

# Predictors of suicidal ideation among Iranian patients with multiple sclerosis

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## Keywords

Multiple Sclerosis; Suicidal Ideation; Anticipated Stigma; Social Support; Depression; Anxiety

## Abstract

**Background:** Considering the high probability of suicidal behaviors in multiple sclerosis (MS) population of other countries and the unlikeliness of its diagnosis in patients with MS by specialists, the current research targets the frequency of suicidal thoughts and mood symptoms in a group of patients with MS in Iran. Also, we investigated the relationships among suicidal thoughts, anxiety, depression, anticipated stigma, social support, some disease characteristics, and sociodemographic factors.

**Methods:** A sample of 276 subjects were selected from community-based MS clinics and referral out-patient MS clinic of Sina Hospital affiliated to Tehran University of Medical Sciences, Tehran, Iran. Participants completed the Patient Health Questionnaire (PHQ), the Hospital Anxiety and Depression Scale (HADS), the Chronic Illness Anticipated Stigma Scale (CIASS), the Multidimensional Scale of Perceived Social Support

(MSPSS), and a personal information questionnaire.

**Results:** 36.2% of the participants had suicidal thoughts. Suicidal ideation was significantly more likely among people who reported higher anxiety and depression scores or anticipated stigma from their friends and families. Women and patients with higher education experienced suicidal ideation more frequently than others.

**Conclusion:** Findings regarding the comorbidity of suicidal thoughts with anticipated stigma, depression and anxiety in MS patients emphasizes therapeutic interventions focused on the alleviation of perceived stigma as well as mood symptoms.

## Introduction

Multiple sclerosis (MS) is an autoimmune disease which affects the central nervous system (CNS).

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MS is one of the most common neurological diseases and the most disabling disease in the youth. It typically spreads throughout the 30s. MS has affected over 2.5 million people all over the world and it has spread the most in Iran among Asian and Middle Eastern countries.<sup>1</sup> Based on research, there are 74-89 patients with MS estimated in every 100000 people in Iran.<sup>2</sup>

Patients with MS suffer from exhaustion, blindness, imbalance, and pain throughout their process. Neuropsychiatric conditions are common in patients with MS. Anxiety disorders are observed in approximately one third of the patients and major depressive disorders as well, with lifetime prevalence of 50%.<sup>3</sup> Additionally, cognitive deficits develop in a majority of the patients.<sup>4</sup>

The rates of suicide have been reported considerably higher in patients with MS than in the common population and physicians are urged to keep this in mind while working with patients with MS.<sup>5</sup>

Suicidal ideation has been shown to be a predictor of prompt and long-term suicide risk. It is obvious that the recognition of factors related to the occurrence of these thoughts in patients is of utmost importance. Sociodemographic variables and disease characteristics are one of these aforementioned factors. Of these, being male, younger age, lower income, social isolation, the first 5 years of MS diagnosis, progressive disease subtype, earlier disease course, and higher levels of physical disability heighten the possibility of suicide.<sup>4,6</sup>

Feelings of uncertainty, high levels of stress, decreased quality of social relationships, and other psychosocial stressors are amongst the factors which endanger patients with MS against depression.<sup>3</sup> As the disease progresses, higher levels of disability emerge, leading to an increased severity of depression and a decreased quality of life (QOL).<sup>7,8</sup> As it is commonly known, depression happens to be one of the main causes of suicide. This applies particularly to patients with MS, as depression soars three to five times higher when diagnosed with the disease.<sup>3</sup>

Anxiety is another psychological symptom closely correlated with suicidal thoughts in patients with MS.<sup>9</sup> On the hierarchy of the contributing determinants of anxiety stands stigma. It has been proven that health-related stigma leads to depression and anxiety in chronic patients and affects their QOL and health.<sup>10</sup>

Patients with MS experience different types of stigma throughout their lives.<sup>11</sup> Many patients suffering from MS with low levels of disability still

have an occupation and an active social life. These people may come to anticipate stigma. Anticipated stigma is how likely a person believes it is for others to devalue and discriminate against the person with the chronic illness in case they discover this identity. Previous research has indicated that anticipated stigma is a significant predictor of psychological distress among these people whose diseases are concealable.<sup>12</sup> Some studies even point to the two-way connectivity of suicidal thoughts and stigma.<sup>13</sup>

To the best of our knowledge, there is no extensive research about the impact of anticipating stigma on suicidal ideation among the patients with MS.

It is also worth knowing that not many studies concerning the role of sociodemographic variables in causing suicidal thoughts in patients suffering from MS have been conducted and how these factors take part in cross-cultural studies is not yet fully explored.

Therefore, the current research, using Patient Health Questionnaire (PHQ), targets the psychological and sociodemographic correlations of suicidal ideation in patients with MS with minimal disability, followed by receiving psychotherapy, drug treatment, and other mental health-related services in an attempt to prevent and lower the risk of suicide in patients with MS.

## Materials and Methods

**Participants:** This cross-sectional study was conducted on patients with MS residing in Tehran, Iran, in 2016. The study was approved by the Ethics Committee of Kashan University of Medical Sciences, Kashan, Iran, and was conducted in accordance with the Declaration of Helsinki (IR.KAUMS.MEDNT.REC.1397.11).

A sample of 276 subjects were recruited from community-based MS clinics and referral out-patient MS clinic of Sina Hospital affiliated to Tehran University of Medical Sciences, Tehran.

The inclusion criteria for study participation were as follows: 1) age of 18-65 years, 2) diagnosed with MS according to the McDonald Criteria confirmed by neurologist, and 3) ability to read and write for filling the questionnaires. Exclusion criteria were being diagnosed with any known psychotic disorder, severe physical disability, and other severe chronic diseases.

**Procedures:** The principal researcher explained the survey to the patients. If patients accepted the proposal, they would be asked to sign the informed consent form. The self-report

questionnaire packet contained items concerning their clinical history, socio-demographic characteristics, and four main measures, mentioned below. The principal researcher was available to help the patients with questionnaire completion (for instance, clarification of the questionnaire). On average, 30 to 50 minutes were needed to complete the questionnaire.

**Measures:** A personal information questionnaire was distributed consisting of two sections: demographics (age, sex, marital status, education, type of occupation) and illness information including (age, sex, marital status, education, type of occupation) and illness information part including: type of MS, duration of illness, Expanded Disability Status Scale (EDSS), and times of relapse and hospitalization. In addition, we questioned the current alcohol and substance abuse and their respective histories one year prior to the study, history of suicidal attempt, and antidepressant consumption one month prior to the study.

**The PHQ-9:** PHQ-9 is a valid and reliable measure, commonly used in research studies to indicate depression severity and the presence of suicidal thought (Altura et al.,<sup>14</sup> 2016). The Persian version of PHQ-9 has been applied in many researches and has been proved to have good reliability and validity in Iranian population (Cronbach's alpha: 0.88).<sup>15</sup>

We used item 9 to assess suicidal ideation in the patients. Participants can respond to the question: "Over the last 2 weeks, how often have you been bothered by the following problem: thoughts that you would be better off dead, or of hurting yourself in some way?", with "not at all", "several days", "more than half the days", and "nearly every day". We considered any positive response as having suicidal ideation.<sup>4,14,16</sup> The validity of item 9 of the PHQ-9 has been confirmed as a screening tool to assess increased risk of suicide mortality beyond general symptoms of depression in the patients with neurological diseases.<sup>14,16</sup>

We applied also the PHQ-8 to evaluate depression in the participants. The PHQ-8 lacks the ninth item of the PHQ-9 in the scoring and has been considered as one of the most appropriate measures for evaluating depression in chronic illnesses.<sup>4,17-20</sup>

**The Hospital Anxiety and Depression Scale (HADS):** The HADS is a 14-item self-report tool designed for screening depression and anxiety severity within the last week in the participants.<sup>21</sup> This tool incorporates a 7-point depression subscale and a 7-point anxiety subscale, in both of which, physical symptoms have been eliminated in

order to omit the possibility of false-positive diagnosis. Thus, the HADS proves to be a comprehensive short screening tool for depression and anxiety symptoms in patients with physical conditions. A score of 8 or higher out of 21 indicates depression or anxiety. To assess anxiety in the participants in the current study, we used the anxiety subscale.

The Persian version of the scale has Cronbach's alpha of 0.78, for anxiety subscale.<sup>22</sup>

**The Chronic Illness Anticipated Stigma Scale (CIASS):** This questionnaire was developed by Earnshaw et al.<sup>23</sup> and includes three sub-measures envisioning the extent that people with chronic diseases anticipate stigma from friends and family, colleagues, and healthcare workers. In Iran, this questionnaire was validated within the Iranian population and the Cronbach's alpha was calculated to be 0.88.<sup>24</sup>

**The Multidimensional Scale of Perceived Social Support (MSPSS):** MSPSS is a 12-item measure meant for assessing social support from the three groups of family, friends, and important people in one's life which was produced by Zimet et al.<sup>25</sup> In each of the three subscales, this scale calculates one's status using a 5-point Likert scale ranging from "completely disagree" to "completely agree". An average is calculated from the sum of all items. The minimum score is 12 and the maximum is 60 which determines a high degree of perceived social support. Validation of the Persian version was also reported to be suitable. Cronbach's alpha of the Persian version was reported 0.84.<sup>26</sup>

To describe characteristics of the patients, mean and standard deviation (SD) were used for continuous variables and frequency and percent for categorical variables. The only numerical variable with skewed distribution was times of hospitalization which median [interquartile range (IQR)] was calculated.

To evaluate associations of suicidal ideation, patients were divided into two groups including ones with any positive response to item 9 and the others in another group.<sup>4</sup>

The differences in characteristics between two groups of suicidal ideation were examined using chi-square test for categorical variables and t-test for quantitative variables.

Logistic regression model was conducted to determine the relation of mood state, anticipated stigma, and social support with suicidal ideation and crude and adjusted odds ratio (OR) and 95% confidence intervals (CIs) were estimated. Model 1 was without adjustment, model 2 was adjusted

with age and sex, and model 3 was additionally adjusted with education as the significant difference in two groups in univariate analysis.

We also performed additional Pearson correlation analysis to better understand the relations among psychological variables such as anticipated stigma, mood states, and social support.

All analyses were conducted with the use of SPSS software (version 23, IBM Corporation, Armonk, NY). Statistical significance was set at  $P < 0.05$ .

## Results

**Descriptive data:** Total survey participants were 276 patients with MS, comprising 205 women (74.3%) and 71 men (25.7%) with a mean age  $\pm$  SD of  $35.8 \pm 8.6$  years. The highest prevalence was between the ages of 30 to 35 years and the least prevalence in ages above 56 years. Mean time since diagnosis of MS was  $6.3 \pm 5.8$  and mean score of EDSS was  $2.6 \pm 1.7$ . The patients had a mean score of  $2.1 \pm 2.5$  for times of hospitalization because of MS relapses. 47 (17.0%) ones reported that they had used antidepressants in the month prior to the study, and 21 (7.6%) reported that they had attempted suicide at least once during their lifetime. 55 (19.9%) patients disclosed past or current alcohol misuse and 17 (6.2%) reported that they had used substances (opium, opioids, cannabis, methamphetamine) in the last year prior to the study. Additional description of the sample is

provided in table 1.

According to the HADS scores, 180 (65.2%) patients experienced anxiety, and 190 (68.8%) experienced depression. From those with anxiety, 75 (41.7%) and those with depression 71 (38.4%) ones had suicidal ideation.

According to the PHQ-9, during the previous 2 weeks, of 276 respondents, 100 (36.2%) including 18.0% men and 82.0% women reported suicidal ideation, with 9.4% reporting it persistently most days and almost every day. None of the demographic features except sex and education were associated with suicidal ideation.

In the studied sample, there were no significant relations between suicidal ideation and subtype of MS, disease duration, times of hospitalization, level of disability (by EDSS), using antidepressants, and suicidal attempts in the past. Consequently, we omitted these variables in the final multivariate model. Table 2 shows disease characteristics and their associations with suicidal ideation.

In unadjusted analysis, suicidal ideation was significantly more likely among people who reported higher anxiety severity scores by HADS ( $P = 0.009$ ) and anticipated stigma from their friends and families ( $P = 0.003$ ). There was also a significant relationship between item 9 of PHQ scale with the other 8 items of the PHQ, showing association of suicidal thoughts with depression in the participants. The results are summarized in table 3.

**Table 1.** Demographic characteristics, substance/alcohol use, and the history of suicidal attempt in patients based on suicidal ideation

Variable	Suicidal ideation (n = 100)	No idea (n = 176)	Total	OR (95% CI)
Sex				
Male	18 (18.0)	53 (30.1)	71 (25.7)	1
Female	82 (82.0)	123 (69.9)	205 (74.3)	1.96 (1.07-3.58)
Age (year)	35.32 $\pm$ 8.71	36.13 $\pm$ 8.68	35.80 $\pm$ 8.60	0.98 (0.96-1.02)
Marital status				
Single	27 (27.0)	44 (25.0)	71 (25.7)	1
Married	64 (64.0)	118 (67.0)	182 (65.9)	0.88 (0.50-1.55)
Other	9 (9.0)	14 (8.0)	23 (8.3)	1.04 (0.39-2.74)
Educational level				
Primary	2 (2.0)	21 (11.9)	23 (8.3)	1
High school	45 (45.0)	75 (42.6)	120 (43.5)	2.30 (1.41-5.81)
University degree	53 (53.0)	80 (45.5)	133 (48.2)	3.92 (1.56-7.82)
Alcohol use				
No	83 (83.0)	138 (78.4)	221 (80.1)	1
Yes	17 (17.0)	38 (21.6)	55 (19.9)	1.34 (0.71-2.53)
Substance abuse				
No	92 (92.0)	167 (94.9)	259 (93.8)	1
Yes	8 (8.0)	9 (5.1)	17 (6.2)	0.62 (0.23-1.66)
History of suicidal attempt				
No	90 (90.0)	165 (93.8)	255 (92.4)	1
Yes	10 (10.0)	11 (6.3)	21 (7.6)	0.60 (0.24-1.46)

Data are reported as mean  $\pm$  standard deviation (SD) and number and percentage.

OR: Odds ratio; CI: Confidence interval

**Table 2.** Disease characteristics and clinical features of the study sample, based on suicidal ideation

Variable	No idea (n = 175)	Suicidal ideation (n = 100)	Total	P
Subtype of MS				
RRMS	9 (5.1)	2 (2.0)	199 (72.1)	0.149
PPMS	126 (71.6)	73 (73.0)	31 (11.2)	
SPMS	23 (13.1)	8 (8.0)	35 (11.2)	
PRMS	18 (10.2)	17 (17.0)	11 (4.0)	
Disease duration (year)	6.13 ± 4.87	6.72 ± 7.35	6.34 ± 5.89	0.430
Times of hospitalization*	2.19 ± 2.51	6.34 ± 5.89	2.19 ± 2.51	0.544
EDSS	2.59 ± 1.74	2.65 ± 1.70	2.65 ± 1.71	0.678
Current antidepressant use	32 (18.2)	17 (17.0)	49 (17.8)	0.805

Data are reported as mean ± standard deviation (SD) and number and percentage.

\*Median and IQ range for suicidal ideation and no ideation were 1(1-3) and 1(1-3), respectively.

MS: Multiple sclerosis; RRMS: Relapsing remitting multiple sclerosis; PPMS: Primary progressive multiple sclerosis; SPMS: Secondary progressive multiple sclerosis; PRMS: Progressive relapsing multiple sclerosis; EDSS: Expanded Disability Status Scale

Logistic regression analyses showed significant relations between suicidal ideation with anxiety (95% CI: 1.01-1.14, OR = 1.09), and anticipated stigma from family/friends (95% CI: 1.03-1.19, OR = 1.11) after adjustment for sex, age, and education. Also, there was a significant association between suicidal ideation and depression with OR = 1.12 (95% CI: 1.06-1.18, P < 0.001). ORs, adjusted for age, sex, and education, are presented in table 4.

According to the results of Pearson correlation analysis, anticipated stigma was significantly correlated with depression (r = 0.959, P < 0.001) and anxiety (r = 0.960, P < 0.001) in the participants. Patients with high scores in anticipated stigma perceived less social support (r = 0.203, P < 0.001).

## Discussion

The present study investigates the relationship between suicidal ideation and some socio-demographic and psychological factors in a group of patients with MS. According to our knowledge, this is the first study which has evaluated the association of anticipating stigma with suicidal

thoughts in patients with MS. Therefore, the findings of this study attribute a novel addition to the literature.

According to our definition given in the "Materials and Methods" part, 36.2% of the participants had suicidal thought. From those with suicidal ideation, 9.4% reported suicidal thoughts most days and almost every day. The prevalence of suicidal ideation correlates with Lewis et al.<sup>27</sup> study on patients with MS, but is slightly higher than the findings of Feinstein and Pavisian<sup>6</sup> and Turner et al.<sup>28</sup> Feinstein and Pavisian<sup>6</sup> also reported a lower lifetime estimate. However, it is difficult to compare the prevalence across different research measures.

These results bear no paradox with other studies that likewise indicate that patients with MS suffer from suicidal ideation more than the general population and other vulnerable demographics in Iran such as studies examining suicidal thoughts in the elderly and students.<sup>29-31</sup>

In our study, suicidal ideation was observed in women significantly more than men, which correlates with studies administered on the general population.

**Table 3.** Means and standard deviations (SDs) of depression, anxiety, anticipated stigma, and social support and their associations with suicidal ideation

Variable	No idea (n = 175)	Suicidal ideation (n = 100)	Total	P
	Mean ± SD	Mean ± SD	Mean ± SD	
Mood states				
Depression	14.84 ± 4.74	17.22 ± 5.75	15.70 ± 5.24	< 0.0001
Anxiety	12.61 ± 4.18	14.02 ± 4.29	13.12 ± 4.27	0.0090
Anticipated stigma	25.51 ± 7.99	27.54 ± 8.43	26.24 ± 8.19	0.0480
Family and friends	8.18 ± 3.76	9.56 ± 3.61	8.68 ± 3.76	0.0030
Work colleagues	10.14 ± 3.51	10.00 ± 4.14	10.09 ± 3.73	0.7620
Healthcare workers	7.18 ± 3.02	7.98 ± 3.94	7.47 ± 3.40	0.0610
Social support	67.22 ± 12.66	66.52 ± 13.21	66.96 ± 12.85	0.6640
Family	23.26 ± 4.71	22.93 ± 4.45	23.14 ± 4.61	0.5670
Friends	21.09 ± 5.98	20.73 ± 6.17	20.96 ± 6.04	0.6290
Significant others	22.82 ± 5.46	22.86 ± 5.05	22.84 ± 5.31	0.9600

SD: Standard deviation



**Table 4.** Unadjusted and adjusted odds ratio (OR) for psychological factors and suicidal ideation

Psychological factors	CI (95%)	Adjusted OR*	CI (95%)	Unadjusted OR	P	P
Depression	1.06-1.18	1.12	1.03-1.14	1.09	< 0.0001	< 0.0001
Anxiety	1.01-1.14	1.09	1.01-1.14	1.08	0.0090	0.0110
Anticipated stigma	1.01-1.07	1.05	1.00-1.06	1.03	0.0430	0.0370
Friends and family	1.03-1.19	1.11	1.03-1.17	1.11	0.0040	0.0020
Work colleagues	0.94-1.07	1.00	0.92-1.05	0.99	0.7610	0.8580
Healthcare workers	0.98-1.13	1.05	0.99-1.14	1.07	0.0640	0.1290
Social support	0.98-1.02	1.00	0.97-1.02	0.99	0.6620	0.9850
Family	0.94-1.04	0.99	0.93-1.03	0.98	0.5660	0.8110
Friends	0.95-1.03	0.99	0.95-1.03	0.99	0.6280	0.7990
Significant others	0.96-1.06	1.01	0.95-1.04	1.00	0.9630	0.5670

\*Adjusted for age, sex, and education

OR: Odds ratio; CI: Confidence interval

Regarding MS, although it is known that there is a higher risk of suicide attempts in men, there are no conclusive findings concerning the relationship between sex and suicidal ideation in patients with MS. We believe that more assessments should be in order.<sup>32</sup>

Depression was the most important factor contributing to suicidal ideation in all multivariate analyses in line with similar findings in the related research.<sup>4,28</sup> Anxiety and anticipating stigma from family and friends were other variables related to suicidal thoughts in the patients in adjusted model. Based on literature, relational problems and family conflicts are known to be significant risk factors of suicidal attempt in Iranian population.<sup>33</sup> This finding is somewhat compatible with our results and the reason might be the family's significance in identity formation and sense of security and support in Iranian culture.<sup>34</sup> Broadly speaking, Iranians are said to be keen and sensitive, socially speaking. These cultural idiosyncrasies definitely contribute to self-consciousness and excessive self-monitoring, ultimately resulting in higher levels of anxiety. Nonetheless, in the present study, we have not scrutinized a direct relationship between active support of the family and suicidal thoughts in the present study. However, some results do suggest that those who predicted stigma on a wider scale, subsequently experienced more severe levels of depression and anxiety and also would come to receive less support from their families. These results are in line with the Cadden et al. research about the experience of stigma in patients with MS, which suggests this phenomenon to be a factor that diminishes patients' psychological resources and increases their susceptibility to mental health problems.<sup>11</sup> Thus, we believe that there are definitely some complexities in the associations here worthy of further investigation.

In this study, 46.0% of the sample had university degrees. Among demographic variables, higher education was associated with suicidal thoughts.<sup>35</sup> In the same way, Koslow et al.<sup>36</sup> have justified the observed relationship between schizophrenic patients with higher education and their increased risk of suicide by disputing that these patients happen to have more insight and also happen to be more aware of their illness, both of which result in better cognitive functioning. MS usually manifests itself in the patient's youth, taking away many occupational and social opportunities from the patients. According to Koslow et al., when higher education or intellectual functioning is accompanied by social dysfunction (difficulties in finding jobs, marriage, or forming satisfying social bonds), suicidal thoughts might exhibit themselves which once again confirms the role of awareness in the patient's condition. This is similarly confirmed by social isolation being one of the most important risk factors of suicidal ideation in patients with MS.<sup>6,36</sup> An audit of how cultural traits may alter this issue has been proven difficult, due to the scarceness of researches conducted in Iran. In the recent years, it has become evident that the affair between the children's level of education and the family's integrity, along with the competitive atmosphere in educational systems, puts a lot of pressure on teenagers and young adults in Iran. Perfectionism has become a mental health issue in this age group.<sup>37</sup> Ziaei et al. have detected preoccupations with matters concerning education to be an important contributing factor to suicidal ideation in students.<sup>31</sup> Does higher education in the individual and/or the family is associated with greater expectations about their functions? And does the failure of these expectations related to MS complications contribute to suicidal thoughts?

However, there has not yet been a study on the association of cognitive functions of patients with MS with suicidal thoughts. Also, we did not find related results in the limited performed studies on patients with chronic conditions in Iran. This is the posing question and in order to answer it, more research with a focus on the patient's cognitive and intellectual functions, personality traits, and family living system is in order.

### Conclusion

The results of this research confirm complexity of suicide phenomenon and its relationship with various factors, involved in patients with MS. The findings encourage further study, especially in a longitudinal fashion in order to obtain more comprehensive understanding of the predictive value of risk factors. The importance of comorbidities of anticipated stigma with depression, anxiety, and suicidal thoughts in patients with MS, emphasizing the need for paying attention to it, and considering effective therapeutic interventions focused on alleviating perceived stigma as well as mood symptoms.

**Limitations:** Our study has several limitations. All data were cross-sectional and there was restricted knowledge on the explicit relations between the variables. Collecting data via self-report might be affected by social desirability especially since there are some questions regarding stigmatized and taboo subjects such as history of suicide attempts and suicidal thoughts, mental disorders, and drug use.

There is no specific scale regarding evaluation of suicidal ideation in MS. We used item 9 related to PHQ scale as indicator of suicidal ideation in the patients. Although this scale has been applied in lots of studies and has been confirmed as a screening tool for suicidal thoughts in neurological conditions such as MS, it still needs further examination to be exclusively relied on in view of its suboptimal predictive value of suicidal ideation.

According to previous researches, patients with

MS experience the highest level of suicidal ideation within the first year of diagnosis.<sup>38</sup> This is while only 11.2% of participants in the current study were in the first year after diagnosis. On the other hand, 17.0% of the patients were on antidepressants which constituted a meaningful affiliation with previous suicide attempts. The fact that using antidepressants lessens the severity of the mood symptoms and thus, decreases suicidal ideation, can describe the matter at hand. However, antidepressant use was still lower than the percentage of people with suicidal thoughts and intentions (50.0%) and this could be a predictive emblem for suicide attempts. Other factor which could have influenced the results is consumed medications including interferons (IFNs) which can interfere in inducing depression symptoms and suicidal ideation, which was not measured in the present study. These count as the other limitations of the study as they made interpretation difficult.

Finally, all the patients seen in the present study were attending MS outpatient clinics for follow-up appointments or reducing symptoms. Also, some patients approached, were not eligible or declined to participate. Therefore, the results cannot be generalized to all patients with MS including community-based patients. Prospective studies with larger sample size are required to allow multivariate analyses, evaluate the important confounders, and clarify the factors which affect the progression of suicidal ideation to suicide attempt.

### Conflict of Interests

The authors declare no conflict of interest in this study.

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