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Personality Traits and Fibromyalgia Syndrome

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ABSTRACT

Background and Objective: Fibromyalgia syndrome (FMS) is considered as a widespread chronic pain disorder of unknown etiology. Since personality traits can play an important role in the development of FMS, this review article was conducted in order to increase the understanding of personality traits related to FMS.

Methods: This review article was conducted by searching articles based on PRISMA guidelines for studies published from 2000 to September 2021 in authentic databases using the keywords fibromyalgia syndrome, chronic widespread pain, personality, and personality tests. The results of 30 eligible studies aimed at identifying personality traits in patients with FMS were reviewed and summarized.

Findings: According to the theoretical model used, the articles that used the TCI tool reported high traumatic avoidance and low self-regulation. High scores in hypochondriasis, hysteria and depression have been observed using the MMPI questionnaire. Moreover, other studies showed a high score in neuroticism using NEO. In this systematic review, some personality traits related to FMS were identified and explained. In other words, many patients with fibromyalgia show personality traits that are related to the mechanisms involved in FMS.

Conclusion: The findings provide evidence that personality traits can play a key role in the development and persistence of this syndrome. However, studies lack sufficient evidence to support an "FMS personality." The results expand our knowledge about the complex nature of this disorder and facilitate the effective treatment of FMS patients. Overall, these findings support the need for a comprehensive personality model to better understand FMS.

Keywords: *Fibromyalgia Syndrome, Chronic Widespread Pain, Personality, Personality Tests.*

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Introduction

Fibromyalgia syndrome (FMS), as the third most common musculoskeletal disease (1), is a chronic disease without underlying lesions with unknown causes (2-4). The prevalence of this disease in the world is estimated at 3-6% (5, 6), and more than 90% of those affected are women (7, 8). In addition to widespread muscle pain in tender points, these patients may also experience low pain tolerance, fatigue, sleep problems, anxiety and depression, stiff joints, attention and memory problems (9-12). These symptoms often occur in an unpredictable remission/recurrence cycle, which reduces the quality of life of these patients (13).

Personality is defined as a relatively stable set of behavioral, cognitive, and emotional patterns that determine a person's reaction and how he/she adapts to stimuli, external conditions, problems, and distress (14, 15). Personality can significantly affect how pain is evaluated and how to react to it (16, 17), the process of adapting to a chronic disease, the use of medicine and medical services, and adherence to treatment prescriptions (18). Moreover, personality plays an important role in the etiology of psychosomatic diseases (19). Therefore, the role of personality traits in the creation and maintenance of FMS has been the focus of researchers. In the biological-psychological model which presents the causes and pathogenesis of FMS, physiological, psychological and social factors are interacting with each other in different stages and in different ways, which shows that several paths may lead to the disease and its continuation. In this framework, FMS can be considered as the final stage of the accumulation of biological and psycho-social vulnerability factors that over time, in interaction with stress, have led to the disease (20, 21). As a psychological factor, personality can play the role of foundation and maintenance in this disease (21).

Malin et al. did not find a personality profile specific to fibromyalgia patients in their review article; however, they believe that many patients with fibromyalgia show personality traits that are related to FMS mechanisms and facilitate psychological responses to stressful situations (22). In their meta-analysis, Novo et al. examined the dimensions of the MMPI questionnaire in these patients and announced that the MMPI can distinguish female patients with fibromyalgia among healthy volunteers. Moreover, hypochondriasis, depression, hysteria and schizophrenia scales were the most reported clinical scales in the studies (23). A systematic review by Conversano et al. showed that a high level of alexithymia and Type D Personality was reported in FMS patients, but when depression was controlled, these results did not differ from the results of the control group (24). None of these studies have comprehensively investigated and explained the personality profile in these patients, so comprehensive investigations in this field are necessary to identify the psychological pathogenesis of FMS.

While personality traits play a role in the persistence or progression of the disease, due to the complexities of research in the field of personality as well as the pathology of FMS, the relationship between the two is still unclear and unknown (22). The aim of this study is to summarize the findings related to personality traits associated with FMS and explain how personality traits influence the process of this disease. This systematic review discusses the studies that investigated the personality traits of patients with FMS and by summarizing and explaining the findings, it tries to increase the current knowledge about this disorder and its complex nature.

Methods

This review article has been approved by the Research Ethics Committee of Isfahan University with code IR.UI.REC.1400.001. In this systematic review, in order to find scientific documents and evidence related to the subject, a search was done in the databases in both English and Farsi. The time period of this research

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was from 2000 to the end of September 2021. Reference lists of retrieved articles were searched by two authors independently and all potential sources were added. In all the stages of selecting the articles, the disputed cases were resolved based on discussions and opinions with other members of the research team. These articles were evaluated according to the inclusion criteria (Table 1). Then, using the PRISMA method, the articles that did not meet the necessary conditions were removed, and considering that no Persian article was found in this regard, finally 30 articles (in English) were included in the research (Figure 1).

Table 1. Search strategy and selection of articles

Description	English	Persian
Evaluated databases	PubMed, MEDLINE, EMBASE, PsychINFO, CAMBASE, Social Sciences Citation Index (SSCI), Science Direct, Scopus, the Cochrane Library data bases, Google scholar	SID, MedLib, Iranmedex, IranPsych, Civilica
keywords	personality, traits, characteristics, personality profiles, individual differences, Fibromyalgia Syndrome, FMS, widespread chronic pain, chronic diffuse pain, Fibrositis, The Minnesota Multiphasic Personality Inventory, The NEO-Five Factor Inventory, The Temperament and Character Inventory, Cloninger's model, The five-factor model of personality	Personality, traits, characteristics, personality profiles, individual differences, Fibromyalgia Syndrome, FMS, widespread chronic pain, chronic diffuse pain, Fibrositis, The Minnesota Multiphasic Personality Inventory, The NEO-Five Factor Inventory, The Temperament and Character Inventory, Cloninger's model, the five-factor model of personality
Inclusion criteria	Articles that examine personality and personality traits in fibromyalgia patients, personality assessment using questionnaires, adult age group (above 18 years old), research articles, English or Farsi articles.	
Exclusion criteria	Age group under 18 years, personality assessment using other tools or interviews, articles that have investigated other rheumatology diseases or chronic pain, articles other than Persian and English languages, lack of access to the full text.	

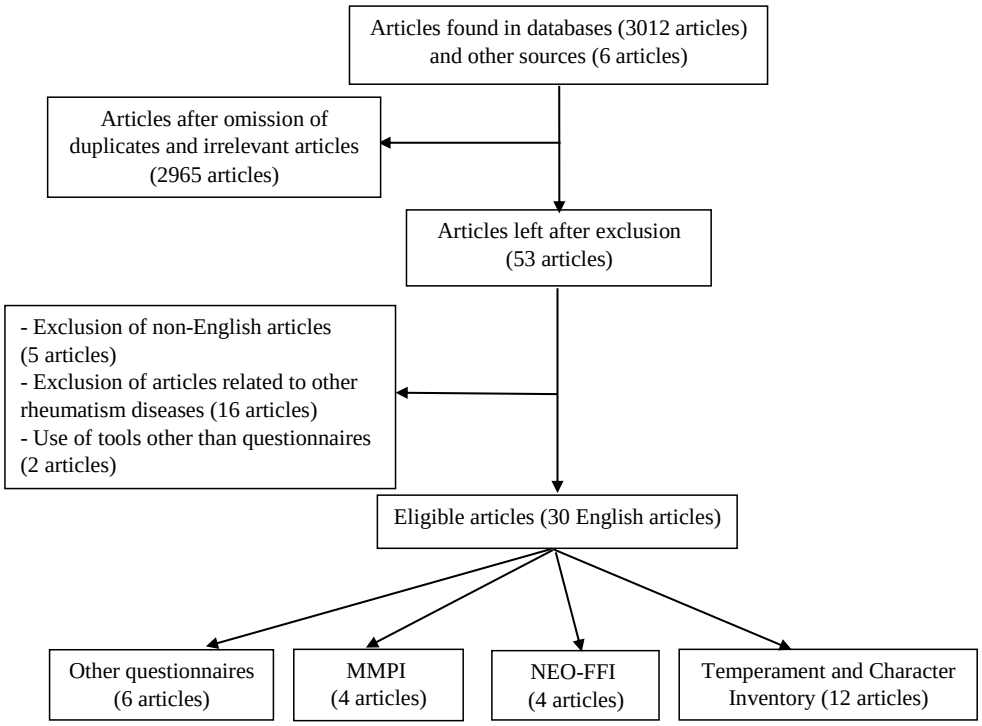

Figure 1. The process of searching and selecting articles based on the PRISMA diagram

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Results

By searching the databases (Table 1), 53 articles were extracted, and by removing the articles that did not have the necessary conditions to enter the research according to the inclusion and exclusion criteria, 30 studies were finally examined (Figure 1). The information and results of the articles included in the research are given in Table 2.

Table 2. Summary of the findings of the conducted studies

Row	writers	The place of research	Mean age	Sample size	Gender	Results in FMS patients	FMS measurement criteria	Personality assessment tool
1	Trygg et al. (25)	Belgium	46.2 years	64 people (FMS patients and patients with regional pain)	Female (100%)	Higher scores of FMS patients in hypochondriasis, depression and hysteria scales	ACR 1990 criteria	Minnesota Multiphasic Personality Inventory (MMPI)
2	Malt et al. (26)	Norway	50 years	100 people (FMS patients and control group)	Female (100%)	FMS patients score higher in neuroticism	ACR 1990 criteria	Eysenck Personality Questionnaire (EPQ)
3	Verdejo-García et al. (10)	Spain	45.8 years	72 people (FMS patients and control group)	Female (100%)	FMS patients score higher in harm avoidance	ACR 1990 criteria	The Temperament and Character Inventory-Revised (TCI-R)
4	Lundberg et al. (27)	Sweden	41.25 years	843 people (FMS patients and control group)	Female (100%)	FMS patients have higher scores in harm avoidance, persistence and self-transcendence and lower scores in autonomy	ACR 1990 criteria	The Temperament and Character Inventory-Revised (TCI-R)
5	Mazza et al. (28)	Italy	36.32 years	140 people (FMS patients and control group)	Female (59%)	FMS patients score higher in harm avoidance and lower scores in autonomy	ACR 1990 criteria	The Temperament and Character Inventory-Revised (TCI-R)
6	Johnson et al. (29)	USA	34.24 years	98 people (FMS patients and control group)	Female (27%)	Higher scores of FMS patients on hypochondriasis and hysteria scales	ACR 1990 criteria	Minnesota Multiphasic Personality Inventory-2 (MMPI-2)
7	Pérez-Pareja et al. (30)	Spain	45.81 years	114 people (FMS patients, patients with chronic pain and control group)	Female (87.7%)	Higher scores of FMS patients on all clinical scales except femininity and masculinity scales	ACR 1990 criteria	Minnesota Multiphasic Personality Inventory-2 (MMPI-2)
8	Glazer et al. (31)	Israel	45.16 years	186 people (FMS patients, people with FMS in their	Female (100%)	FMS patients score higher in harm avoidance	ACR 1990 criteria	Tridimensional Personality

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Row	writers	The place of research	Mean age	Sample size	Gender	Results in FMS patients	FMS measurement criteria	Personality assessment tool
				relatives and those without it)				Questionnaire (TPQ)
9	Martínez et al. (32)	Spain	46.54 years	74 people (FMS patients)	Female (94.5%)	Neuroticism and openness scores predict pain catastrophizing.	ACR 1990 criteria	NEO Five-Factor Inventory (NEO-FFI)
10	Santos et al. (33)	Brazil	46.33 years	69 people	Female (100%)	FMS patients have higher scores on traumatic avoidance and lower scores on cooperation and autonomy	ACR 1990 criteria	Temperament and Character Inventory (TCI)
11	Gencay-Can et al. (34)	Turkey	35.3 years	90 (FMS patients and control group)	Female (100%)	FMS patients score higher in harm avoidance and self-transcendence and lower scores in autonomy	ACR 1990 criteria	Temperament and Character Inventory (TCI)
12	Malin et al. (35)	Australia	Average not reported (20 to 35 years)	56 people (FMS patients and control group)	Female (100%)	FMS patients score higher in neuroticism	ACR 1990 criteria	The Big Five Inventory (BFI)
13	Torres et al. (36)	Spain	41.6 years	874 people (FMS patients, patients with simultaneous diagnosis of FMS and RA, chronic pain patients and drug-resistant epilepsy patients)	Female (88%)	High neuroticism scores and low extraversion scores in FMS patients. Two groups were identified: one group had higher scores in neuroticism and lower scores in openness, conscientiousness, extroversion, and conscientiousness.	ACR 1990 criteria	NEO Five-Factor Inventory-revised (NEO-FFI-R)
14	Vural et al. (37)	Turkey	37 years	136 people (FMS patients and control group)	Female (100%)	Higher scores of FMS patients on hysteria and hypochondriasis scales	ACR 1990 criteria	Minnesota Multiphasic Personality Inventory (MMPI)
15	Garcia-Fontanals et al. (38)	Spain	47.1 years	80 people (FMS patients and control group)	Female (100%)	FMS patients have higher scores in harm avoidance and lower scores in innovativeness and autonomy	ACR 1990 criteria	Temperament and Character Inventory-Revised (TCI-R)
16	de Tommaso et al. (39)	Italy	41.9 years	102 people (FMS patients with migraine without aura, migraine	Female (67%)	Low scores in extraversion in FMS patients and low scores in openness and conscientiousness in FMS	Not reported	The Big Five Inventory (BFI)

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Row	writers	The place of research	Mean age	Sample size	Gender	Results in FMS patients	FMS measurement criteria	Personality assessment tool
				without aura and healthy people)		patients with migraine without aura		
17	Gonzalez et al. (40)	Portugal	46.96 years	50 people (FMS patients)	Female (100%)	Three subgroups were identified: the first group scored above 65 in the hypochondriasis, hysteria and depression subscales. The second group scored above 65 in most clinical scales (except femininity/masculinity, social introversion and hypomania). The profile of the third group was normal.	Not reported	Minnesota Multiphasic Personality Inventory-2 (MMPI-2)
18	Montoro et al. (18)	Spain	50.77 years	157 people (FMS patients and control group)	Female (96%)	FMS patients score higher in neuroticism and psychosis	ACR 1990 criteria	Eysenck Personality Questionnaire Revised - Abbreviated (EPQR-A)
19	Ablin et al. (41)	Israel	41.74 years	204 people (patients with FMS and CFS in one group)	Female (89.8%)	FMS patients have higher scores on harm avoidance and lower scores on persistence, reward dependence, cooperation and autonomy	ACR 2010 criteria	Temperament and Character Inventory-Revised (TCI-R)
20	Leombruni et al. (42)	Italy	52.04 years	170 people (FMS patients and control group)	Female (100%)	Significant difference of FMS patients in the scales of harm avoidance, innovativeness and autonomy	ACR 2010 criteria	Temperament and Character Inventory-Revised (TCI-R)
21	Chang et al. (43)	Taiwan	52.07 years	230 people (FMS patients and patients with chronic regional pain, control group)	Female (64.3%)	Higher scores of FMS patients and chronic regional pain in the neuroticism scale and lower scores in extraversion compared to the control group.	ACR 1990 criteria	Eysenck Personality Inventory (EPI)
22	Garcia-Fontanals et al. (44)	Spain	47.1 years	80 people (FMS patients and control group)	Female (100%)	FMS patients score higher in harm avoidance	ACR 1990 criteria	Temperament and Character Inventory (TCI)
23	Bucourt et al. (3)	France	47.18 years	163 people	Female (100%)	Higher scores of FMS patients on neuroticism,	ACR 1990 criteria	The Big Five Inventory (BFI)

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Row	writers	The place of research	Mean age	Sample size	Gender	Results in FMS patients	FMS measurement criteria	Personality assessment tool
						agreeableness and openness		
24	Dogru et al. (45)	Turkey	41.2 years	155 (FMS patients and control group)	Female (100%)	Higher scores of FMS patients in harm avoidance and lack of statistical significance of autonomy scores	ACR 2010 criteria	Temperament and Character Inventory (TCI)
25	Balbaloglu et al. (46)	Turkey	40.6 years	154 (FMS patients and control group)	Female (100%)	FMS patients have higher scores on harm avoidance and lower scores on autonomy	ACR 1990 criteria	Temperament and Character Inventory (TCI)
26	Bartkowska et al. (47)	Holland	Not reported	60 people (FMS patients and control group)	Female (100%)	FMS patients score higher in agreeableness and conscientiousness	ACR 2010 criteria (2016 Revisions)	NEO Five-Factor Inventory (NEO-FFI)
27	Gonzalez et al. (48)	Portugal	45.95 years	56 people	Female (100%)	Higher scores of FMS patients in depression, hysteria, schizophrenia, mental weakness and hypochondriasis. Two subgroups of FMS patients were identified. In one of the subgroups, a clinically significant increase was observed in the scales of introversion and negative affectivity.	Not reported	Minnesota Multiphasic Personality Inventory-2 (MMPI-2)
28	Gonzalez et al. (49)	Portugal	46.3 years	70 people (FMS patients and RA patients)	Female (100%)	Higher scores of FMS patients in depression, hysteria, schizophrenia and hypochondriasis scales	Not reported	Minnesota Multiphasic Personality Inventory-2 (MMPI-2)
29	Seto et al. (15)	USA	52 years	92 people	Female (95%)	Higher scores of FMS patients on neuroticism scale	ACR 1990 criteria and ACR 2010 criteria	NEO Five-Factor Inventory-3 (NEO-FFI-3)
30	Berkol et al. (50)	Turkey	34.38 years	24 people (FMS patient)	Female (100%)	FMS patients high scores (scores above 70) in hysteria	ACR 1990 criteria	Minnesota Multiphasic Personality Inventory (MMPI)

MMPI= The Minnesota Multiphasic Personality Inventory, EPQ-N= The neuroticism scale of the Eysenck Personality Questionnaire, TCI-R= The Temperament and Character Inventory-Revised, TPQ= The Tridimensional Personality Questionnaire, NEO-FFI= The NEO Five-Factor Inventory, BFI= The Big Five Inventory, EPQR-A= The Eysenck Personality Questionnaire Revised-Abbreviated, EPI= Eysenck Personality Inventory.

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Below are the personality questionnaires and diagnostic criteria used in the articles:

Questionnaires used in the studies: In the reviewed articles, the Temperament and Character Inventory (TCI) (12 articles), Minnesota Multiphasic Personality Inventory (MMPI) (8 articles) and NEO Five-Factor Inventory (NEO-FFI) (4 articles) have been used more than others questionnaires, which are briefly introduced below:

Temperament and Character Inventory (TCI): states that the causal structure of personality is based on biological mechanisms and environmental influences (51). In this questionnaire, temperament as the emotional core of personality is heritable and relatively stable throughout life and has five dimensions (27). Character, the cognitive core of personality, is influenced by learning and reaches maturity by late adulthood and includes three dimensions (27).

The Minnesota Multiphasic Personality Inventory (MMPI): has been widely used in health and chronic disease contexts as well as FMS patients (49), which consists of 566 true/false questions that examine personality using 10 personality scales and 3 validation scales (37).

NEO Five-Factor Inventory (NEO-FFI): It assesses the Big Five personality traits using 60 questions (15). The Big Five personality theory is a well-known model describing five personality traits that are considered stable throughout adult life: Openness, Conscientiousness, Extraversion, Agreeableness, Neuroticism (52).

Diagnostic criteria in fibromyalgia: In 1990, the American College of Rheumatology (ACR) described extensive diagnostic criteria (53). These criteria define FMS by the presence of widespread pain for a duration of at least three months and tenderness in more than 11 of 18 specific anatomical points (when a pressure of 4 kg/cm is applied) (23,54). In 2010, the ACR endorsed the "Fibromyalgia Preliminary Diagnostic Criteria and Symptom Severity Scale" as an alternative method of diagnosis (55). These criteria include pain in 7 out of 18 areas. Moreover, in this scale, cognitive symptoms, fatigue and sleep disorders are scored in each one (24, 54). Among the articles examined in this research, twenty-one articles used the ACR 1990 criteria, five articles used the ACR 2010 criteria, and four articles did not report their criteria.

In summarizing the articles reviewed in this study, it was found that some personality traits are common in patients with FMS. High scores in harm avoidance and low scores in self-directedness were shown by TCI, while high score in neuroticism was shown by NEO. Moreover, common features reported using the MMPI include hypochondriasis, hysteria, and severe depression. Below is an explanation of the mechanism of action of each of these personality traits in the FMS disease process:

Harm avoidance and self-directedness: Harm avoidance is a heritable trait that shows a person's tendency to inhibit behaviors based on pessimistic concern or to avoid punishment (56). A high score in harm avoidance refers to the tendency to fear, pessimism, sensitivity to criticism and the need for high reassurance (51). People with a high harm avoidance score anticipate harm even in supportive conditions (57) and easily acquire conditioned avoidance responses to disturbing stimuli. Thus, they are prone to fear (58), so it can be considered as a personality dimension that underlies fear-avoidance behavior (59). Contemporary models of fear and avoidance of chronic musculoskeletal pain suggest fear and avoidance of pain as the main factors in the transition from acute pain to chronic pain. After the acute phase of pain has passed, some patients tend to evaluate their pain in a dysfunctional way, these people describe the pain as threatening and to some extent catastrophic, and they are wary of their bodily sensations. According to them, pain is a physical feeling that means injury with the prediction of disability. As a result, the mistaken expectation that pain will increase after exposure, patients engage in fear-avoidance behaviors to reduce fear. Therefore, patients are reluctant to perform daily activities that may be associated with the risk of causing pain. Such avoidance behaviors in turn confirm catastrophic perceptions of pain and perpetuate pain, pain-related fear, and

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maladaptive avoidance behaviors. After that, an endless loop of fear and avoidance begins with the interaction between fear-avoidance and powerlessness beliefs (34, 38-40). People with low self-directedness can be called blameworthy, destructive, fragile, and lacking internal control sources, which prevent them from setting and achieving meaningful goals, which manifests with low motivation and difficulty in adaptive coping. In addition, they have low self-efficacy, so they cannot solve problems in stressful situations (51, 56). For this reason, people with FMS who score lower in self-directedness may have difficulty managing difficult situations, stopping rumination, overcoming obstacles, and engaging in more active coping behaviors. In sum, high harm avoidance and low self-directedness indicate a personality vulnerability that significantly leads to the patient's inability to cope with stressful situations, such as chronic illness (38, 42, 60).

Neuroticism: This personality trait is included in Eysenck's personality model and McCrae and Costa's five-factor model (61). Neuroticism is defined as the tendency to experience frequent and intense negative emotions in response to various sources of stress (62). Neuroticism increases vulnerability to mental and physical illnesses by reducing self-efficacy, self-awareness and social support. That's because people who have higher neuroticism have less ability to reduce and relieve problematic events and experiences (63, 64). Furthermore, neuroticism is associated with a passive way of coping with pain, higher perceived pain intensity, and increased reaction to pain (18, 65). Evidence suggests that neuroticism can affect the cognitive processing of the meaning of pain in people's lives and the extent of their suffering (66).

Some researchers believe that there are several pathways through which neuroticism may contribute to an increased risk of persistent and chronic pain: The first pathway may be through increased sensitivity to pain. People report different perceptions of pain even when the stimulus is held constant, and individuals with high neuroticism are more sensitive to pain, which makes them more vulnerable to pain (67). In the second pathway, the neurotic personality can be associated with pain through health-related behaviors. There is considerable evidence that neuroticism is associated with risky health behaviors (such as physical inactivity and smoking) that increase pain risk (67-69). In the third pathway, neuroticism is associated with greater likelihood of experiencing pain through its association with mood; negative mood predicts the increase of pain over time in patients with chronic pain, and neuroticism is one of the emotional characteristics that has a strong relationship with negative mood (67). It is also possible that neuroticism is associated with depression due to a common genetic basis (65) or potential psychological mechanisms that have been proposed regarding the effect of neuroticism on depression (such as psychological flexibility, emotional regulation, and rumination), may play an effective role (70-72). In the fourth pathway, the relationship between neuroticism and the components of the fear-avoidance model in chronic pain is focused on. This model suggests that personality vulnerabilities may make certain individuals more vulnerable to threat, thus resulting in greater pain-related fear, avoidance, and disability, pain catastrophizing, and fear of re-injury from movement (51, 65, 73).

There is a lot of evidence that higher neuroticism is associated with reduced self-efficacy, self-awareness and social support, severity of fibromyalgia symptoms, anxiety, depression, stress (15), high level of chronic pain and pain catastrophizing in fibromyalgia patients (3, 32), pain-related suffering, pain sensitivity and neuropathic pain (74). When neuroticism levels were conventionally classified into low, moderate, and high levels, there was generally a significant association between moderate and high levels of neuroticism with FMS symptoms compared to low levels (35).

Hysteria, Hypochondriasis, and depression: Research has shown that the FMS group gets scores higher than other chronic pain groups in at least four clinical scales in the Minnesota Multiphasic Personality Inventory (MMPI) (25). The evaluation of the personality traits of FMS patients using MMPI has shown an increase in the parameters of hypochondriasis, depression and hysteria. Individuals with high scores in

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hysteria use suppression and denial to manage conflict and tend to develop physical symptoms when under severe stress (25). Individuals who score high on hypochondriasis have many vague physical complaints and are described as unhappy, complaining, and attention-seeking (25). In addition, increases in hypochondriasis and hysteria scales typically indicate tension, emotional restriction, and general physical distress typically observed in chronic pain patients (30). The depression parameter shows discomfort, suffering and dissatisfaction with the individual life situation, worry, apathy and lethargy, lack of interest and low self-esteem and reflects the presence of symptoms of physicalized depression, boredom, distress, physical discomfort and vegetative symptoms (30). If in the MMPI profile, the score of depression is slightly lower than that of hypochondriasis and hysteria, a V-shaped visual pattern named the conversion V pattern or the neurotic triad appears (30). These results have been interpreted as supporting the psychodynamic formulation of pain, whereby depressed individuals are unable to express their feelings, therefore, turning them into physical symptoms (75, 76). Of course, the question of whether the "conversion V" personality pattern in the MMPI is common in all patients with chronic pain or is only present in some sub-groups of the personality type is still raised; it seems that more than one personality type exists in patients suffering from chronic pain (51).

Another noteworthy point is that FMS patients also score high on the F, Fb, and F(p) validation scales; high scores on the F scale can be due to maladaptive patterns, the presence of real psychopathology, or impairment. The raw F score of fibromyalgia patients is such that they are likely to respond to the questionnaire by over-reporting or exaggerating symptoms, although there are no additional data (whether patients are involved in litigation or seeking disability compensation, etc.) to consider potential biases (patients with potential bias were excluded from the study). The Fb scale should be interpreted in the same direction as the F scale, and exaggeration of psychopathology or malingering can only be interpreted when both F and Fb are high. The F(p) index is designed as an additional measure to accurately detect over- or under-reporting responses. Overall, there appear to be two different response styles among patients with fibromyalgia: a) an exaggerated response style and b) a presumptive response style of pretending or malingering. In this regard, high-range F(p) is likely to be related to individuals who seek social/family reinforcement and support rather than economic reward to maintain the chronic patient role, chronic pain behaviors, and avoidance of daily activities and tasks (30). However, some authors point out the risk of malingering because FMS disease is not based on a specific body organ, which makes it difficult to measure pain and disability (30, 37). It seems that the main feature in differentiating fibromyalgia patients from other patients with pain may be in the validation scales, especially the F, Fb and F(p) scales, a point that has received little attention in the research literature (30).

On the other hand, some studies indicate that patients with FMS are not a homogeneous group and identifying different subgroups with different clinical characteristics in FMS disease can help to better describe fibromyalgia and treat this disease for each subgroup (1, 36).

In general, conducting more research in this regard and identifying subgroups can be important in the treatment process. Currently, only five articles have mentioned the existence of subgroups (27,36, 42, 49, 77).

Discussion

In general, according to the findings of this systematic review, it was determined that some personality traits are seen in patients with FMS. Of course, the evidence to conclude that "there is a special personality profile in FMS patients" is insufficient. In summary, there is evidence to suggest a relationship between personality traits and FMS. Affected individuals may show relatively higher or lower levels of certain

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personality traits compared to healthy individuals. As mentioned, some researches have indicated the existence of subgroups of these patients, which makes the assumption that these patients are a heterogeneous group in terms of personality and psychological profile.

Personality traits in patients with fibromyalgia have been investigated in several studies, but the literature on this topic provides mixed results. The differences in studies may have several reasons: First, the use of different personality models to measure and explain the findings can cause differences in the results (24, 35). Second, differences in the population studied may lead to these differences in patients' personality profiles (28). Third, in most of the correlation analysis results, important modulating variables in the field of FMS disease (such as pain level and mood) are not considered (52). It should also be noted that positive psychological factors such as optimism, self-efficacy, social support, etc. play an important role in adapting and reducing the severity of symptoms (18, 78), while little attention has been paid to these factors. Therefore, in summarizing the results, these points should be considered.

Among the limitations of this research, we can mention some inclusion criteria such as language (Persian and English) and time frame (2000-2021). In addition, most of the studies included female participants and therefore no gender difference was controlled. Although 90% of patients with this disease are women, it would be useful to pay attention to the gender difference in future research. Also, questionnaire was used to examine personality, which should be noted that there are limitations in personality measurement scales such as the length of the questionnaire, bias, intercultural issues, and language-related considerations (22). On the other hand, it should be noted that the studies reviewed in this article have been cross-sectional. Therefore, using a comprehensive model of personality, longitudinal studies with controlled conditions are needed to better understand the specific personality traits associated with fibromyalgia.

In general, the fact that which personality dimensions, as one of the important psychological characteristics, can positively or negatively affect the clinical status and therapeutic response of FMS patients, increases the current knowledge about this disorder and its complex nature. This research suggests that there should be a comprehensive look at the personality of FMS patients, the relationships between different personality traits should be investigated and not just limited to certain aspects of it. Therefore, more investigations in this area are necessary.

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