significant depressive symptoms were present in 35%. The researchers concluded that population studies report lower prevalence rates for both depression and the clinically significant depressive symptoms than studies in other settings [33].

Depression is the psychiatric syndrome that has received the most attention in individuals with cancer. Although many research groups have assessed depression in cancer patients since the 1960s, the reported prevalence (0%–38%) varies significantly because of varying conceptualizations of depression, different criteria used to define depression, differences in methodological approaches to the measurement of depression, and different populations studied. Depression is highly associated with oropharyngeal (22%–57%), pancreatic (33%–50%), breast (1.5%–46%), and lung (11%–44%) cancers. A less high prevalence of depression is reported in patients with other cancers, such as colon (13%–25%), gynecological (12%–23%), and lymphoma (8%–19%) [34]. Diagnostic difficulties of depression in cancer using different structured methods are mentioned by Ciaramella *et al.* [35].

The prevalence of comorbid depression in adults with diabetes was investigated by Anderson *et al.* The prevalence of comorbid depression was significantly higher in diabetic women (28%) than in diabetic men (18%), in uncontrolled (30%) than in controlled studies (21%), in clinical (32%) than in community (20%) samples, and when assessed by self-report questionnaires (31%) than by standardized diagnostic interviews (11%). Authors concluded that presence of diabetes doubles the odds of comorbid depression. However they confirmed that prevalence estimates are affected by several clinical and methodological variables that do not affect the stability of the odds ratio [36]. Assessment of depression in diabetes using a representative population sample was provided by Goldney *et al.* in South Australia. The prevalence of depression in the diabetic population was 24% compared with 1.7% in the non-diabetic population [37].

Increasing attention has been focused on mood disturbance in patients recovering from an acute myocardial infarction (AMI), especially since it was first reported that depression was associated with increased mortality after AMI. Ziegelstein *et al.* investigated the prevalence of depression in survivors of acute

myocardial infarction. Depression was identified in 19.8% of patients using structured interviews (n=10,785, 8 studies). Although a significant proportion of patients continued to be depressed in the year after discharge, the limited number of studies and variable follow-up times precluded specification of prevalence rates at given time points. Authors concluded, that depression is common and persistent in AMI survivors, however prevalence varies depending on assessment method, likely reflecting treatment of somatic symptoms [38].

In our survey the prevalence of depression in female and male MS patients was similar and took 20.3% vs. 21.7%, $p>0.05$. It means we find prevalence ratio 1:1 in contrast to 2:1 depression prevalence ratio between females and males usually found in MS free patients [27]. Beal *et al.* and Pugliatti *et al.* had reported similar findings. They indicated that prevalence of depression in MS patients statistically didn't show any significant differences by gender [1,39]. However, depression in MS patients is aggravated by already existing physical disability and cause high level of pain and suffering. It strongly aggravates social activities, household, professional activities and family life of patients [40].

Multiple sclerosis is associated with significant socio-economic burden and high rates of unemployment. There is a need for detailed knowledge of the socio-economic consequences of the disease. Pflieger *et al.* described the course of the professional life and career of 2538 MS patients in Denmark at the time of disease onset and thereafter, in terms of probability of early pension and income development. They found that the probability of remaining without early pension was at 5 years 70% for patients and 97% for controls, and at 20 years 22% for patients and 86% for controls [41,42]. Julian *et al.* evaluated patients' and MS characteristics associated with work loss and work initiation. Eligible participants included 8,867 patients for the cross-sectional component, and 8,122 for longitudinal analysis. Fifty-six percent of MS patients were not employed. Specific problems in mobility, hand function, fatigue, and cognitive performance domains were associated with increased odds of becoming unemployed [43]. Busche *et al.* investigated short term predictors of unemployment in MS patients. At baseline 50.1% of participants were employed. Two and a half years later only 40.6% remained employed. This represents loss of employment for 22.0% of those originally employed. Factors associated with unemployment at baseline included greater disability, progressive disease course, longer disease duration, and older age [44].

In our survey 35.2% of participants noted they were unemployed and 76.3% had limited work capacity. Unemployment wasn't related with depression.

However, patients who indicated limited work capacity had 3.58 times higher odds ratio to be diagnosed with depression. High rate of MS patients' unemployment and limited work capacity provided in our survey is in line with results found in other countries [41-44]. However, more exhaustive surveys are needed to investigate relations between depression, unemployment and limited work capacity.

Multiple sclerosis significantly aggravates patient's professional activities. Putzki et al. had conducted a comprehensive study of the relationships between MS and patients' professional activities. They investigated 1157 relapsing-remitting (RR) MS patients in an open label multicenter survey in Germany [45]. Jongen et al. provided similar results in 2 years lasting survey which investigated 284 RRMS patients in 36 neurological centers [46]. The relationship between MS patients' social activities and household was investigated by Einarsson et al. in 166 MS patients. Seventy percent of respondents indicated that MS aggravated patients' household. Sixty-five percent of respondents indicated that MS exacerbated patient's social activities and functioning [47]. In meta-analysis of 32 trials' Buhse investigated relationships between MS, patients' family activities, duties and life. More than two thirds of respondents (60-74%) indicated that MS hindered their ability to sustain their role in the family - to attend the family, to make one's living. Multiple sclerosis was significantly related with impairment of sexual life [48]. Pflieger et al. investigated the probability for MS patients to remain in marriage or relationship with the same partner after onset of MS in comparison with the general population. All 2538 Danes with onset of MS 1980-1989, retrieved from the Danish MS-Registry, and 50.760 matched and randomly drawn control persons were included. Five years after onset, the cumulative probability of remaining in the same relationship was 86% in patients vs. 89% in controls. The probabilities continued to deviate, and at 24 years, the probability was 33% in patients vs. 53% in the control persons ($p < 0.001$). Authors concluded that MS significantly affects the probability of remaining in the same relationship compared with the general population [49].

The respondents of our survey who were diagnosed with depression significantly more often than non-depressed respondents indicated that MS impaired their social activities (chi-square=8.778, $p < 0.01$), household (chi-square=12.19, $p < 0.001$), professional activities (chi-square=9.21, $p < 0.01$) and family life (chi-square=31.135, $p < 0.001$). However, multifactor logistic regression showed that odds ratio to be diagnosed with depression was 7.2 times higher in patients who indicated that MS had impaired their family life. This

point a need for the follow-up studies on the family life of MS patients.

Little is known about the provision of medical and community services for MS patients and how this compares with their needs. It needs to be assessed taking into account high prevalence of depression in these patients. MacLurg et al. assessed primary care-based needs of people with MS. Information was collected about their medical condition, socio-demographic characteristics, receipt of benefits and services, perceived needs and sense of well-being. Physiotherapy was a commonly perceived need. Other perceived needs differed between the moderately and severely disabled groups [50]. Vazirinejad et al. described the frequency of impairments, disabilities, and related services used in a community sample of adults with MS to estimate the service needs of this population. The findings suggested under-use of existing health care services by those who experienced potentially treatable symptoms and/or problems associated with MS [51]. Coopman et al. offered 75 proposals to MS patients how to improve their conditions with intention to reveal 10 most important areas for MS patients. The patients indicated fulfillment of socio-psychological needs (relations with doctor, MS nursing team, family members and friends) as most important issues which have highest influence on QoL and treatment of MS. Proposals to provide more information about MS for the society and to improve economic support for MS treatment were mentioned as very important as well [52].

The respondents of our survey actively took part indicating proposals how to improve their well-being. More than half of respondents mentioned 'to get more assistance from government', 'to provide more information for society about MS', 'to solve MS related economical problems', 'to improve early diagnostic of MS', 'to simplify MS treatment conditions', 'to improve physical, psychological rehabilitation and nursing' as most important needs. Significantly more depressed MS patients compared with non-depressed indicated 'to pay more attention to MS in general' (71.4% vs. 51.9%, $p < 0.01$), 'to get more assistance from government' (62.5% vs. 46.7%, $p < 0.05$), 'to include more medications for MS into reimbursement list' (except IM) (64.3% vs. 43%, $p < 0.01$), and 'to improve social rehabilitation' (53.6% vs. 38.3%, $p < 0.05$). However, multifactor logistic regression analysis revealed that respondents who indicated 'to pay more attention to MS in general' and 'to include more medications for MS to reimbursement list' had respectively 2.18 and 2.09 times higher odds ratio to be diagnosed with depression.

The risk for depression begins with the onset of MS. However little is known how depression influences MS patients' perceptions how to improve their well-being and a need for more studies in this area is obvious. The analytical snapshot method of this study limited the possibility to get more exhaustive analysis of changes in patients' characteristics; therefore follow-up studies would be requested.

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5. Conclusions

- Multiple sclerosis patients diagnosed with depression significantly more often than non-depressed indicated that MS disturbs their family life.
- Depression was significantly related with MS patients' recommendations to assign more attention to MS in general and to include more medications into reimbursement list.

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