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The Impact of Type D Personality Traits on Quality of Life, Sleep, Anxiety, and Depression in Fibromyalgia Patients: A Comparative Study with Healthy Controls

Authors' Contribution:
Study Design A
Data Collection B
Statistical Analysis C
Data Interpretation D
Manuscript Preparation E
Literature Search F
Funds Collection G

ABCDEFG 1 İlknur Topal
ADFG 2 Taha Can Tuman

1 Department of Physical Medicine and Rehabilitation, International School of Medicine, Istanbul Medipol University, Istanbul, Turkey
2 Department of Psychiatry, International School of Medicine, Istanbul Medipol University, Istanbul, Turkey

Corresponding Author: İlknur Topal, e-mail: dr.ilknurcann@gmail.com
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Background: Type D personality has been associated with adverse clinical outcomes and poor quality of life in many diseases. This study aimed to evaluate the effects of type D personality on pain, anxiety and depression, sleep quality, and quality of life in 50 patients with fibromyalgia syndrome.

Material/Methods: Fifty patients with fibromyalgia and 50 healthy controls were included in the study. Baseline and post-treatment evaluations encompassed a comprehensive battery of assessment tools: socio-demographic questionnaire, visual analog scale for pain, Beck Anxiety Inventory, Beck Depression Inventory, Fibromyalgia Impact Questionnaire, SF-36 Short Form Questionnaire, and Pittsburgh Sleep Quality Index. The effects of type D personality traits on clinical parameters were determined by evaluating the participants with the D-Type Personality Scale (DS-14).

Results: Twelve participants (24%) in the control group and 30 patients (60%) in the fibromyalgia group had type D personality traits, and the difference was significant ($P<0.001$). The Beck Anxiety Inventory and Beck Depression Inventory scores were significantly higher, and the SF-36 domains of vitality and mental health were significantly lower in fibromyalgia patients with type D personality ($P=0.023$, $P=0.036$, $P=0.002$, $P>0.001$).

Conclusions: This study draws attention to the high prevalence of type D personality in patients with fibromyalgia and demonstrates that this personality trait has a negative impact on patients' clinical parameters.

Keywords: Fibromyalgia Syndrome • Sleep Quality • Depression • Anxiety • Type D Personality • Quality of Life

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Background

Fibromyalgia syndrome is described as a persistent pain condition characterized by widespread bodily discomfort, fatigue, sleep disturbances, and various other symptoms [1]. Alongside these primary symptoms, individuals with fibromyalgia can also experience issues such as dizziness, mood disorders, cognitive impairment, anxiety, depression, tingling sensations, abdominal bloating, and shortness of breath [1]. The etiology of fibromyalgia is thought to involve central sensitization, which entails dysfunction within the locomotor system, affecting the perception, transmission, and processing of incoming pain signals [2]. Recent research has linked fibromyalgia to a range of other factors, including inflammatory, immune, endocrine, genetic, and psychosocial elements [2]. Pain, the primary symptom in fibromyalgia, falls under the category of nociplastic pain, which refers to pain arising from altered nociception without any damage to tissues or the somatosensory system, causing activation of peripheral nociceptors [3]. Fibromyalgia is more prevalent in women than men, and community incidence rates are reported between 7.3% and 12.9% [1].

The diagnosis of fibromyalgia has undergone changes over time. Initially, the American College of Rheumatology established diagnostic criteria that necessitated the presence of tender points. However, more recent research, as indicated by Wolfe et al [4], has demonstrated that a tender point examination is no longer a prerequisite for diagnosis. The 3 fibromyalgia criteria recommended by the American College of Rheumatology in 2010/2011 are as follows [5]: (1) Pain severity: The patient rates their pain on a scale from 0 to 10, reflecting the severity of their pain experienced in the past 7 days, allowing an assessment of pain intensity. (2) Generalized pain: The patient reports pain felt in at least 1 area of the body for a minimum of 1 month, involving the right and left sides, upper and lower halves, and front and back of the body. (3) Symptom severity: The patient assesses the severity of symptoms such as headaches, fatigue, cognitive difficulties, sleep disturbances, gastrointestinal issues, and depression experienced in the past 7 days on a scale from 0 to 3. A fibromyalgia diagnosis is based on the total of scores of generalized pain, symptom severity, and pain severity. If these criteria surpass a specific threshold, a diagnosis of fibromyalgia is made.

The National Institute for Health and Care Excellence has outlined general principles for the clinical management of fibromyalgia in its 2021 guidelines [6]. The primary objective of treating fibromyalgia is to alleviate symptoms and enhance the quality of life for affected individuals. Non-pharmacological interventions, including exercise, cognitive-behavioral therapy, and patient education, have demonstrated effectiveness in symptom management, as supported by Adams et al [7], Arnold et al [8], and the National Institute for Health and Care Excellence. In addition to non-pharmacological approaches, pharmacological treatments involving medications such as antidepressants, anticonvulsants, and analgesics have also been considered [6,8]. A comprehensive approach to the recovery of individuals with fibromyalgia encompasses 4 fundamental pillars: (1) patient education, (2) psychological therapy, (3) medication-based treatment, and (4) physical activity.

"Type D personality" (TDP) is derived from the initials of "distrustful" and "distressed". TDP represents an individual's internal state of being distrustful and distressed, with the individual frequently experiencing negative emotional responses [9]. TDP is defined as a personality disposition that predisposes individuals to chronic distress; it is characterized by the presence of negative affect and social inhibition [9]. Negative affect encompasses a susceptibility to experiencing negative emotions, such as anxiety, depression, dysphoria, and irritability, while social inhibition refers to the tendency to withhold the expression of emotions in social situations due to a fear of rejection [9,10]. Individuals exhibiting TDP tend to experience heightened levels of worry, nervousness, and self-blame. They also typically hold a pessimistic outlook on life, possess lower self-confidence, and report reduced overall life satisfaction [11,12]. Additionally, they often perceive social relationships negatively, have limited social support, and form weak connections with others [13]. TDP is associated with increased anxiety, depression, diminished quality of life, and a negative assessment of one's own health [14]. Moreover, individuals with TDP traits are more susceptible to physical and mental health conditions [14]. Research suggests that TDP can elevate the risk of heart attacks and is more prevalent among individuals with heart disease, indicating a link between these personality traits and heart conditions [15]. Furthermore, patients with ankylosing spondylitis and TDP tend to experience more severe clinical symptoms [16].

The available body of literature concerning the influence of TDP on fibromyalgia is quite sparse. In the context of our research, we hypothesized that TDP could be linked to elevated levels of anxiety, depression, sleep disruptions, reduced quality of life, and heightened disease activity in individuals with fibromyalgia. Therefore, this study aimed to evaluate the effects of type D personality on pain, anxiety and depression, sleep quality, and quality of life in 50 patients with fibromyalgia syndrome. This way, early diagnosis of TDP in patients with fibromyalgia can facilitate interventions to improve patient well-being.

Material and Methods

Sample

We enrolled a total of 50 patients who sought treatment at our hospital's physical therapy outpatient clinic. In our study,

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the diagnosis of fibromyalgia was made based on the updated American College of Rheumatology in 2010/2011 criteria, which require the presence of pain lasting for more than 3 months, a pain score of 17 or higher in at least 3 months of pain distribution, and a symptom impact score of 17 or higher [4]. Additionally, we recruited 50 healthy volunteers from the same age group to serve as a control group.

Participant Inclusion and Exclusion Criteria

Patients diagnosed with fibromyalgia according to the American College of Rheumatology 2010/2011 criteria and aged between 18 and 65 were included in our study. Those with inflammatory rheumatic disease, malignancy, and neurological disease were excluded. Healthy volunteers between the ages of 18 and 65 years were included in the control group.

Informed Consent

Before being enrolled in the study, a comprehensive explanation of the research aims and procedures was given to all participants. Participation was contingent upon our obtaining written informed consent.

Ethical Approval

The study received approval from the Clinical Research Ethics Committee of the Faculty of Medicine at Medipol University (approval number: 10840098-6004.01.01-E.15458), ensuring compliance with ethical guidelines.

Assessment

All study participants completed a comprehensive set of assessments, as follows:

Sociodemographic data form: This form gathered information about the participants' age, sex, educational background, occupation, marital status, smoking and alcohol habits, as well as any history of chronic illnesses.

The 14-item Type D Personality Scale (DS-14): We used the DS-14 scale to determine the presence of TDP traits [17]. This assessment comprises 2 sub-dimensions, which evaluate negative affect and social inhibition, for a total of 14 items. Each item is rated on a scale from 0 to 4, with some items requiring reverse scoring. Individuals who scored 10 or higher on both subdimensions were classified as demonstrating TDP characteristics.

Beck Anxiety Inventory: This assessment tool was employed to gauge the severity of anxiety [18]. It consists of a total of 21 questions, each scored between 0 and 3. The maximum achievable score on this scale is 63, with higher scores indicative of a greater degree of anxiety.

Beck Depression Inventory: This scale was used to assess the severity of depressive symptoms [19]. It comprises 21 questions, each scored between 0 and 3, with a maximum total score of 63. Elevated scores on this scale denote a higher level of depression.

Fibromyalgia Impact Questionnaire: This questionnaire was used to evaluate the impact of fibromyalgia on patients' well-being and current status [20]. It encompasses 10 factors, including physical function, overall well-being, work-related issues, fatigue, morning fatigue, stiffness, anxiety, and depression. The first section has 10 items scored on a Likert scale from 0 to 3. In the second and third sections, participants were asked to indicate the frequency of "being affected by the disease" and "inability to attend work" on specified days, and scores were calculated accordingly. The remaining 7 questions involved marking the appropriate position on a visual analog scale. Higher scores on the scale indicate a greater level of impairment, with a maximum possible score of 100.

Visual Analogue Scale: This 10-point scale was used to assess pain levels, ranging from 0 (no pain) to 10 (unbearable pain). Pain severity was categorized [21] as mild (1-3), moderate (4-7), or severe (8-10).

SF-36 Short Form Questionnaire: We used the SF-36 as a tool to assess the well-being and quality of life of our research participants. This survey comprises 36 questions designed to measure 8 dimensions related to physical and mental health. These dimensions encompass physical function, role physical, role emotional, vitality, mental health, social function, body pain, and general health. Scores on these subscales can range from 0 to 100, with higher scores indicating a more positive quality of life [22].

Statistical Analysis

Quantitative variables were described using measures of central tendency and variance, with mean±SD. The Fisher's exact test (in cases of low sample size) and chi-squared test were used to determine differences between proportions or associations among categorical variables. To demonstrate differences in behavioral patterns of group means, the Mann-Whitney U test was used when the normality and homoscedasticity assumptions were not met. The Mann Whitney U test was also used to compare the distribution between specific categorical groups related to numerical values of the parameters. The chi-squared test or Fisher's Exact test were used to assess the relationship between categorical variables. The G*Power program [23] was used to calculate the sample size. Significant

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Table 1. Comparison of demographic data between groups.

		Control Group (n=50)	Fibromyalgia Group (n=50)	*P*
Age		41.0±10.8	39.1±11.5	0.394
Sex	Male	6 (12%)	5 (10%)	0.749
	Female	44 (88%)	45 (90%)	
Marital status	Married	9 (18%)	6 (40.0%)	0.234
	Single	39 (78%)	44 (53%)	
	Widow	2 (4%)	0	
Education	Primary School	7 (14%)	13 (26%)	0.497
	Middle School	10 (20%)	9 (18%)	
	High School	12 (24%)	9 (18%)	
	University	21 (42%)	19 (38%)	
Alcohol	No	45 (90%)	48 (96%)	0.240
	Yes	5 (10%)	2 (4%)	
Smoking	No	38 (76%)	43 (86%)	0.202
	Yes	12 (24%)	7 (14%)	

high or low values at the 0.05 level were indicated based on ratios obtained when a similar independent relationship between groups was assumed. Statistical significance was set at *P*=0.05 for all cases. Statistical analyses were performed using the IBM SPSS (Statistical Package for the Social Sciences, Version 21.0, IBM Corp Armonk, NY, USA) software package for Windows.

Results

Participant Characteristics

In this study, we investigated 50 patients with a diagnosis of fibromyalgia based on American College of Rheumatology criteria (FM group), alongside a matched control group of 50 healthy individuals. The FM group had an average disease duration of 40.2±42.6 months, a Fibromyalgia Impact Questionnaire score of 69.6±16.3, and a visual analog scale pain score of 7±1.8. Demographically, there were no statistically significant differences between the FM and control groups (**Table 1**).

Type D Personality Prevalence

TDP traits were significantly more prevalent in the FM group, with 60% (n=30) of patients exhibiting these traits, compared with 24% (n=12) of participants in the control group (*P*<0.001**). Furthermore, scores in the FM group were significantly higher on the Pittsburgh Sleep Quality Index, Beck Anxiety Inventory, and Beck Depression Inventory than in the control group (*P*<0.001, *P*<0.001, *P*=0.001, respectively; **Table 2**).

Table 2. Clinical comparison of fibromyalgia and control groups.

	Fibromyalgia (n=50)	Control (n=50)	*P*
PSQI	9.0±3.6	4.70±2.1	<0.001
BAI	27.2±12.7	6.7±9.1	<0.001
BDI	18.5±10.5	8.1±9.4	0.001
PF	46.5±23.4	80.8±21.5	<0.001
RP	35.0±36.7	72.0±35.5	<0.001
RE	37.9±39.2	70.2±25.6	<0.001
VT	28.9±15.7	56.6±19.8	<0.001
MH	47.7±20.8	61.3±34.2	0.018
SF	50.5±24.3	69.3±25.4	<0.001
BP	31.8±19.5	69.7±25.5	<0.001
GH	35.6±20.8	62.7±18.6	<0.001

Mann-Whitney U test. BAI – Beck Anxiety Inventory; BDI – Beck Depression Inventory; BP – body pain; GH – general health; MH – mental health; PF – physical function; PSQI – Pittsburgh Sleep Quality Index; RE – role emotional; RP – role physical; SF – social function; VT – vitality.

Quality of Life Assessment

The FM group consistently reported lower scores across all dimensions of the SF-36 quality of life questionnaire than did the control group, as shown in **Table 2**.

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Table 3. Comparison of all participants in terms of sleep, depression, anxiety, and quality of life according to whether they have type D personality traits or not.

	With type D personality (n=42)	Without type D personality (n=58)	*P*
PSQI	8.6±3.5	7.0±3.9	0.086
BAI	26.9±14.2	16.3±13.7	0.003
BDI	19.6±10.7	11.4±10.1	0.002
PF	55.9±26.6	69.2±28.3	0.019
RP	46.4±41.1	58.6±39.6	0.138
RE	42.7±38.9	62.3±33.0	0.08
VT	33.3±21.4	49.6±21.0	<0.001
MH	43.5±24.6	62.5±29.5	0.001
SF	53.3±26.6	64.6±25.6	0.034
BP	44.2±27.6	55.4±30.2	0.060
GH	42.2±22.7	54.1±23.6	0.013

Mann-Whitney U test. BAI – Beck Anxiety Inventory; BDI – Beck Depression Inventory; BP – body pain; GH – general health; MH – mental health; PF – physical function; PSQI – Pittsburgh Sleep Quality Index; RE – role emotional; RP – role physical; SF – social function; VT – vitality.

Impact of Type D Personality

Analyzing sleep, depression, and quality of life in all participants, regardless of TDP status, revealed no statistically significant differences in sleep quality (*P*=0.086). However, individuals with TDP showed higher Beck Anxiety Inventory and Beck Depression Inventory scores (*P*=0.003, *P*=0.002, respectively) and lower scores in various SF-36 quality of life sub-domains, including physical function, vitality, mental health, social function, and general health, as detailed in **Table 3**.

In the FM group, there were no significant distinctions in sleep quality between patients with and without TDP. However, among patients in the FM group with TDP, Beck Anxiety Inventory and Beck Depression Inventory scores were significantly higher (*P*=0.02, *P*=0.036, respectively), and the quality of life was notably lower in the mental health and vitality domains of the SF-36, as detailed in **Table 4**.

Notably, among healthy individuals in the control group, regardless of TDP traits, no significant differences were found in sleep, depression, and quality of life levels (*P*>0.05)

Table 4. Comparison of clinical parameters of fibromyalgia patients according to whether they have Type D personality or not.

	FM with type D personality (n=30)	FM without type D personality (n=20)	*P*
PSQI	9.3±3.3	8.6±3.9	0.467
BAI	30.5±12.2	22.2±12.0	0.023*
BDI	21.0±10.3	14.7±9.7	0.036*
PF	46.0±22.6	47.2±25.1	0.856
RP	33.3±36.7	37.5±37.6	0.699
RE	31.0±36.0	48.3±42.5	0.130
VT	23.5±13.2	37.0±16.0	0.002*
MH	39.1±19.6	60.6±15.5	<0.001**
SF	45.4±23.7	58.1±23.7	0.070
BP	33.1±18.8	29.8±20.8	0.573
GH	32.1±16.8	40.7±25.3	0.156
FİQ	70.9±15.4	67.7±17.8	0.498
VAS	7.4±1.7	6.5±1.8	0.070

Mann-Whitney U test. BAI – Beck Anxiety Inventory; BDI – Beck Depression Inventory; BP – body pain; GH – general health; MH – mental health; PF – physical function; PSQI – Pittsburgh Sleep Quality Index; RE – role emotional; RP – role physical; SF – social function; VT – vitality; FIQ – Fibromyalgia Impact Questionnaire; VAS – visual analog scale.

Discussion

Our study yielded significant findings. First, we observed a considerably higher prevalence of TDP traits in the FM group, with 60% of patients exhibiting these characteristics, compared with the control group. Second, patients in the FM group with TDP exhibited higher depression and anxiety scores and lower quality of life scores.

These results provide empirical support for our initial hypothesis that TDP adversely affects the quality of life of individuals with fibromyalgia and correlates with heightened levels of depression and anxiety. It is worth noting that we did not discover a significant link between TDP and sleep quality in patients with fibromyalgia. TDP has been linked with numerous medical conditions, particularly cardiovascular diseases [15]. Studies have shown that individuals with TDP traits face an elevated risk of encountering heart-related problems, such as heart attacks, and that these traits are more prevalent among individuals with

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heart diseases, including conditions such as arrhythmia, coronary artery disease, and peripheral artery disease [15]. It is believed that TDP traits contribute to the development of cardiovascular diseases through factors such as an unhealthy lifestyle, heightened cortisol levels, activation of the hypothalamus-pituitary-adrenal axis, and the initiation of oxidative stress [24,25].

In a study conducted with patients with diabetes, TDP was found to be more prevalent in the patient group than in the control group, and adverse mental health outcomes, such as depressed mood, anhedonia, and anxiety, were linked to poor medication adherence and the adoption of an unhealthy lifestyle [26]. Another study reported a robust association between TDP and negative emotional states, as well as mild cognitive impairment, in patients with hypertension [27].

While the prevalence of TDP is approximately 21% in the general population [13], previous investigations have examined its prevalence in various medical conditions. For instance, TDP was found in 38.7% of patients with psoriasis, 44.5% of patients with multiple sclerosis, 52.8% of patients with Parkinson's disease, and 31.9% of patients with myofascial pain syndrome [14,28,29]. Regarding fibromyalgia, 3 studies in the literature have examined the prevalence of TDP. Middendrop et al reported a prevalence of 56.5% among fibromyalgia patients, Ablin et al reported a prevalence of 30%, and Garip et al noted a prevalence of 33% [30-32]. In our study, the prevalence of TDP was notably higher, at 60% in the FM group, compared with 24% in the control group. However, it is worth noting that there may be variations in the prevalence of TDP related to genetic and cultural factors between countries.

Interestingly, in a study by Garip et al that evaluated TDP in fibromyalgia patients, those with TDP exhibited higher disease severity and visual analog scale pain scores than did those without TDP. However, in our study, no significant relationship was observed between TDP and pain levels or disease severity. This discrepancy may be attributed to differences in sample size. Can and Tuman [14] found that patients with myofascial pain syndrome with TDP experience higher levels of anxiety, depression, and sleep issues, while their overall quality of life is significantly lower than in those without TDP. Therefore, they underscored the importance of assessing TDP in patients with myofascial pain syndrome to identify individuals at risk for reduced quality of life and psychiatric concerns. Demirci et al [33] linked TDP in patients with multiple sclerosis to high levels of depression, anxiety, and poorer quality of life. As a result, they emphasized the importance of evaluating TDP in patients with multiple sclerosis.

İn our study, fibromyalgia patients with TDP exhibited markedly reduced quality of life and elevated depression and anxiety scores. It is worth highlighting that we did not identify any connection between TDP and sleep disturbances. Several investigations have associated TDP with negative mood, decreased quality of life, and an unfavorable perception of one's health [14].

In a study exploring the impact of TDP on self-care practices and self-efficacy in Chinese patients with heart failure, it was observed that TDP had a negative association with the maintenance of self-care and self-efficacy [34]. Similarly, Sánchez-Díaz et al discovered that TDP was linked to mood disorders and lower quality of life in patients with chronic spontaneous urticaria, particularly in emotional and psychological domains, regardless of disease severity [35]. In the context of Parkinson's disease, TDP emerged as the second most significant factor affecting quality of life, following disease severity, and was associated with reduced quality of life scores [36]. Furthermore, a study conducted in patients with myofascial pain syndrome reported that the presence of TDP had an adverse effect on quality of life and sleep quality, while elevating levels of anxiety and depression [14].

Study Limitations

This study had several limitations. A relatively small sample size and a single-center setting may restrict generalizability. Furthermore, our cross-sectional study had some fundamental limitations. First, these types of studies cannot be used to establish causal relationships and rely solely on data from a specific point in time. Second, variability and memory errors can also limit data reliability. Lastly, observer effects and non-response issues can influence participant behavior and potentially lead to misleading outcomes. Therefore, these limitations should be considered when interpreting the results of this cross-sectional study.

Conclusions

This study has revealed a significant connection between TDP and the development of fibromyalgia. The study emphasizes that the FM group was more likely to exhibit TDP traits than was the control group. Additionally, fibromyalgia patients with TDP traits showed high levels of depression and anxiety, accompanied by a noticeable decline in overall quality of life. Recognizing TDP traits in patients with fibromyalgia and managing them through psychotherapeutic interventions can lead to the development of adaptive coping strategies. In light of the results obtained, expanding the sample size and conducting new studies can provide a clearer understanding of the relationship between fibromyalgia and TDP.

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