

Attachment Styles and Theory of Mind Functions in Patients with Fibromyalgia Syndrome

Ferhat Ege¹ and Funda Çiçek Ege²

¹ Department of Algology, Hatay Training and Research Hospital, Hatay, Turkey

² Department of Psychiatry, Hatay Training and Research Hospital, Hatay, Turkey

ABSTRACT

The primary objective of this study was to determine the adult attachment styles that play a role in the onset and continuation of chronic pain in fibromyalgia syndrome (FMS) patients, and to evaluate the relationship between the dimensions of adult attachment and depression. The secondary objective of this study was to determine whether social interaction and assessment of emotions via face expressions are impaired in FMS patients and to evaluate the relationship between said impairment, if any, with depression. The patient group consisted of 65 individuals diagnosed with FM in accordance with the American College of Rheumatology criteria published in 2010 and 2016. The control group consisted of 70 volunteers with sociodemographic characteristics that matched those of the patient group. A sociodemographic data form, the Reading the Mind in the Eyes Test (RMET), Beck's Depression Inventory (BDI), and the Experiences in Close Relationships (ECR) Scale were used to collect the research data. No statistically significant difference was found between the patient and control groups in terms of sociodemographic characteristics, that is, gender, place of residence, educational level, marital status, and occupation. However, there were significant differences between the patient and control groups in terms of both attachment and theory of mind (ToM) functions. FM patients reported anxious and avoidant attachment more than the control subjects. Categorically, the fearful attachment style was more prominent. A weak correlation, albeit not statistically significant, was observed between ToM functions and attachment styles and depression in both the patient and control groups. The findings of this study related to attachment and ToM indicate that developmental factors may play a role in the etiology of FMS. In this context, a combined approach that also includes psychiatric treatment methods may prove more effective in the treatment of FM patients. Accordingly, assessing the mental profiles and attachment styles of FMS patients jointly with psychiatrists may strengthen the weak relations of these patients with their environment and the physician and create a positive effect on their self-perception, benefiting the patient's follow-up and treatment processes.

KEYWORDS

attachment
fibromyalgia
mentalizing

INTRODUCTION

Fibromyalgia syndrome (FMS) is a chronic pain syndrome characterized by widespread muscle pain, fatigue, and sleep disturbances. FMS occurs in about 2% of adults and is more common in females than in males (Degotardi et al., 2006). In Turkey, approximately 100,000 people are diagnosed with FMS every year (Gur et al., 2006). The etiopathogenesis of FMS includes changes in the biochemistry of the central nervous system, neuroendocrine dysfunction, sleep disorders, psychological dysfunctions, pain modulation disorder, immunological factors, and genetic factors (Çapaci & Hepgüler, 1998). The complex interactions between these factors play a crucial role in the etiology of FMS. Among the psychological factors, mood disorders and anxiety disorders are widely (13-64%) reported in FMS patients. Additionally, it has been reported that depressive disorders are the most common (20-80%) psychiatric disorders accompanying FMS (Fietta et al., 2007).

Attachment is characterized by the search for intimacy in the relationship that develops between the child and the caregiver, starting from the first years of life. Attachment theory was put forward by John Bowlby based on his work that began in the 1950s and was theorized in 1969. Four attachment styles have been defined in adults: secure, fearful, dismissive, and preoccupied (Kesebir et al., 2011). Individuals with the secure attachment style can remain autonomous and easily form intimacy with others. Individuals with the preoccupied attachment style feel anxious in their close relationships and constantly need to be comforted and affirmed. Individuals with the dismissive attachment style, on the other hand, avoid close relationships with others in order to maintain their autonomy and independence. Lastly, individuals with the fearful attach-

Corresponding author: Ferhat Ege, Department of Algology, Hatay Training and Research Hospital, Hatay, Turkey.

E-mail: dr.ege_ferhat@hotmail.com

ment style avoid close relationships due to their high levels of anxiety about possible abandonment and feeling of loss in close relationships, and in order to avoid getting hurt (Bartholomew & Horowitz, 1991).

The results of the studies available in the literature suggest that adult attachment styles are associated with pain-related difficulties (MacDonald & Kingsbury, 2006; Meredith et al., 2006). In a recent study, it was found that FMS patients reported the insecure attachment styles much more frequently, both in the avoidant and anxious dimensions, compared to healthy control subjects (Peñacoba et al., 2018). Another study investigated whether attachment styles are determinative in coping with difficulties in social life and found that female FMS patients with anxious attachment style perceived their situation as more catastrophic on days when they had more pain than other days (Kratz et al., 2012). In a study in which female FMS patients were compared with healthy control subjects in terms of attachment styles, pain severity, and emotional variables, it was concluded that FMS patients had higher scores than healthy control subjects, especially in insecure attachment parameters such as low self-confidence, high need for approval, and fear of rejection (Peñacoba et al., 2018). On the other hand, it was found that they felt more uncomfortable in establishing intimacy despite having higher emotional self-efficacy levels. The low attachment scores related to affective trust reported in these findings, that is, feeling comfortable in relationships, can be attributed to having problems in expressing emotions.

The attachment-diathesis model of chronic pain (ADMPC) demonstrates how insecure attachment can affect the negative outcomes of the chronic pain state, particularly in maladaptive cognitive appraisal conditions such as low-self-perception (Meredith et al., 2008). Considering that pain is aversive and may pose a threat to general well-being, attachment processes may be activated by the experience of pain and affect the individual's response to pain. Studies showed that insecure attachment is associated with chronic widespread pain, pain-related fear and hypervigilance, increased levels of emotional distress and catastrophizing, and low self-efficacy in coping with pain, in support of the ADMPC model (Davies et al., 2009; McWilliams & Holmberg 2010).

Theory of mind (ToM) is defined as the ability to think about the minds of other people by making sense of their beliefs and behaviors (Green et al., 2015). ToM was first introduced by Premack and Woodruff (1978). The Reading the Mind in the Eyes Test (RMET) is the gold standard for assessing the theory of mind. The individuals who are administered this test are shown face photographs that contain the eyes and are asked to choose the word that best describes what the person in the photograph is thinking or feeling (Baron-Cohen et al., 2001). High levels of emotional stress (depression, anxiety, alexithymia) in FMS patients and the detection of functional and structural changes in the brain areas related to ToM and emotional processes reveal the necessity of examining ToM functions in FMS patients (Burgmer et al., 2009; Lee et al., 2013). As a matter of fact, the RMET scores of FMS patients were reported to be significantly lower than those of control subjects (Di Tella et al., 2015; Özsoy & Okan, 2018). ToM functions enable the individual to empathize and play a central role in ensuring successful social communication and interaction.

In view of the above, the primary objective of this study was to determine the attachment styles that play a significant role in the onset and continuation of chronic pain in fibromyalgia patients and to evaluate the relationship between the dimensions of adult attachment and depression. Additionally, the secondary objective of this study was to determine whether social interaction and assessment of emotions via face expressions are impaired in fibromyalgia patients and to evaluate the relationship between the said impairment, if any, with depression.

MATERIALS AND METHODS

The patient group consisted of 65 individuals between 18 and 70 years old who were diagnosed clinically with FMS in accordance with the American College of Rheumatology (ACR) criteria published in 2010 and 2016 (Wolfe et al., 2016). The control group consisted of 70 volunteers with sociodemographic characteristics that matched those of the patient group. Those who had severe visual impairment, loss of consciousness (history of head trauma accompanied by cranial surgery, were diagnosed with epilepsy and/or a neurological disease, had a history of electroconvulsive therapy), did not graduate from elementary school, those with any chronic pain conditions other than FMS, and those with clinically determined mental retardation were excluded from the study.

The patient group was comprised of patients diagnosed with FMS in the Hatay training and research hospital algology department between November 2020 and June 2021. The control group was comprised of the patients who applied to the algology clinic, relatives of these patients, and the hospital staff, on the condition that they have met the inclusion criteria of the research. Written informed consent was obtained from each participant included in the study. The study protocol was approved by the Hatay training and research hospital institutional ethics committee (2020-90-2020/08). The study was conducted in accordance with the principles of the Declaration of Helsinki. Participants completed the forms, scales, and inventories which they were administered to collect the research data under the supervision of a physician.

Data Collection Tools

A sociodemographic data form, the Reading the Mind in the Eyes Test (RMET), Beck's Depression Inventory (BDI), and the Experiences in Close Relationships (ECR) Scale were used to collect the data.

SOCIODEMOGRAPHIC DATA FORM

Participants' data about gender, age, educational level, occupation, psychological trauma history, and marital status were obtained using the sociodemographic data form.

READING THE MIND IN THE EYES TEST (RMET)

The RMET consists of 36 items. In each item, participants are asked to choose the answer that best describes the mental state of the person in the photograph from among the four choices. The choices are constructed based on complex emotions or intentions. For this reason, the RMET is accepted as an indicator of ToM abilities and not of emotion recognition abilities.

BECK'S DEPRESSION INVENTORY (BDI)

The BDI consists of 21 items, each of which is assigned a score between 0 and 3. Thus the total score ranges between 0-63. Individuals who receive a total score between 0-13 are considered minimally, 14-19 as mildly, 20-28 as moderately, and 29-63 as severely depressive.

EXPERIENCES IN CLOSE RELATIONSHIPS (ECR) SCALE

The ECR was developed by Brennan et al. (1998) to measure anxiety and avoidance, which are deemed as the two basic dimensions of attachment. The ECR consists of 36 items, 18 of which assess the anxiety dimension and the remaining 18 assess the avoidance dimension. Each item is answered on a Likert-type scale from 1 to 7. The total score and its two subscales are analyzed using correlation and regression analyses (Brennan et al., 1998). The scale, which can also be used categorically, was adapted into Turkish (Sumer & Gungor, 1999). Brennan et al. suggested that categorical measurements can be made by performing a cluster analysis on the two dimensions of the four attachment styles assessed by the scale and that classifications can be made based on the quadruple attachment model. Accordingly, those who score relatively low on both subscales are considered to have a secure attachment style, those who score high on both subscales are considered to have a fearful attachment style, those who score low on the avoidance subscale and high on the anxiety subscale are considered to have a preoccupied attachment style, and those who score high on avoidance subscale and low on anxiety subscale are considered to have a dismissive attachment style (Sumer & Gungor, 1999).

Statistical Analysis

SPSS 20.0 software was used to analyze the data. Continuous variables were expressed in terms of mean, standard deviations, and minimum and maximum values, whereas categorical variables were expressed in terms of frequency and percentage values. The conformity of continuous variables to the normal distribution was tested using the Shapiro-Wilk test. Continuous variables that satisfied the parametric test assumptions

for intergroup comparisons were tested with the Student's *t*-test. Pearson's chi-squared test was used in the group comparisons of categorical variables, whereas Fisher's exact test was used in cases when the conditions of the chi-squared test were not met. Spearman's correlation was used for the correlation analysis between continuous variables that were determined not to have conformed to the normal distribution.

Comparisons with a probability (*p*) value of < .05 were considered to indicate statistical significance.

RESULTS

A total of 135 participants, 65 FMS patients, and 70 control subjects, were included in the study. No significant differences were found between the patient and control groups in terms of gender, place of residence, educational and marital status, and occupation (*p* > .05, see Table 1).

The mean BDI scores in the patient and control groups were found to be 9.74 ± 5.57 and 4.91 ± 3.29 , respectively, which indicated a highly statistically significant difference between the groups (*p* < .001, see Table 2). The mean ECR anxiety scores in the patient and control groups were found to be 69.07 ± 12.97 and 54.68 ± 18.78 , respectively. This finding also indicated a highly statistically significant difference between the groups (*p* < .001, see Table 2).

In addition, a weak, though not statistically significant correlation was found between the clinical scales within both the patient and control groups (see Tables 3 and 4).

An analysis of the ECR scores revealed that 14 (21.5%) FMS patients had a secure, 26 (40%) had a fearful, 10 (15.3%) had a dismissive, and 15 (23.07%) had a preoccupied attachment style, whereas 31 (44.2%) control subjects had a secure, 16 (22.8%) had a fearful, 14 (20%) had a dismissive, and 9 (12.8%) had a preoccupied attachment style. The distribution of the ECR subscale scores by the group revealed a statistically significant difference between the patient and control groups (*p* < .01). Further statistical analyses revealed that the fearful attachment

TABLE 1.
Demographic and Clinical Characteristics of The Study Participants

Demographic and clinical variables	Demographic and clinical characteristics	<i>n</i> = 135	Patient group <i>n</i> = 65	Control group <i>n</i> = 70	<i>p</i>
Age			35.42±9.82	34.3±10.12	.515
Gender	Male	41	16(24.6%)	25(35.7%)	.225
	Female	94	49(75.4%)	45(69.6%)	
Marital status	Married	104	54(83.1%)	50(71.4%)	.161
	Single	31	11(16.9%)	20(28.6%)	
Educational status	Elementary school degree	74	40(61.5%)	34(48.6%)	.180
	A degree higher than elementary school degree	61	25(38.5%)	36(51.4%)	
Trauma history	Yes	92	60(92.3%)	32(45.7%)	.0001
	No	43	5(7.3%)	38(54.3%)	
Place of residence	Rural	65	31(47.7%)	34(48.6%)	.919
	Urban	70	34(52.3%)	36(51.4%)	
Occupational status	Housewife/unemployed	66	32(49.2%)	34(48.6%)	.260
	Blue-collar worker	55	29(44.6%)	26(37.1%)	
	White-collar worker	14	4(6.2%)	10(14.3%)	

TABLE 2.

Intergroup Comparison of Clinical Assessment Method Scores

Clinical assessment methods	Patient group <i>n</i> = 65	Control group <i>n</i> = 70	<i>p</i>
BDI	9.74±5.57	4.91±3.29	.001
ECR Anxiety	69.07 ±12.97	54.68 ±18.78	.001
ECR Avoidance	62.36 ±16.94	53.34 ±16.86	.002
RMET	17.91 ±2.42	23.83 ±2.02	.001

Note. BDI = Beck Depression Inventory, ECR = Experiences in Close Relationships Scale, RMET = Reading the Mind in the Eyes Test.

TABLE 3.

Correlation Analysis of Patient Scores

Clinical assessment methods		BDI	ECR Anxiety	ECR Avoidance	RMET
BDI	<i>r</i>	1			
ECR Anxiety	<i>r</i>	.195	1		
ECR Avoidance	<i>r</i>	-.039	.137	1	
RMET	<i>r</i>	-.218	-.192	.014	1

Note. BDI = Beck Depression Inventory, ECR = Experiences in Close Relationships Scale, RMET = Reading the Mind in the Eyes Test.

TABLE 4.

Correlation Analysis of Control Scores

Clinical assessment methods		BDI	ECR Anxiety	ECR Avoidance	RMET
BDI	<i>r</i>	1			
ECR Anxiety	<i>r</i>	.177	1		
ECR Avoidance	<i>r</i>	.165	-.042	1	
RMET	<i>r</i>	-.116	.312	.003	1

Note. BDI = Beck Depression Inventory, ECR = Experiences in Close Relationships Scale, RMET = Reading the Mind in the Eyes Test.

TABLE 5.

Four-Dimensional Analysis of the ECR Scores

Adult attachment styles	Patient group		Control group		<i>p</i>
	<i>n</i>	%	<i>n</i>	%	
Secure	14	21.5	31	44.2	.001
Fearful-Avoidant	26	40	16	22.8	.001
Dismissive-Avoidant	10	15.3	14	20	.001
Anxious-Preoccupied	15	23.07	9	12.8	.001

ment style was more common in the patient group whereas the secure attachment style was more frequent in the control group (see Table 5).

DISCUSSION

The results of the current study revealed significant differences between the patient and control groups in terms of both attachment styles and ToM functions.

The RMET scores of the FMS patients were reported to be significantly lower compared to the control subjects in several studies in which ToM functions were investigated (De Oca et al., 1998; Di Tella et al., 2015; Özsoy & Okan, 2018; Weiß et al., 2013). Another study of ToM functions of patients with mood disorders showed that depression negatively affects ToM skills. In parallel, in a study by Weiß et al. (2013), it was concluded that ToM skills were impaired in the FMS group and that pain intensity, alexithymia, depression, and anxiety were inversely correlated with ToM skills (Weiß et al., 2013). Similarly, in the current study, a highly statistically significant difference was found between the FMS patients' and control subjects' scores on the Turkish version of the RMET. Additionally, FMS patients' RMET scores were found to be low, whereas their BDI scores were found to be high. In other words, the rate of wrong answers given by FMS patients in the RMET test was high. The ability to identify and interpret facial expressions and associate them with emotions is essential in human communication and social interaction (Ekman & Friesen, 1971). Distinguishing emotions from facial expressions has been the focus of a number of psychological studies (Adolphs, 2002; Bennett & Hacker, 2005). There are controversial findings in the literature on the measurement of the emotional component of ToM skills. In a meta-analysis of 22 studies, it was concluded that the ability to recognize emotions based on facial expressions is affected by depression. Nevertheless, in 5 of these 22 studies, no statistically significant difference had been found between the individuals with major depressive disorder and healthy control subjects in terms of the ability to recognize emotions based on face expressions (Dalili et al., 2015). It was reported that depression, anxiety, and somatoform disorders were frequently encountered in FMS patients (McBeth & Silman, 2001). Additionally, in another study, it was reported that depressive disorders are the most common psychiatric disorders accompanying FMS (Fietta et al., 2007). However, there is no information in these studies as to whether FMS or depression developed first. In comparison, in the current study, the patient group's mean RMET score was significantly lower, whereas the mean BDI score was significantly higher.

Correlation analysis revealed a significant inverse correlation between RMET and BDI scores in the patient group, but not in the control group. This result suggests that FMS affects ToM functions and that FMS is a stress factor for ToM dysfunction. Weak ToM skills cause social interaction problems, leading problems in interpersonal relationships and difficulty in expressing feelings. Both of these conditions negatively affect chronic pain and its management, causing an increase in the symptoms experienced by FMS patients (Thieme et al., 2006). In a study in which the relationship between chronic pelvic pain and ToM

capacity was investigated, patients were found to have low ToM capacities (Leithner-Dziubas et al., 2010). Based on the findings of the current study and the results of other relevant studies, it seems that FMS may affect ToM functionality and hence, patients with FMS should be treated in cooperation with psychiatrists. Accordingly, the use of a multidisciplinary approach in the treatment of FMS may strengthen the weak interpersonal relationships with FMS patients, have a positive effect on their patients' self-perception, and prove to be beneficial in their follow-up and treatment.

Human relationships are significantly affected by attachment styles. An individual's attachment style determines what they perceive and expect from themselves or others. Accordingly, negative attachment styles affect the strategies used to cope with the events regarding themselves and/or their environment, and often lead to poor management of these situations, resulting in conflict and stress. Many studies have been carried out on the relationships between FMS and stress, coping strategies, and interpersonal relationships based on attachment theory (Baron-Cohen et al., 2001; Govender et al., 2009; Palomino et al., 2007; Vlaeyen et al., 2007). Most of these studies revealed that insecure attachment styles are the most common attachment styles in FMS patients (Hallberg & Carlsson, 1998; Inanc et al., 2019; Peñacoba et al., 2018). However, in one study, the secure attachment style was found to be more common among FMS patients, yet this finding was interpreted as an exception and attributed to the small sample size (Govender et al., 2009). The relationship between attachment styles of FMS patients was investigated in a sibling study where the control group and the patient group were closely matched. Consequentially, a trend was detected between FMS patients and healthy siblings, but no significant difference was found between the groups in terms of attachment styles (Silva, 2011). In comparison, in the current study, 21.5% of the FMS patients were found to have a secure attachment style, compared to the 78.5% of the FMS patients with insecure attachment styles. Additionally, the mean ECR avoidance and anxiety subscale scores of the FMS patients were found to be significantly higher than those of the control subjects. The fearful attachment style was more frequent among FMS patients and the secure attachment style was more frequent among the control subjects. In a 2019 study, the mean ECR anxiety and avoidance subscale scores of FMS patients were found to be higher than those of healthy control subjects (Hallberg & Carlsson, 1998). Similarly, in another study, a statistically significantly higher number of FMS patients was found to have insecure attachment styles, both in the avoidance and anxious dimensions, compared to healthy control subjects (Peñacoba et al., 2018). In parallel, in another study, a significantly higher number of FMS patients was found to have dismissive attachment styles compared to the control group. Nevertheless, in the same study, no statistically significant difference was found between the patient and control groups in the frequency of the anxious attachment style (Ayhan et al., 2021).

Attachment style may be activated by the experience of pain and may influence the individual's response to pain as a result. As a matter of fact, negative perception of pain was found to be associated with insecure attachment styles in patients with chronic pain. The increase

in psychological distress as a result of the negative perception of pain makes it more difficult to cope with it (Ciechanowski et al., 2003). In parallel, it has been suggested that the insecure attachment styles observed in FMS patients give rise to their inability to cope with chronic pain (Hallberg & Carlsson, 1998). In a study of 2509 participants, insecure attachment styles were found to be more frequent in the group with chronic pain compared to the group without pain. Additionally, in the group with chronic pain, the fearful attachment style was the most common (McWilliams & Holmberg, 2010). In comparison, in the current study, the number of FMS patients with high anxiety and avoidance ECR scores, and thus with the fearful attachment style, was significantly higher compared to the control group. Negative perception of both self and others was also prominent in these patients. This situation may worsen the experience of pain, thereby predisposing to the development of the disease, since the inability to cope with pain appropriately leads to worsening and chronicity of the problem. Along these lines, it has been reported in many studies that individuals with insecure attachment styles have more somatic complaints (Ciechanowski et al., 2003). Fearful and anxious insecure attachment styles, two of the insecure attachment styles, were associated with somatization (Wearden et al., 2005). In a study conducted with FMS and/or osteoarthritis patients, it was found that the anxious attachment style was associated with catastrophizing pain, and that the dismissive attachment style was associated with both catastrophizing pain and pain severity (Kratz et al., 2012).

Taken together with the above-mentioned literature, the finding of the current study that both the mean ECR anxiety and avoidance scores of FMS patients were high suggests that psychological factors play a role in the etiology of this disease. Anxious patients are expected to seek medical care earlier and more successfully. However, such patients may also attempt to sabotage the treatment after an unsatisfactory initial examination (Ekman & Friesen, 1971; Mikail et al., 1998). High anxiety levels lead to persistent care-seeking in such patients and they negatively affect the clinician's attitude towards these patients. On the other hand, high avoidance levels lead to distrust in interactions, further complicating the clinician's work.

The relationships between attachment and psychopathology have generally been examined in relational studies, regardless of the theoretical connections between the two (Dozier et al., 1999; Mikulincer & Shaver, 2007; Shorey & Snyder, 2006). Consequentially, those with insecure attachment styles were found to be more prone to psychopathology. These results were reproduced successfully in samples of patients or healthy subjects. For example, many studies have shown that the preoccupied attachment style is associated with depression susceptibility due to the associated negative self-image (low self-esteem) and need for approval from others (Simpson et al., 2003). In studies conducted with psychiatric diagnosis groups, it was found that those with preoccupied attachment styles were more likely to be diagnosed with depression or show depression symptoms than those with secure or dismissive attachment styles (Cole-Detke & Kobak, 1996). On the other hand, the results of studies on the relationship between dismissive attachment styles and depression are more controversial. Some studies

reported a significant relationship (Wei et al., 2004), whereas others did not (Shaver et al., 2005). Studies examining the relationship between the two insecure attachment styles (preoccupied and dismissive) and different symptoms of depression revealed that the preoccupied attachment style was associated with symptoms related to relationships with others (e.g., over-attachment, jealousy, approval-seeking), whereas the dismissive attachment style was associated with symptoms such as being excessively success-oriented, loneliness, and so forth (Mikulincer & Shaver, 2007). In comparison, in the current study, a weak, though not statistically significant correlation was found between attachment and depression. Findings on the relationship between attachment and ToM functions indicate that developmental factors may play a role in the etiology of FMS. This is important considering that FMS is encountered increasingly frequently. FMS patients with ToM disorders have poor relationships with their physicians and the environment due to the high anxiety and avoidance levels associated with the fearful attachment style commonly observed in FMS patients. This negative relationship affects the effectiveness of the treatment and causes an increase in the severity of pain, resulting in chronic pain. This negative outcome may be prevented if the patients are aware of their mental state or receive a psychiatric diagnosis. Otherwise, patients access effective treatments with delay, if at all, and persistently seek care.

In the light of the above information, a combined approach that also includes psychiatric treatment methods may prove more effective in the treatment of FM patients. Accordingly, assessing the mental profiles and attachment styles of FM patients jointly with psychiatrists may strengthen the weak relations of these patients with their environment and the physician and create a positive effect on their self-perception, benefiting the patient's follow-up and treatment processes.

The relationship between attachment and psychopathology is still not fully understood due to biases arising from the measurement of attachment styles by self-report, as was the case in the current study and most of the previous studies. It is known that self-report measures cannot objectively reveal attachment styles or any subdimensions thereof as they are open to defensive approaches and are not sufficiently powerful. Accordingly, this was the most important limitation of this study. Another limitation is that no test was used to measure the disease severity in FMS patients. Additionally, although it has been discussed that attachment-related anxiety and avoidance may cause psychopathology, it should be kept in mind that this study was correlational, and therefore the findings may not be used as direct evidence in drawing a cause-effect relationship. Lastly, given that the sample size was relatively small and that the population consisted of only those who applied to one hospital, care should be taken in generalizing the findings.

CONCLUSIONS

The current study aimed to investigate attachment and ToM dysfunction in patients with FMS. Consequentially, ECR anxiety and avoidance scores were found to be statistically significantly higher in patients with FMS compared to the control subjects. On the other hand, RMET scores of FMS patients were significantly lower than those of the con-

trol subjects. The patient group demonstrated significantly more frequent anxious and avoidant attachment styles than the control group. The fearful attachment style was significantly more common in the patient group whereas that secure attachment style was significantly more common in the control group. There was an inverse, though not statistically significant correlation between the RMET and BDI scores in both the patient and control groups. Similarly, an inverse yet not statistically significant correlation was also present between the ECR avoidance and BDI scores. Additionally, a positive, but also not statistically significant correlation was found between ECR anxiety and BDI scores. Further large-scale studies are needed to verify the results of this study on the relationship between attachment styles and ToM functions in FM patients.

DATA AVAILABILITY

The data that support the findings of this study are available from the corresponding author upon reasonable request.

REFERENCES

- Ayhan, B. G., Ayribas, B., Sanal, C., & Ünal, P. C. (2021). Social cognition and attachment profiles of fibromyalgia syndrome patients in comparison with healthy subjects. *Authorea Preprints*. doi: 10.22541/au.162079429.90749485/v1
- Adolphs R. (2002). Recognizing emotion from facial expressions: psychological and neurological mechanisms. *Behavioral and Cognitive Neuroscience Reviews*, 1, 21–62. doi: 10.1177/1534582302001001003
- Baron-Cohen, S., Wheelwright, S., Hill, J., Raste, Y., & Plumb, I. (2001). The "Reading the Mind in the Eyes" Test revised version: A study with normal adults, and adults with Asperger syndrome or high-functioning autism. *Journal of Child Psychology and Psychiatry, and Allied Disciplines*, 42, 241–251. <https://doi.org/10.1017/S0021963001006643>
- Bartholomew, K., & Horowitz, L. M. (1991). Attachment styles among young adults: A test of a four-category model. *Journal of Personality and Social Psychology*, 61, 226–244. doi: 10.1037//0022-3514.61.2.226
- Bennett, M. R., & Hacker, P. M. (2005). Emotion and cortical-subcortical function: Conceptual developments. *Progress in Neurobiology*, 75, 29–52. doi: 10.1016/j.pneurobio.2004.11.002
- Brennan, K. A., Clark, C. L., & Shaver, P. R. (1998) self-report measurement of adult attachment: An integrative overview. In J. A. Simpson, & W. S. Rholes (Eds.), *Attachment theory and close relationships* (pp. 46–76). Guilford Press.
- Burgmer, M., Gaubitz, M., Konrad, C., Wrenger, M., Hilgart, S., Heuft, G., & Pfleiderer, B. (2009). Decreased gray matter volumes in the cingulo-frontal cortex and the amygdala in patients with fibromyalgia. *Psychosomatic Medicine*, 71, 566–573. doi: 10.1097/PSY.0b013e3181a32da0
- Capaci, K., & Hepgüler, S. (1998). Fibromyalgia syndrome: Etiopathogenesis. *Ege Fizik Tıp Rehberi Dergisi*, 4, 219–226.
- Ciechanowski, P., Sullivan, M., Jensen, M., Romano, J., & Summers,

- H. (2003). The relationship of attachment style to depression, catastrophizing and health care utilization in patients with chronic pain. *Pain*, 104, 627–637. doi: 10.1016/S0304-3959(03)00120-9
- Cole-Detke, H., & Kobak, R. (1996). Attachment processes in eating disorder and depression. *Journal of Consulting and Clinical Psychology*, 64, 282–290. doi: 10.1037//0022-006x.64.2.282
- Dalili, M. N., Penton-Voak, I. S., Harmer, C. J., & Munaf , M. R. (2015). Meta-analysis of emotion recognition deficits in major depressive disorder. *Psychological Medicine*, 45, 1135–1144. doi: 10.1017/S0033291714002591
- Davies, K. A., Macfarlane, G. J., McBeth, J., Morriss, R., & Dickens, C. (2009). Insecure attachment style is associated with chronic widespread pain. *Pain*, 143, 200–205. doi: 10.1016/j.pain.2009.02.013
- De Oca, B. M., DeCola, J. P., Maren, S., & Fanselow, M. S. (1998). Distinct regions of the periaqueductal gray are involved in the acquisition and expression of defensive responses. *The Journal of Neuroscience*, 18, 3426–3432. doi: 10.1523/jneurosci.18-09-03426.1998
- Degotardi, P. J., Klass, E. S., Rosenberg, B. S., Fox, D. G., Gallelli, K. A., & Gottlieb, B. S. (2006). Development and evaluation of a cognitive-behavioral intervention for juvenile fibromyalgia. *Journal of Pediatric Psychology*, 31, 714–723. doi:10.1093/jpepsy/jsj064
- Di Tella, M., Castelli, L., Colonna, F., Fusaro, E., Torta, R., Ardito, R. B., & Adenzato, M. (2015). Theory of mind and emotional functioning in fibromyalgia syndrome: An investigation of the relationship between social cognition and executive function. *PloS One*, 10, e0116542. doi: 10.1371/journal.pone.0116542
- Dozier, M., Stovall, K., & Albus, K. (1999). Attachment and psychopathology in adulthood. In J. Cassidy, P. Shaver (Eds.), *Handbook of attachment: Theory, research, and clinical applications* (pp. 497–519). Guilford Press.
- Ekman, P., & Friesen, W. V. (1971). Constants across cultures in the face and emotion. *Journal of Personality and Social Psychology*, 17, 124–129. doi: 10.1037/h0030377
- Fietta, P., Fietta, P., & Manganelli, P. (2007). Fibromyalgia and psychiatric disorders. *Acta Biomedica*, 78, 88–95.
- Govender, C., Cassimjee, N., Schoeman, J., & Meyer, H. (2009). Psychological characteristics of FMS patients. *Scandinavian Journal of Caring Sciences*, 23, 76–83. doi: 10.1111/j.1471-6712.2007.00592.x
- Green, M. F., Horan, W. P., & Lee, J. (2015). Social cognition in schizophrenia. *Nature Reviews Neuroscience*, 16, 620–631. doi: 10.1038/nrn4005
- Gur, A., Cevik, R., Nas, K., Sarac, A.J. and Ozen, S. (2006). Quality of life in young fibromyalgia patients and effect of depression. *APLAR Journal of Rheumatology*, 9, 70–78. doi: 10.1111/j.1479-8077.2006.00168.x
- Hallberg, L. R., & Carlsson, S. G. (1998). Psychosocial vulnerability and maintaining forces related to fibromyalgia. In-depth interviews with twenty-two female patients. *Scandinavian Journal of Caring Sciences*, 12, 95–103. doi: 10.1111/j.1471-6712.1998.tb00482.x
- Inanc, L., Bodur, N. E., Parlak, S. C., Sarıkaya, M., Sari, A., Gulec, H., & Çitak, S. (2019). Relationship between mentalizing abilities, attachment styles, anxiety and depressive symptom levels in fibromyalgia patients. *Dusunen Adam The Journal of Psychiatry and Neurological Sciences*, 2, 113–120. doi: 10.14744/DAJPNS.2019.00017
- Kesebir, S., Kavzoğlu, S. Ö., & Üstündağ, M. F. (2011). Bağlanma ve psikopatoloji [Attachment and psychopathology]. *Psikiyatride Güncel Yaklaşımlar*, 3, 321–342.
- Kratz, A. L., Davis, M. C., & Zautra, A. J. (2012). Attachment predicts daily catastrophizing and social coping in women with pain. *Health Psychology*, 31, 278–285. doi: 10.1037/a0025230
- Lee, S. J., Song, H. J., Decety, J., Seo, J., Kim, S. H., Kim, S. H., Nam, E. J., Kim, S. K., Han, S. W., Lee, H. J., Do, Y., & Chang, Y. (2013). Do patients with fibromyalgia show abnormal neural responses to the observation of pain in others? *Neuroscience Research*, 75, 305–315. doi: 10.1016/j.neures.2013.01.013
- Leithner-Dziubas, K., Blüml, V., Naderer, A., Tmej, A., & Fischer-Kern, M. (2010). Mentalisierungsfähigkeit und Bindung bei Patientinnen mit chronischen Unterbauchschmerzen: Eine Pilotstudie [Mentalization and bonding in chronic pelvic pain patients: a pilot study]. *Zeitschrift für Psychosomatische Medizin und Psychotherapie*, 56, 179–190. doi: 10.13109/zptm.2010.56.2.179
- MacDonald, G., & Kingsbury, R. (2006). Does physical pain augment anxious attachment? *Journal of Social and Personal Relationships*, 23, 291–304. doi: 10.1177/0265407506062481
- McBeth, J., & Silman, A. J. (2001). The role of psychiatric disorders in fibromyalgia. *Current Rheumatology Reports*, 3, 157–164. doi: 10.1007/s11926-001-0011-8
- McWilliams, L. A., & Holmberg, D. (2010). Adult attachment and pain catastrophizing for self and significant other. *Pain*, 149, 278–283. doi: 10.1016/j.pain.2010.02.019
- Meredith, P., Strong, J., & Feeney, J. A. (2006). Adult attachment, anxiety, and pain self-efficacy as predictors of pain intensity and disability. *Pain*, 123, 146–154. doi: 10.1016/j.pain.2006.02.025
- Meredith, P., Ownsworth, T., & Strong, J. (2008). A review of the evidence linking adult attachment theory and chronic pain: Presenting a conceptual model. *Clinical Psychology Review*, 28, 407–429. doi: 10.1016/j.cpr.2007.07.009
- Mikail, S. F., Henderson, P. R., & Tasca, G. A. (1994). An interpersonally based model of chronic pain: An application of attachment theory. *Clinical Psychology Review*, 14, 1–16. doi: 10.1016/0272-7358(94)90045-0
- Mikulincer, M., & Shaver, P. R. (2007). *Attachment in adulthood: Structure, dynamics, and change*. Guilford Press.
- Özsoy F., & Okan S. (2018). Theory of mind and metacognitive functions in patients with fibromyalgia syndrome. *Turkish Journal of Clinical Psychiatry*, 21, 351–359. doi: 10.5505/kpd.2018.46036
- Palomino, R. A., Nicassio, P. M., Greenberg, M. A., & Medina, E. P., Jr (2007). Helplessness and loss as mediators between pain and depressive symptoms in fibromyalgia. *Pain*, 129, 185–194. doi: 10.1016/j.pain.2006.12.026
- Peñacoba, C., Perez-Calvo, S., Blanco, S., & Sanroman, L. (2018). Attachment styles, pain intensity and emotional variables in women with fibromyalgia. *Scandinavian Journal of Caring Sciences*, 32, 535–544. doi: 10.1111/scs.12477

- Premack, D., & Woodruff, G. (1978). Does the chimpanzee have a theory of mind? *Behavioral and Brain Sciences*, 1, 515–526. doi: 10.1017/S0140525X00076512
- Shaver, P. R., Schachner, D. A., & Mikulincer, M. (2005). Attachment style, excessive reassurance seeking, relationship processes, and depression. *Personality & Social Psychology Bulletin*, 31, 343–359. doi: 10.1177/0146167204271709
- Shorey, H. S., & Snyder, C. R. (2006). The role of adult attachment styles in psychopathology and psychotherapy outcomes. *Review of General Psychology*, 10, 1–20. doi: 10.1037/1089-2680.10.1.1
- Silva, P. L. P. D. S. (2011). *The role of adult attachment styles in fibromyalgia* [Doctoral dissertation, Universidade de Coimbra].
- Simpson, J. A., Rholes, W. S., Campbell, L., Tran, S., & Wilson, C. L. (2003). Adult attachment, the transition to parenthood, and depressive symptoms. *Journal of Personality and Social Psychology*, 84, 1172–1187. doi: 10.1037/0022-3514.84.6.1172
- Sumer, N., & Gungor, D. (1999). The impact of perceived parenting styles on attachment styles, self-evaluations and close relationships. *Türk Psikoloji Dergisi*, 14, 35–58.
- Thieme, K., Flor, H., & Turk, D. C. (2006). Psychological pain treatment in fibromyalgia syndrome: Efficacy of operant behavioural and cognitive behavioural treatments. *Arthritis Research & Therapy*, 8, R121. doi: 10.1186/ar2010
- Vlaeyen, J., Crombez, G., & Goubert, L. (2007). The psychology of chronic pain and its management. *Physical Therapy Reviews*, 12, 179–188. doi: 10.1179/108331907X223001
- Wearden, A. J., Lambertson, N., Crook, N., & Walsh, V. (2005). Adult attachment, alexithymia, and symptom reporting: An extension to the four category model of attachment. *Journal of Psychosomatic Research*, 58, 279–288. doi: 10.1016/j.jpsychores.2004.09.010
- Wei, M., Mallinckrodt, B., Russell, D. W., & Abraham, W. T. (2004). Maladaptive perfectionism as a mediator and moderator between adult attachment and depressive mood. *Journal of Counseling Psychology*, 51, 201–212. doi:10.1037/0022-0167.51.2.201
- Weiß, S., Winkelmann, A., & Duschek, S. (2013). Recognition of facially expressed emotions in patients with fibromyalgia syndrome. *Behavioral Medicine*, 39, 146–154. doi: 10.1080/08964289.2013.818932
- Wolfe, F., Clauw, D. J., Fitzcharles, M. A., Goldenberg, D. L., Häuser, W., Katz, R. L., Mease, P. J., Russell, A. S., Russell, I. J., & Walitt, B. (2016). 2016 Revisions to the 2010/2011 fibromyalgia diagnostic criteria. *Seminars in Arthritis and Rheumatism*, 46, 319–329. doi.org/10.1016/j.semarthrit.2016.08.012

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