

## The Effect of Type D Personality on Quality of Life in Patients with Multiple Sclerosis

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### ABSTRACT

**Introduction:** The Type D personality was reported as an important indicator of adverse clinical outcomes and quality of life in various diseases. The objective of this study was to investigate the relationships between the Type D personality and clinical features and the effect of Type D personality on quality of life in patients with multiple sclerosis (MS).

**Methods:** Seventy-four patients with MS participated in this study. Clinical parameters of the patients were recorded and disability was assessed using the Expanded Disability Status Scale (EDSS). Patients were examined with the Beck Depression Inventory (BDI), Beck Anxiety Inventory (BAI), Type D Scale (DS14), and 36-Item Short-Form Health Survey (SF-36).

**Results:** BDI and BAI scores were significantly higher and mental subscale of the SF-36 scores were significantly lower in Type

D compared to nonType D ( $p<0.001$ ,  $p=0.001$ , and  $p<0.001$ , respectively). The total DS14 scores were found to be positively correlated with EDSS, BDI, and BAI and negatively correlated with SF-36 mental subscale ( $p=0.02$ ,  $p<0.001$ ,  $p<0.001$ , and  $p<0.001$ , respectively). Multivariate linear regression analysis indicated that the total DS14 score was independently associated with the mental component of SF-36 ( $p<0.001$ ).

**Conclusion:** The Type D personality traits may worsen the quality of life, particularly the mental component, in patients with MS. Consequently, the assessment of MS patients by brief and valid DS14 may be valuable for clinical practice.

**Keywords:** Multiple sclerosis, personality, type D personality, quality of life

**Cite this article as:** Demirci S, Demirci K, Demirci S. The Effect of Type D Personality on Quality of Life in Patients with Multiple Sclerosis. Arch Neuropsychiatry 2017; 54:272-276.

### INTRODUCTION

Multiple sclerosis (MS) is a demyelinating, chronic inflammatory, and neurodegenerative disease of the central nervous system, which is frequently diagnosed during the second to fourth decades of life, usually at the peak of work productivity. The incidence and prevalence rate of MS have recently increased in some populations (1). The disease can affect any part of the central nervous system with a preference for white matter tracts in the cerebral hemispheres, optic nerves, cerebellum, brainstem, and spinal cord. The main clinical characteristics of MS include motor and sensory symptoms, impaired vision, cerebellar signs, and autonomic dysfunction. Most MS patients (80%) have a relapsing-remitting form of the disease (2).

Multiple sclerosis is related to a range of psychiatric conditions, including depression, bipolar affective disorder, anxiety disorders, euphoria, pathological laughing and crying, and psychosis (3). More than 50% of MS patients experience depression and approximately 30% of patients experience generalized anxiety disorder at some point during the course of their illness (4). Depressed mood and/or increased anxiety in MS might decrease quality of life, lead to problems associated with treatment compliance, and aggravate the MS symptoms (5). Personality changes, such as social inappropriateness, disinhibition, apathy, emotional lability, and impulsiveness have also been reported in many MS patients (6,7,8). Studies on personality in patients with MS have been conducted (9,10,11).

Type D or "distressed" personality is characterized by co-occurrence of two normal and stable personality traits as negative affectivity (NA) and social inhibition (SI), constituting predisposition to chronic distress. NA is the propensity to experience negative emotions in the face of situations and time, while SI refers to the inhibited expression of emotions or behaviors in social relationships due to the concern of rejection and disapproval by other people (12). Individuals with high scores of NA frequently experience depression, dysphoria, hostility, anxiety, worry, unhappiness, and irritability and have a pessimistic view regarding the self and world (12,13). Persons with elevated scores of SI tend to feel inhibited, stressful, and insecure while interacting with other people due to a fear of their reaction (12). Individuals may be vulnerable to general psychological distress due to having Type D personality; hence, it is related to disease-promoting mechanisms (12,14).

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**Received:** 04.01.2016      **Accepted:** 03.03.2016

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The Type D personality has attracted much attention in cardiovascular diseases in recent years. Researchers suggested that Type D personality was an important indicator of adverse events and quality of life in people with cardiac diseases (12,14,15). Similar results have been found in diseases, such as Parkinson's disease, ankylosing spondylitis, and tinnitus (16,17,18). A recent study evaluating the relation of Type D personality with quality of life in both Parkinson's disease and MS reported that Type D personality was significantly associated with quality of life in MS patients; however, its predictive value disappeared after adjustment for anxiety and depression (19). To the best of our knowledge, the comparison of the Type D and nonType D personalities regarding clinical characteristics and quality of life were not investigated previously in MS patients. Thus, the objective of the present study was to analyze the associations between Type D personality, clinical features, and quality of life and to explain the effect of Type D personality on quality of life in MS patients.

## METHODS

### Participants

Seventy-four MS patients who applied to our outpatient clinic were enrolled in the study. No patient rejected to participate to the study. MS diagnosis was made based on the McDonald classification (20). All of the patients with MS had relapsing-remitting form diagnosed based on the Lublin and Reingold criteria (21). Patients aged >18 years with at least basic school education and a diagnosis of MS for at least 1 year were included. Patients with chronic diseases or neurological diseases other than MS; a Mini-Mental State Examination score <25 points; history of psychiatric conditions; chronic systemic diseases, such as renal, hepatic, cardiac, blood, or circulatory disorders; past or current history of alcohol or drug abuse; head trauma; and visual/auditory deficits that could interfere in the performance of the tests; evidence of a clinical relapse; or receiving corticosteroid pulse within the preceding 3 months; and the incomplete identification were excluded. Complete neurologic examination was performed for all participants by the same neurologist. The age, sex, education, and disease duration were recorded. Disability was evaluated using Expanded Disability Status Scale (EDSS), which is generally used to determine the disability related to MS (22).

All participants were instructed to complete Beck Depression Inventory (BDI), Beck Anxiety Inventory (BAI), Type D Scale (DS14), 36-Item Short-Form Health Survey (SF-36) in a quiet room. Psychiatric disorders were also excluded from the study using a semi-structured psychiatric interview by the same psychiatrist.

Written informed consent was obtained from all participants with respect to the ethical principles of the Declaration of Helsinki. The local ethics committee approved the study.

### Self-Reported Measurements

Beck Depression Inventory is a frequently used self-administered evaluation of depressive symptoms. It is composed of 21 self-assessment items that evaluate physiological, emotional, cognitive, and motivational symptoms observed in depression. Each item is scored from 0 to 3, indicating a total score of 0-63, with higher scores demonstrating elevated severity of depression. The validity and reliability study was conducted in Turkey and the cut-off point has been determined as 17 for the Turkish version (23).

Beck Anxiety Inventory is a self-completed instrument used to evaluate the frequency of anxiety symptoms experienced by an individual. This scale comprises 21 questions and each item is scored from 0 to 3, with 3 indicating the most severe anxiety. The total possible score ranges from 0

to 63. The validity and reliability study in Turkish was performed by Ulusoy et al. (24) in 1998.

SF-36 is used to evaluate the general quality of life. This questionnaire contains 36 health-related items and assesses eight dimensions of mental and physical health. These are associated with physical functioning, general health, physical role, vitality, bodily pain, emotional role, social functioning, and mental health. The physical and the mental composite scores are summary measures of the 36 items. The score of each domain ranges between 0 and 100 with higher scores showing greater health status. The SF-36 was tested and proven to be a reliable and valid measure of health status in Turkey (25).

The Type D personality was evaluated using the validated Turkish version of Type D Scale (DS14). The DS14 questionnaire includes 14 items and two subscales as SI and NA. Each subscale comprises seven items answered on a five-point response scale ranging from 0=false to 4=true. Equivalent and >10 points on both subscales is used to categorize individuals as Type D (SI≥10 and NA≥10) (26).

### Statistical Analysis

The Statistical Package for Social Sciences software (version 15 SPSS Inc.; Chicago, IL, USA) was used for all statistical analyses. The normality of distribution of all continuous variables was evaluated using the Kolmogorov-Smirnov test. Descriptive statistics were performed to report the analysis of data, which were presented as mean±standard deviation. Chi-square test was performed to compare the categorical variables described as the number of cases and percentages. Independent t test and the Mann-Whitney U test were performed for group comparisons of parametric and nonparametric data, respectively. Pearson's and Spearman's correlation tests were used to detect the strength of relations between the variables. An multivariate linear regression analysis was used to determine the relationship between SF-36 and clinical parameters. A statistically significant level was regarded as p value <0.05.

## RESULTS

Seventy-four MS patients (47 females and 27 males) were included in this study. On an average, MS patients were aged 35.3±7.00 years of age. The sociodemographic and clinical characteristics of MS patients are shown in Table 1. Mean total DS14 scores were 28.2±13.6 in the patients with MS; 56.8% of the patients with MS were classified as having Type D personality. Age, gender, education, disease duration, EDSS, and physical component of the SF-36 did not significantly differ between the Type Ds and nonType Ds (p=0.12, p=0.41, p=0.07, p=0.83, p=0.06, and p=0.21, respectively). The scores of BDI and BAI were significantly higher, and the scores of mental section of the SF-36 were lower in Type Ds than in nonType Ds (p<0.001, p=0.001, p<0.001, respectively; Table 1).

The scores of NA subscale of the DS14 were positively correlated with the scores of the BDI (r=0.60, p<0.001) and BAI (r=0.49, p<0.001) and negatively correlated with the mental section of SF-36 (r=-0.69, p<0.001). The SI subscale scores of DS14 were positively correlated with EDSS (r=0.24, p=0.03), and the scores of BDI (r=0.41, p<0.001) negatively correlated with mental component scores of SF-36 (r=-0.55, p<0.001). The scores of total DS14 were positively correlated with EDSS (r=0.26, p=0.02) and the scores of BDI (r=0.58, p<0.001) and BAI (r=0.42, p<0.001) negatively correlated with those of SF-36 mental component (r=-0.71, p<0.001; Table 2).

A multivariate linear regression analysis was carried out for analyzing the relations between the mental component of SF-36 and clinical variables. The mental component of SF-36 was regarded as dependent; age, gen-

**Table 1.** Demographic and clinical characteristics of patients with MS

	MS Patients (n=74)	Presence of type D personality		
		Type D (n=32)	Nontype D (n=42)	p
Age (year)	35.3±7.00	33.9±6.95	36.4±6.92	0.12
Sex (female/male)	47/27	22/10	25/17	0.41
Education (year)	10.9±4.10	11.9±3.98	10.19±4.08	0.07
Disease duration (year)	6.70±4.92	6.84±4.51	6.59±5.26	0.83
EDSS	1.85±1.30	1.50±1.11	2.11±1.39	0.06
BDI	13.2±8.87	8.76±9.55	16.5±6.72	<0.001
BAI	17.1±11.9	12.6±10.0	20.7±12.2	0.001
NA	15.6±9.03	8.25±7.58	21.2±5.22	<0.001
SI	12.7±6.40	7.03±3.34	17.0±4.43	<0.001
SF-36 physical	39.6±9.33	41.2±9.75	38.3±8.87	0.21
SF-36 mental	42.9±11.2	50.9±8.58	36.1±8.39	<0.001

MS: multiple sclerosis; EDSS: expanded disability status scale; BDI: beck depression inventory; BAI: beck anxiety inventory; NA: negative affectivity; SI: social inhibition; SF-36: 36-item short-form health survey

**Table 2.** Correlations between the scores of NA, SI, and total DSI4 and clinical and quality of life parameters in patients with MS (n=74)

	NA		SI		Total	
	r	p	r	p	r	p
Disease duration (years)	0.20	0.07	0.01	0.89	0.13	0.24
EDSS	0.22	0.05	0.24	0.03	0.26	0.02
BDI	0.60	<0.001	0.41	<0.001	0.58	<0.001
BAI	0.49	<0.001	0.19	0.10	0.42	<0.001
SF-36 physical	-0.13	0.29	-0.12	0.34	-0.14	0.25
SF-36 mental	-0.69	<0.001	-0.55	<0.001	-0.71	<0.001

r: pearson and spearman's correlation coefficient; MS: multiple sclerosis; EDSS: expanded disability status scale; BDI: beck depression inventory; BAI: beck anxiety inventory; NA: negative affectivity; SI: social inhibition, DSI4: 14-item type D scale; SF-36: 36-item short-form health survey

der, EDSS, BDI, BAI, and DSI4 total score were regarded as independent variables in patients with MS. The multivariate linear regression analysis indicated that DSI4 total score was independently associated with mental component of the SF-36 even after adjustment for confounding background variables (Adjust  $R^2=0.514$ ,  $\beta=-0.723$ , 95% confidence interval= $-0.735$ - $-0.435$ ,  $p<0.001$ ).

## DISCUSSION

There are three major findings in the present study. First, patients with MS classified as having Type D personality had significantly higher scores of BDI and BAI and lower scores of the mental component of SF-36 compared to without Type D. Second, the total DSI4 scores were positively correlated with EDSS, BDI, and BAI and negatively correlated with the SF-36 mental component. Third, the multivariate linear regression analysis revealed that the DSI4 total score was independently associated with the mental component of SF-36 in MS patients.

Personality changes may occur in patients with MS (9,27). Demyelinating lesions are suggested to give rise to the personality changes by affecting the frontal-subcortical circuits and limbic structures (28). It was reported that patients with MS were more neurotic and less empathic, agreeable, and conscientious compared to healthy individuals (29). Benedict et al. (8) investigated a small group of MS patients and found high maladjustment (neuroticism) and a decrease in empathy, agreeableness, and conscientiousness. The researchers reported that executive control predicted the presence of these personality abnormalities. Lima et al. (27) reported that conscientiousness was the most common, whereas openness to experience was the least observed personality factor in 33 females recently diagnosed with relapsing-remitting MS by using the NEO five-factor inventory personality scale. Gazioğlu et al. (30) assessed the characteristics of a personality in MS patients by temperament and character inventory and found increased harm avoidance and decreased self-directedness levels in patients compared to healthy subjects. Also, the duration of the disease was found to positively correlate with harm avoidance and negatively correlate with novelty-seeking scores; EDSS was found to negatively correlate with reward dependence. Gioia et al. (31) found that EDSS was negatively correlated with extraversion in MS patients with normal cognitive function. Increased neuroticism and decreased extraversion compose the Type D personality complex. Consistent with previous studies (31,32), the total DSI4 and the SI subscale scores were correlated with EDSS in this study. Accordingly, higher disability may be considered a reason for SI in MS patients.

A study investigating Type D personality in Parkinson's disease and MS reported that 44.5% of the MS patients and 52.8% of the Parkinson's patients showed this personality (19). In the present study, we found that 56.8% of the patients with MS had Type D personality trait. These differences may be associated with the different sample size of the studies. Type D personality was reported to affect physical and mental health status in the general population as well as in conditions such as heart failure and myocardial infarction (14,15). There are several studies on Type D personality in various diseases but fewer for neurological diseases (12,14,15,16,17,18,19). Dubayova et al. (16) investigated the Type D personality in Parkinson's disease and found that Type D personality was the second most significant variable affecting the quality of life after severity of disease and was associated with poor score in the mental component of quality of life. The researchers suggested that Type D personality played a considerable role in quality of life of the patients with Parkinson's disease. In another recent study, Type D personality was significantly related to the mental component of quality of life in Parkinson's patients and it was significantly related to both mental and physical components of quality of life in MS patients; however, after adjustment for the confounding factors the significance of Type D personality on the quality of life disappeared (19). In our study, as distinct from the other studies, we compared the Type Ds and nonType Ds regarding clinical characteristics and quality of life in MS (16,19). We found significantly worse mental quality of life in Type Ds than in nonType Ds and negative correlations between mental component of quality of life and Type D personality. Furthermore, the multivariate linear regression analysis revealed that Type D personality was significantly related to the mental component of quality of life even after adjustment for confounding background variables. This result may accentuate the significance of the evaluation of Type D personality in patients with MS.

It was suggested that the association between personality characteristics and choice of coping strategies were different in MS patients compared to the healthy individuals. Ratsep et al. (32) reported that patients with high neuroticism and low extroversion were associated with the emo-

tion-focused coping strategy in MS, and these patients exhibited maladaptive health behaviors, such as low adherence to disease-modifying medications. MS patients with Type D personality might not deal with stressful life events efficiently. In a study, Type D personality was reported to be related to health-related behaviors and social support perception (33). People with Type D personality are less likely to express their emotions owing to the traits of Type D as SI and NA. Despite the fact that Type D is a stable personality trait, this may not indicate that distress level of the patients may not be modified. For this reason, psychological interventions aimed for ameliorating the coping skills to reduce the stress experienced and to improve disease management skills may be helpful for these patients. These interventions may also increase quality of life by improving the health-related behaviors and perceived social support in MS patients with Type D personality.

Our study has several limitations that should be considered in the interpretation of the results. This study had a cross-sectional design and investigated a small sample size. As we selected the patients from single-center, our results could not be generalized for the MS population. Furthermore, we included only relapsing-remitting MS patients in this study and the other types of MS were not investigated. Another possible limitation is the lack of a healthy control group. Moreover, we did not perform neuropsychological tests except Mini-Mental State Examination for evaluating cognitive functions. Nonetheless, despite these limitations, our study is remarkable with regard to that it suggests the importance of having Type D personality on quality of life in MS patients.

We conclude that Type D personality traits might worsen the mental section of the quality of life in MS, therefore evaluating MS patients with brief and valid Type D Scale is important for neurological practice. Early identification of Type D personality may contribute to a better quality of life and may help to deal with MS for providing early psychological support. Future studies with longer follow-up periods are needed to explore the relationships precisely and to analyze the impacts of psychological interventions on Type D personality in MS patients.

**Ethics Committee Approval:** Ethics committee approval was received for this study from the ethics committee of Süleyman Demirel University School of Medicine.

**Informed Consent:** Written informed consent was obtained from patients who participated in this study.

**Peer-review:** Externally peer-reviewed.

**Author Contributions:** Concept - Seden.D., K.D.; Design - Seden.D., K.D.; Supervision - Serpil.D.; Resource - Seden.D., Serpil.D.; Materials - Seden.D., K.D.; Data Collection and/or Processing - Seden.D., K.D.; Analysis and/or Interpretation - Seden.D., K.D., Serpil.D.; Literature Search - Seden.D., K.D.; Writing - Seden.D.; Critical Reviews - K.D., Serpil.D.

**Conflict of Interest:** No conflict of interest was declared by the authors.

**Financial Disclosure:** The authors declared that this study has received no financial support.

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