

# Dissociative features of fibromyalgia syndrome

Tonguc D. Berkol, MD, Yasin H. Balcioglu, MD, Simge S. Kirlioglu, MD, Habib Erensoy, MD, Meltem Vural, MD.

## ABSTRACT

**الأهداف:** لتقييم العلاقات بين خصائص الانفصام من FMS والألم، والوضع النفسي، والوضع الوظيفي.

**الطريقة:** اشتملت هذه الدراسة المستعرضة على 27 امرأة مصابة بمتلازمة فيبروميالغيا (FMS) و 24 مجموعة التحكم في مستشفى الطب الطبيعي وإعادة التأهيل في اسطنبول، تركيا خلال الفترة من 2013م إلى 2015م. استخدم الدليل التشخيصي والإحصائي للاضطرابات النفسية وتم إجراء مقابلة سريرية لاضطرابات المحور الأول لتقييم المشاركين. استخدم كلا من مقياس ماثل البصرية (VAS)، واستبيان تأثير الفيبروميالغيا (FIQ)، ومقياس بيك للاكتئاب (BDI)، وBAI، واستخدم مخزون القلق (BAI) لتقييم مستويات الألم، ونوعية النوم، والوضع الوظيفي، والنفسي. تم استخدام مقياس التجارب التفاضلية (DES) لتقييم خصائص الانفصام.

**النتائج:** ارتبط مقياس BDI، وBAI و DES بشكل مهم إحصائي مع حالات FMS. كانت هناك ارتباطات ملحوظة بين الكل ما عدا 2 من درجات DES و FIQ، في حين تم العثور على ارتباطات إيجابية بين DES والألم VAS ونقاط جودة النوم. كان انتشار الاكتئاب حالياً ومدى الحياة، واضطراب الاكتئاب الكبير، لم يحدد خلاف ذلك، والقلق المنتشر والاضطرابات الجسدية أعلى في حالات FMS.

**الخاتمة:** ارتبط كلا من الألم، والوظيفة البدنية والعاطفية مع خصائص الانفصام في FMS. وهناك حاجة إلى مزيد من الدراسات لتحديد هذه العلاقات وتحسين العلاج.

**Objective:** To assess the relationships between the dissociative features of FMS and the pain, psychological status, and functional status.

**Methods:** Twenty-seven women with fibromyalgia syndrome (FMS) and 24 controls from the Istanbul Physical Medicine and Rehabilitation Hospital (2013-2015) were included in this cross-sectional study. The Diagnostic and Statistical Manual of Mental Disorders Structured Clinical Interview for Axis I Disorders was

used to evaluate the participants. A visual analogous scale (VAS), Fibromyalgia Impact Questionnaire (FIQ), Beck Depression Inventory (BDI), and Beck Anxiety Inventory (BAI) were used to assess the levels of pain, quality of sleep and functional and psychological statuses. The Dissociative Experiences Scale (DES) was used to evaluate the dissociative features.

**Results:** The BDI, BAI and DES scores were statistically significantly higher in the cases of FMS. There were remarkable associations between all but 2 of the DES and FIQ scores, while positive correlations were found between the DES and, VAS pain and sleep quality scores. The prevalences of current and lifelong dysthymia, and major depressive disorder; not otherwise specified, common anxiety and somatoform disorders were higher in the cases of FMS.

**Conclusion:** Pain, physical function and emotional status appear to be associated with dissociative features in FMS. Further studies are required to define these relationships and improve treatment.

*Neurosciences 2017; Vol. 22 (3): 198-204  
doi: 10.17712/nsj.2017.3.20160538*

*From the Department of Psychiatry, Bakirkoy Research and Training Hospital for Psychiatry, Neurology and Neurosurgery (Berkol, Balcioglu, Kirlioglu), from the Department of Psychiatry (Erensoy), Neuropsychiatry Hospital, Uskudar University, and from the Department of Physical Medicine and Rehabilitation (Vural), Physical Medicine and Rehabilitation Hospital, Istanbul, Turkey.*

*Received 6th October 2016. Accepted 4th December 2016.*

*Address correspondence and reprint request to:  
Dr. Tonguc D. Berkol, Bakirkoy Research and Training Hospital for Psychiatry, Neurology and Neurosurgery, Dr. Tevfik Saglam St. No. 52/2, Zuhuratbaba, Bakirkoy, Istanbul, Turkey. E-mail: tberkol@gmail.com*

**Disclosure.** The authors declare no conflicting interests, support or funding from any drug company.

Fibromyalgia syndrome (FMS) is a disorder characterized by chronic and widespread musculoskeletal pain and other concomitant symptoms.<sup>1</sup> It is reported to be more common in women than men.<sup>2</sup> According to the 1990 American College of Rheumatology (ACR) criteria, in addition to widespread pain in 4 quadrants of the body for at least 3 months, the pain sensitivity is determined by a finger pressure of 4 kilograms in at least 11 of 18 points.<sup>3</sup> Pain, fatigue, and non-relaxing sleep problems constitute the main FMS symptomatology, but it is accompanied by other symptoms, such as headaches, paresthesia, and an irritable colon or bladder.<sup>4,5</sup> These symptoms have gained importance according to the recently published ACR diagnosis criteria.<sup>6</sup> Fibromyalgia syndrome is a medically unexplained condition, with no biological tests for establishing its diagnosis. In the etiopathogenesis, several entities have been mentioned, including central and autonomous nervous system dysfunction, and various neurotransmitter imbalances, hormones, and psychiatric features.<sup>7</sup> It is known that FMS, which is one of the most common reasons for widespread chronic pain, can be accompanied by different psychiatric disorders. Fibromyalgia syndrome substantially reduces the quality of life, thereby increasing the diagnosis and treatment costs.<sup>8</sup> The prevalence of emotional distress is high, and mood and/or anxiety disorders frequently accompany FMS. However, many authors have emphasized that these diagnoses may occur prior to (or consecutively with) an FMS diagnosis; therefore, joint and advanced treatment strategies must be developed.<sup>9-11</sup> Dissociation is defined as the breakage of generally integrated functions of consciousness, memory, identity, or environmental perception. Impairment of these integrative and connective functions in the mind may vary, ranging from normal values to pathological situations. Fibromyalgia syndrome has been associated with childhood traumas, more frequently than in other chronic pain groups, and it has been stated that traumas may constitute an independent risk for the development of FMS.<sup>12-15</sup> In a limited number of studies, it has been reported that dissociative symptoms are frequently seen in FMS.<sup>16,17</sup> Considering the frequent incidence of childhood traumas in these patients, and the fact that FMS is accompanied by various different psychiatric disorders, it may be assumed that the rates of dissociation will be high in FMS. In addition, it may be related to the neurodevelopmental and experience-related factors of early childhood, such as dissociative experiences attachment properties. The aim of this study was to examine the effects of dissociative features on the pain, sleep quality, symptoms, and emotional and functional

properties of FMS patients, and to compare the results with healthy control subjects.

**Methods.** Twenty-seven female patients with FMS diagnoses according to 1990 the ACR criteria, between 20-45 years of age, who applied to the Istanbul Physical Medicine and Rehabilitation Hospital, Physical Medicine and Rehabilitation outpatient clinic between 2013 and 2015, were included in this study. In addition, 24 healthy control group subjects, age and gender-matched to the patients, with no psychiatric disorder histories and no pain complaints, volunteered to participate. Regional ethical committee approval was obtained for this study. The inclusion criteria were an FMS diagnosis according to the 1990 ACR criteria in the patients, and an education level of elementary school or above for all of the participants. The exclusion criteria were pregnancy, ongoing suicidal ideation, psychotic disorder, neurological disease, the use of neurological and/or psychiatric drugs, severe systemic disease, and abnormalities in the routine analyses. The demographical features of the patients, symptoms accompanying FMS, and number of sensitive points were determined, and a visual analog scale (VAS) was used to assess the pain and sleep quality. The Fibromyalgia Impact Questionnaire (FIQ) was used to evaluate the health-related physical functions, and the Diagnostic and Statistical Manual of Mental Disorders (DSM)-IV Structured Clinical Interview for Axis I Disorders (SCID-I) was used to determine whether or not a patient had an axis I psychiatric disease. The Beck Depression Scale (BDS) and Beck Anxiety Scale (BAS) were applied in order to determine the anxiety and depression levels of the patients. The Dissociative Experiences Scale (DES) was used to assess the dissociative experiences and disorders. The psychiatric diagnosis distribution, dissociative features, and depression and anxiety levels of the FMS patients were determined, and compared to the control group.

In this study, the statistical analyses were conducted using the Number Cruncher Statistical System (NCSS) 2007 statistical software program (Utah, USA). In addition to the descriptive statistical methods (average, standard deviation) used in the assessment of the data, an independent t test was used for the comparison of the dual groups, the chi-squared test was used to compare the qualitative data, and the Pearson correlation test was used to determine the interrelationships of the variables. The results were assessed at a significance level of  $p < 0.05$ .

**Results.** The anthropometric data and demographical features of the FMS and control groups

are shown in Table 1 and Figure 1. The average of the sensitive points detected by palpation in the FMS group was found to be statistically significantly higher than in the control group ( $p < 0.001$ ). In addition, the VAS pain and sleep quality averages of the FMS group were found to be statistically significantly higher than in the control group ( $p < 0.001$ ) (Table 1). The incidences of fatigue, morning stiffness, sleep disorders, morning tiredness, paresthesia, irritable colon syndrome (ICS), sicca symptoms, female urethral syndrome, swelling sense in the tissues, and headaches in the FMS group were found to be statistically significantly higher than in the control group ( $p < 0.001$ ). Statistically insignificant differences were observed between the FMS and control groups in terms of Raynaud's Phenomenon ( $p > 0.05$ ) and dysmenorrhea ( $p > 0.05$ ) (Figure 2).

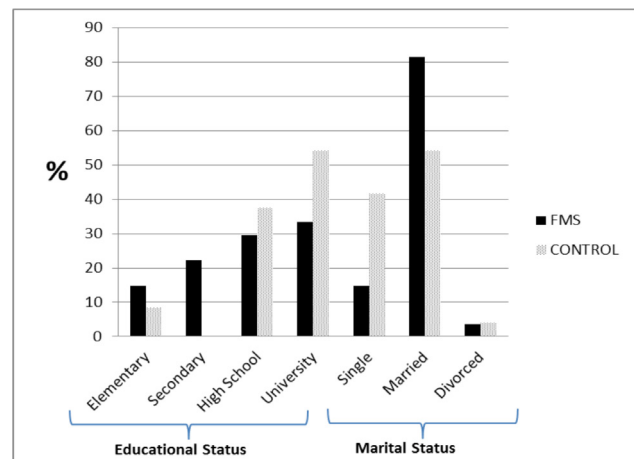
In the FMS patients, the FIQ physical functioning, well-being, missed days of work, job difficulty, pain, fatigue, resting, stiffness, anxiety, and depression parameters, and the total FIQ averages were found to be statistically significantly higher than in the control group ( $p < 0.001$ ). However, a statistically significant difference was not found between the missed days of work parameter averages of the FMS and control groups ( $p > 0.05$ ) (Table 2). The BDS  $p < 0.001$ , BAS  $p < 0.001$ , and DES  $p < 0.05$  averages of the FMS patients were found to be statistically significantly higher than in the control group (Table 1).

In the FMS patients, with regard to the SCID-I diagnoses, the prevalences of both current and lifelong major depressive disorders, dysthymia, not otherwise specified (NOS) depressive disorder, common anxiety disorder, and somatoform disorder were statistically significantly higher than in the control group ( $p < 0.05$ ). The prevalences of NOS anxiety disorder in current

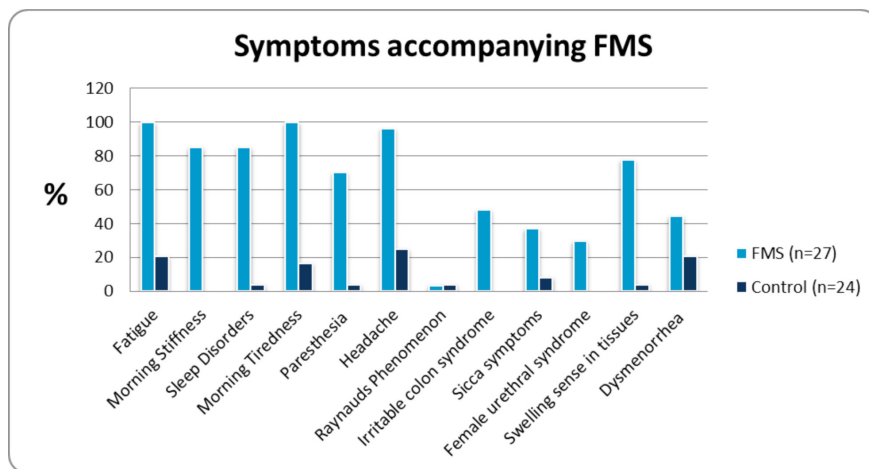
**Table 1 -** Anthropometric data, clinical findings and beck depression Scale, beck anxiety scale and dissociative experiences scale scores in FMS and control groups.

Variables	FMS (n=27)	Control (n=24)	P-value
	(Average±SD)		
Age (years)	34.59±5.08	33.21±7.88	0.455
Height (cm)	161.26±5.88	163.33±4.84	0.179
Bodyweight (kg)	64.04±7.78	60.54±9.34	0.151
No. Sensitive points by palpation	14.78±1.25	1.21±1.44	0.0001*
VAS pain	7.19±2.3	1.33±1.69	0.0001*
VAS sleep quality	6.04±2.39	1.33±2.32	0.0001*
BDS	19.63±8.55	7.38±6.84	0.0001*
BAS	24.19±12.95	7.63±6.91	0.0001*
DES	16.48±14.46	6.28±7.81	0.003*

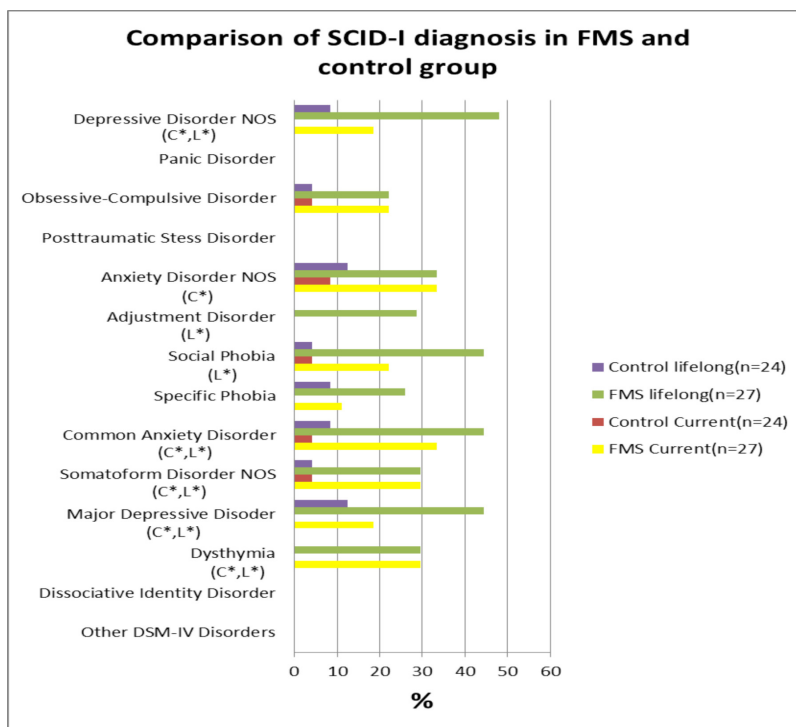
\* $p < 0.05$ , FMS - Fibromyalgia syndrome, VAS - Visual analogous scale, BDS - Beck depression scale, BAS - Beck anxiety scale, DES - Dissociative experiences scale, SD - Standard deviation



**Figure 1 -** The anthropometric data and demographical features of the FMS and control groups. FMS - fibromyalgia syndrome



**Figure 2 -** Symptoms accompanying FMS. \* $p < 0,05$ , FMS - fibromyalgia syndrome



**Figure 3** - Comparison of SCID-I diagnoses in FMS and control groups. C - Statistical comparison of Current SCID-I diagnoses between FMS and control group, L - Statistical comparison of Lifelong SCID-I diagnoses between FMS and control group, NOS - Not otherwise specified, \* $p < 0.05$

SCID-I and adjustment disorder with social phobia in lifelong SCID-I were higher in the cases of FMS. However, current and lifelong SCID-I panic disorders, post-traumatic stress disorder, and dissociative identity disorder diagnoses were not observed in either group (Figure 3).

A positive and statistically significant relationship was determined between the DES and VAS pain ( $r=0.465, p < 0.001$ ) and sleep quality scores ( $r=0.408, p < 0.001$ ). Similarly, a positive and statistically significant relationship was found between the DES score and the number of palpation points ( $r=0.419, p < 0.001$ ).

Overall, a positive and statistically significant relationship was seen between the DES scores and the total FIQ scores ( $r=0.427, p < 0.01$ ) and FIQ parameters, other than the well-being ( $r=0.256, p > 0.05$ ) and missed days of work ( $r=0.035, p > 0.05$ ) parameters. There was also a positive and statistically significant relationship between the DES and the BDS ( $r=0.523, p < 0.001$ ) and BAS scores ( $r=0.656, p < 0.001$ ).

**Discussion.** Physical and mental responses to stress may lead to various psychosomatic consequences. For example, FMS itself is recognized as a somatoform

disorder. In the pathophysiology of FMS, factors like neuroendocrine, genetic, and psychosocial variables, environmental stressors, and autonomous and central nervous system abnormalities have been blamed.

**Table 2** - Comparison of components of fibromyalgia syndrome impact questionnaire form in FMS and control groups.

FIQ	FMS	Control	P-value
	(Average±SD)		
Physical functioning	5.13±1.71	2.8±1.62	0.0001*
Well-being	6.98±2.07	2.2±2.11	0.0001*
Missed days of work	1±2.16	0.58±2.0	0.592
Job difficulty	5.7±2.5	1.75±1.59	0.001*
Pain	7.41±2.04	1.63±1.53	0.0001*
Fatigue	8.37±1.55	2.33±2.08	0.0001*
Resting	8.74±1.63	2.08±2.45	0.0001*
Stiffness	6.56±2.98	1.29±1.78	0.0001*
Anxiety	8.07±1.8	2.63±2.43	0.0001*
Depression	7.56±1.8	1.63±2.08	0.0001*
Total FIQ Score	70.72±13.89	19.28±12.96	0.0001*

\* $p < 0.05$ , FIQ - Fibromyalgia syndrome impact questionnaire form, SD - Standard deviation, FMS - Fibromyalgia syndrome



Among FMS patients, continuous or repetitive pain is often accompanied by emotional distress, as well as some psychiatric disorders. FMS has been associated with several psychological factors, including perfectionism, neuroticism, catastrophic thinking, and vigilance to pain.<sup>19</sup>

Somatoform dissociation represents an overmodulation of emotion, which is an intrapsychic process of traumatic stress, and leads to psychosomatic disorders such as FMS.<sup>20</sup> In our study, the average DES score was found to be significantly higher than in the control subjects. In addition, Haviland et al<sup>21</sup> reported a significant increase in the DES score in FMS patients suffering a major trauma. In another study, the average DES score of the FMS patients was found to be higher than in the rheumatoid arthritis (RA) patients, which was reported to be three times the general population average.<sup>15</sup> Additionally, the average DES score of the FMS patients was found to be higher than in other rheumatologic diseases, and it was reported that this average was equal to 4 times the general population average.

A positive relationship was observed between the dissociation rates and medical symptom notification, and these symptoms were related to dissociation.<sup>22</sup> In addition, a positive and statistically significant relationship was observed between the number of sensitive points, VAS pain and sleep quality, and DES averages in our study. Furthermore, a positive and statistically significant relationship was found between the DES and FIQ physical function, exercise, pain, fatigue, resting, malfunction, anxiety, and depression parameters and the total FIQ scores. In another study, the average DES score and total FIQ score were found to be higher in the FMS patients than in the control group subjects. However, in that study, the DES and FIQ correlation was not studied, but it was stated that post-traumatic stress disorder and physical activity may play roles in the development of FMS.<sup>21</sup> In FMS patients, a relationship was seen between dissociation and pain, fatigue, and depression, while a significant relationship was not seen with sleep quality.<sup>16</sup>

The existence of a strong and direct correlation between trauma and dissociation has frequently been emphasized.<sup>23</sup> The reason for this is that dissociation constitutes a basic adaptive response to trauma; therefore, dissociation ensures the reduction of an effect by the segmentation of traumatic experiences. At the same time, dissociation occurs in the form of disorders in the senses, movements, and other bodily functions. Anesthesia, analgesia, sensorial changes, and/or the loss of motor control constitute the basic symptoms

of conversion disorder, and may be called somatoform dissociation.<sup>24</sup>

In our study, significant differences were seen between the FMS patients and control group subjects in terms of current and lifelong somatoform disorder diagnoses in the SCID-I. In one previous study, it was argued that post-traumatic stress disorder, dissociation, somatization, and affect dysregulation as a spectrum play roles in the adaptation to trauma.<sup>25</sup> According to the authors, these phenomena are often seen together, and various combinations of them may develop in traumatized individuals overtime.

Depression and anxiety findings are seen in approximately 1/3 of FMS patients.<sup>26</sup> In a study performed by Johnson et al,<sup>27</sup> the severities of depression and anxiety were examined in healthy controls and FMS patients with chronic widespread musculoskeletal system pain, and found to be higher in the FMS patients. In addition, the current and lifelong major depression prevalences were determined to be between 20% and 80% in FMS patients when compared to healthy controls.<sup>28-30</sup> Moreover, in one epidemiological study, FMS was described as the second most commonly observed general medical condition in relation to major depression.<sup>31</sup>

Considering the significance of the relationship between personality and depression in the general population, the significance of this relationship for FMS patients becomes obvious.<sup>28</sup> In our study, in the FMS patients, the average BDS was  $19.63 \pm 8.55$ , and the average BAS was  $24.9 \pm 12.95$ . Busch et al<sup>32</sup> reported an average BDS score of  $20.6 \pm 3.1$  in their FMS patients. In studies conducted on different disease groups, the relationships between depression and anxiety and dissociative disorders have been mentioned.<sup>33-35</sup> We also determined a positive and significant relationship between the DES and the BDS and BAS scores in FMS patients. Moreover, anxious and depressive states have been found to be related to the symptomatology of FMS. Overall, the relationship between FMS and depressive disorders is more complicated than expected; therefore, more attention should be paid to the relationship between depression and anxiety and FMS.<sup>36</sup>

Our study did have several limitations. For example, the low numbers in both the patient and control groups, particularly the number of patients diagnosed with specific mental disorders, were the main restrictions of the current study. In addition, depersonalization and derealization were not included as dissociative disorder subtypes, due to their highly prevalent concurrence with other mental disorders as independent symptoms.

In conclusion, dissociative features seem to be related

to pain, sleep disorders, functional situations, and depression in FMS patients. Describing the relationships between FMS and its concomitant symptoms, as well as emotional situations and dissociations, will be helpful in terms of both the FMS etiopathogenesis and treatment approaches.

## References

- Spaeth M, Bennett RM, Benson BA, Wang YG, Lai C, Choy EH. Sodium oxybate therapy provides multidimensional improvement in fibromyalgia: results of an international phase 3 trial. *Ann Rheum Dis* 2012; 71: 935-942.
- López-Roig S, Pastor MÁ, Peñacoba C, Lledó A, Sanz Y, Velasco L. Prevalence and predictors of unsupervised walking and physical activity in a community population of women with fibromyalgia. *Rheumatol Int* 2016; 36: 1127-1133.
- Ting TV, Barnett K, Lynch-Jordan A, Whitacre C, Henrickson M, Kashikar-Zuck S. 2010 American College of Rheumatology Adult Fibromyalgia Criteria for Use in an Adolescent Female Population with Juvenile Fibromyalgia. *J Pediatr* 2016; 169: 181-187.
- Choy E, Perrot S, Leon T, Kaplan J, Petersel D, Ginovker A, et al. A patient survey of the impact of fibromyalgia and the journey to diagnosis. *BMC Health Serv Res* 2010; 26:102.
- Carbonell-Baeza A, Ruiz JR, Aparicio VA, Ortega FB, Munguía-Izquierdo D, Alvarez-Gallardo IC, et al. Land- and water-based exercise intervention in women with fibromyalgia: the al-Andalus physical activity randomised controlled trial. *BMC Musculoskelet Disord* 2012; 15: 18.
- Perrot S, Choy E, Petersel D, Ginovker A, Kramer E. Survey of physician experiences and perceptions about the diagnosis and treatment of fibromyalgia. *BMC Health Serv Res* 2012; 10: 356.
- Bellato E, Marini E, Castoldi F, Barbasetti N, Mattei L, Bonasia DE, et al. Fibromyalgia syndrome: etiology, pathogenesis, diagnosis, and treatment. *Pain Res Treat* 2012; 1: 1-17.
- Williams DA, Kratz AL. Patient-Reported Outcomes and Fibromyalgia. *Rheum Dis Clin North Am* 2016; 42: 317-332.
- Arnold LM, Clauw DJ, McCarberg BH; FibroCollaborative. Improving the recognition and diagnosis of fibromyalgia. *Mayo Clin Proc* 2011; 86: 457-464.
- van Middendorp H, Kool MB, van Beugen S, Denollet J, Lumley MA, Geenen R. Prevalence and relevance of Type D personality in fibromyalgia. *Gen Hosp Psychiatry* 2016; 39: 66-72.
- Chang MH, Hsu JW, Huang KL, Su TP, Bai YM, Li CT, et al. Bidirectional association between depression and fibromyalgia syndrome: a nationwide longitudinal study. *J Pain* 2015; 16: 895-902.
- Bohn D, Bernardy K, Wolfe F, Häuser W. The association among childhood maltreatment, somatic symptom intensity, depression, and somatoform dissociative symptoms in patients with fibromyalgia syndrome: a single-center cohort study. *J Trauma Dissociation* 2013; 14: 342-358.
- Evren C, Cinar O, Evren B, Ulku M, Karabulut V, Umut G. The mediator roles of trait anxiety, hostility, and impulsivity in the association between childhood trauma and dissociation in male substance-dependent inpatients. *Compr Psychiatry* 2013; 54: 158-166.
- Haviland M, Morton KR, Oda K, Fraser GE. Traumatic experiences, major life stressors, and self-reporting a physician-given fibromyalgia diagnosis. *Psychiatry Res* 2010; 177: 335-341.
- Neigh GN, Ali FF. Co-morbidity of PTSD and immune system dysfunction: opportunities for treatment. *Curr Opin Pharmacol* 2016; 29: 104-110.
- Danis R, Llacer JB, Bouza RG. Fibromyalgia and Multiple Psychiatric Diagnosis. *Eur Psychiatry* 2015; 30: 483.
- Häuser W, Henningsen P. Fibromyalgia syndrome: a somatoform disorder? *Eur J Pain* 2015; 18: 1052-1059.
- Fayed N, Andres E, Rojas G, Moreno S, Serrano-Blanco A, Roca M, et al. Brain dysfunction in fibromyalgia and somatization disorder using proton magnetic resonance spectroscopy: a controlled study. *Acta Psychiatr Scand* 2012; 126: 115-125.
- Kollmann J, Gollwitzer M, Spada MM, Fernie BA. The association between metacognitions and the impact of Fibromyalgia in a German sample. *J Psychosom Res* 2016; 83: 1-9.
- Kilic O, Sar V, Taycan O, Aksoy-Poyraz C, Erol TC, Tecer O, et al. Dissociative depression among women with fibromyalgia or rheumatoid arthritis. *J Trauma Dissociation* 2014; 15: 285-302.
- Haviland MG, Morton KR, Oda K, Fraser GE. Traumatic experiences, major life stressors, and self-reporting a physician-given fibromyalgia diagnosis. *Psychiatry Res* 2010; 177: 335-341.
- Farina B, Mazzotti E, Pasquini P, Giuseppina Mantione M. Somatoform and psychoform dissociation among women with orgasmic and sexual pain disorders. *J Trauma Dissociation* 2011; 12: 526-534.
- Schäfer I, Fisher HL, Aderhold V, Huber B, Hoffmann-Langer L, Golks D, et al. Dissociative symptoms in patients with schizophrenia: relationships with childhood trauma and psychotic symptoms. *Compr Psychiatry* 2012; 53: 364-371.
- Van der Kruijs SJ, Bodde NM, Vaessen MJ, Lazeron RH, Vonck K, Boon P, et al. Functional connectivity of dissociation in patients with psychogenic non-epileptic seizures. *J Neurol Neurosurg Psychiatry* 2012; 83: 239-247.
- Van der Boom KJ, van den Hout MA, Huntjens RJ. Psychoform and somatoform dissociation, traumatic experiences, and fantasy proneness in somatoform disorders. *Pers Individ Differ* 2010; 48: 447-451.
- Sluka KA, Clauw DJ. Neurobiology of fibromyalgia and chronic widespread pain. *Neuroscience* 2016; 338: 114-129.
- Johnson AL, Storzbach D, Binder LM, Barkhuizen A, Anger WK, Salinsky MC, et al. MMPI-2 profiles: fibromyalgia patients compared to epileptic and non-epileptic seizure patients. *Clin Neuropsychol* 2010; 24: 220-234.
- Santos Dde M, Lage LV, Jabur EK, Kaziyama HHS, Iosifescu DV, de Lucia MCS, et al. The association of major depressive episode and personality traits in patients with fibromyalgia. *Clinics (Sao Paulo)* 2011; 66: 973-978.
- Salazar A, Dueñas M, Mico JA, Ojeda B, Agüera-Ortiz L, Cervilla JA, et al. Undiagnosed mood disorders and sleep disturbances in primary care patients with chronic musculoskeletal pain. *Pain Med* 2013; 14: 1416-1425.
- Fiest KM, Currie SR, Williams JV, Wang J. Chronic conditions and major depression in community-dwelling older adults. *J Affect Disord* 2011; 131: 172-178.

31. Aguglia A, Salvi V, Maina G, Rossetto I, Aguglia E. Fibromyalgia syndrome and depressive symptoms: comorbidity and clinical correlates. *J Affect Disord* 2011; 128: 262-266.
32. Busch AJ, Webber SC, Brachaniec M, Bidonde J, Dal Bello-Haas V, Danyliw A, et al. Exercise therapy for fibromyalgia. *Curr Pain Headache Rep* 2011; 15: 358-367.
33. Rodewald F, Wilhelm-Göling C, Emrich HM, Reddemann L, Gast U. Axis-I comorbidity in female patients with dissociative identity disorder and dissociative identity disorder not otherwise specified. *J Nerv Ment Dis* 2011; 199: 122-131.
34. Moscariello MM, Ratti F, Quartini A, Forcén FE, Munuera JN, Bersani G. Dissociative symptoms in patients with mood and anxiety disorders. *Riv Psichiatr* 2010; 45: 234-243.
35. Selvi Y, Besiroglu L, Aydin A, Gulec M, Atli A, Boysan M et al. Relations between childhood traumatic experiences, dissociation, and cognitive models in obsessive compulsive disorder. *Int J Psychiatry Clin Pract* 2012; 16: 53-59.
36. Vural M, Berkol TD, Erdogdu Z, Kucukserat B, Aksoy C. Evaluation of personality profile in patients with fibromyalgia syndrome and healthy controls. *Mod Rheumatol* 2014; 24: 823-828.

### *Authorship entitlement*

Excerpts from the Uniform Requirements for Manuscripts Submitted to Biomedical Journals updated November 2003.

Available from [www.icmje.org](http://www.icmje.org)

The International Committee of Medical Journal Editors has recommended the following criteria for authorship; these criteria are still appropriate for those journals that distinguish authors from other contributors.

Authorship credit should be based on 1) substantial contributions to conception and design, or acquisition of data, or analysis and interpretation of data; 2) intellectual content; and 3) final approval of the version to be published. Authors should meet conditions 1, 2, and 3.

Acquisition of funding, collection of data, or general supervision of the research group, alone, does not justify authorship.

An author should be prepared to explain the order in which authors are listed.