

The relationship between physical activity and pain, interoceptive awareness, and personal well-being in women with fibromyalgia: A cross-sectional study



Fibromiyaljili kadınlarda fiziksel aktivite ile ağrı, interoseptif farkındalık ve kişisel iyi oluş arasındaki ilişki: Kesitsel çalışma

Abstract

Aim: In this study, the effect of physical activity level on pain, interoceptive awareness, and personal well-being in women with fibromyalgia was investigated.

Methods: Fifty female patients diagnosed with fibromyalgia syndrome who applied to the physical medicine and rehabilitation outpatient clinic were evaluated as follows: Demographics (age, occupational status, and body mass index (BMI)) were recorded, pain levels were evaluated with visual analog scale (VAS), physical activity levels were evaluated with the international physical activity questionnaire (IPAQ), personal well-being were evaluated with the personal well-being index adult form (PWI-A) and interoceptive awareness were evaluated with multidimensional assessment of interoceptive awareness (MAIA).

Results: The mean age of the participants was 50.96±8.35, and the mean BMI was 27.74±4.01. Fifty-four % of the participants had low physical activity levels and 46% had moderate physical activity levels. The mean MAIA total score was 19.44±3.73 and the mean VAS was 6.32±1.69. In correlation analysis, a large negative statistically significant relationship between VAS and PWI-A ($p<0.001$, $r=-0.780$), VAS and all subscores and total scores of MAIA ($p<0.001$) except no relationship with not distracting ($p>0.05$) and moderate positive relationship with noticing scores ($p<0.01$, $r=0.380$) was found. Large positive statistically significant relationship between IPAQ and PWI-A ($p<0.001$, $r=0.755$), IPAQ and all subscores and total scores of MAIA ($p<0.001$) except no relationship with not distracting ($p>0.05$) and moderate negative relationship with noticing scores ($p<0.001$, $r=-0.489$) and large negative relationship between IPAQ and VAS ($p<0.001$, $r=-0.796$) was found.

Conclusion: Interoceptive awareness is impaired in women with fibromyalgia. Decreased interoceptive awareness and well-being are closely associated with physical activity levels. Regular exercise and optimal physical activity may increase interoceptive awareness and improve the quality of life in fibromyalgia.

Keywords: awareness; fibromyalgia; pain; psychological well-being

Öz

Amaç: Bu çalışmada, fibromiyaljili kadınlarda fiziksel aktivite düzeyinin ağrı, interoseptif farkındalık ve kişisel iyilik hali üzerindeki etkisi araştırıldı.

Yöntemler: Fiziksel Tıp ve Rehabilitasyon polikliniğine başvuran fibromiyalji sendromu tanılı 50 kadın hasta şu şekilde değerlendirildi: Demografik veriler (yaş, mesleki durum ve vücut kitle indeksi (VKİ)) kaydedildi, ağrı vizüel analog skala (VAS) ile değerlendirildi, fiziksel aktivite düzeyleri uluslararası fiziksel aktivite anketi (IPAQ) ile, kişisel iyi oluş kişisel iyi oluş indeksi yetişkin formu (PWI-A) ile ve interoseptif farkındalık çok boyutlu bedensel farkındalık değerlendirmesi (MAIA) ile değerlendirildi.

Bulgular: Katılımcıların ortalama yaşı 50.96±8.35, ortalama BMI 27.74±4.01 idi. Katılımcıların %54'ü düşük fiziksel aktivite düzeyine, %46'sı orta fiziksel aktivite düzeyine sahipti. MAIA total skor ortalaması 19.44±3.73, ortalama VAS 6.32±1.69'du. Korelasyon analizinde, VAS ile PWI-A ($p<0.001$, $r=-0.780$), VAS ve MAIA'nın not distracting ($p>0.05$) ile anlamlı ilişki olmaması ve noticing puanları ile orta düzeyde pozitif ilişki ($p<0.01$, $r=0.380$) haricindeki tüm alt skorları ve toplam skor arasında ($p<0.001$) büyük negatif istatistiksel olarak anlamlı ilişki bulundu. IPAQ ile PWI-A ($p<0.001$, $r=0.755$), IPAQ ve MAIA'nın not distracting ile anlamlı ilişki olmaması ($p>0.05$) ve noticing skoru ile orta düzeyde negatif ilişki ($p<0.001$, $r=-0.489$) dışında, tüm alt skorları ve toplam skor ($p<0.001$) arasında, büyük pozitif istatistiksel olarak anlamlı ilişki ve IPAQ ile VAS arasında büyük negatif ilişki ($p<0.001$, $r=-0.796$) saptandı.

Sonuç: Fibromiyaljili kadınlarda interoseptif farkındalık bozulmuştur. Azalmış interoseptif farkındalık ve kişisel iyi oluş, fiziksel aktivite düzeyi ile yakından ilişkilidir. Düzenli egzersiz ve optimal fiziksel aktivite, interoseptif farkındalığı artırabilir ve fibromiyalji'de yaşam kalitesini iyileştirebilir.

Anahtar Sözcükler: Ağrı; fibromiyalji; farkındalık; sosyal refah

Tugce Pasin¹, Bilinc Dogruoz Karatekin¹

¹ Physical Medicine and Rehabilitation, Goztepe Prof. Dr. Suleyman Yalcin City Hospital

Received/Gelis : 19.08.2023

Accepted/Kabul: 07.09.2023

DOI: 10.21673/anadoluklin.1346436

Corresponding author/Yazisma yazarı
Bilinc Dogruoz Karatekin

İstanbul Medeniyet Üniversitesi, Prof. Dr. Süleyman Yalçın Şehir Hastanesi, Fiziksel Tıp ve Rehabilitasyon Kliniği, İstanbul, Türkiye
E-mail: bilincdogruoz@hotmail.com

ORCID

Tugce Pasin: 0000-0002-8814-2921

B. Dogruoz Karatekin: 0000-0002-0568-9498

INTRODUCTION

Fibromyalgia syndrome (FMS) is a complex health problem that continues for at least three months and is accompanied by complaints of intense pain, fatigue, and muscle weakness in various parts of the body, accompanied by psychological and social difficulties (1). It affects 1-2% of the population and most of them are female patients between the ages of 40-55 (2).

Interoceptive awareness (IA) is a multifaceted concept related to the connection between body and mind that includes body management and experience (3). IA depends on the capacity to perceive and integrate tactile, proprioceptive, nociceptive, vestibular, visual, motor, and cognitive information (4). Therefore, body awareness provides a basis for experiencing, recognizing, and accepting one's bodily responses, and forming coping strategies (3). Especially in chronic pain groups such as FMS, it is seen that patients have low body awareness, these patients involuntarily (unconsciously) stretch their muscles and have difficulty in establishing emotional and thought connections with these changes in the body (5).

Pain is a complex and dynamic phenomenon consisting of genetic, physiological, cognitive, affective, behavioral, and social components (6). Pain, which is the main symptom of FMS, is an important source of stress in people's lives both on its own and with its consequences. In this context, although personality traits, cognitive predispositions, physiological predispositions, and disorders accompanying fibromyalgia are broad spectrum, they differ from person to person and greatly affect the severity of the disease.

Quality of life (QoL) is the way individuals perceive and evaluate their situation in life in the context of the cultural structure and value system they belong to (7). In various previous studies, it has been shown that the quality of life in patients with FMS is negatively affected (8, 9). Penny et al. reported that personal well-being scores became progressively lower as the pain intensity increased, and declined dramatically as disability became more severe (10). The improvement in the well-being of people with fibromyalgia is also promising in terms of benefiting their pain management and physical development. In this respect, it is thought that the inclusion of relaxation exercise, which focuses on the body-mind interac-

tion, will also benefit the physical recovery of chronic pain patients (11).

In many studies, physical performance and daily activity levels of individuals with FMS were found to be lower than healthy women and the general population (12, 13). The literature shows that spending more time on physical activity is associated with reduced symptoms and improved QoL in FMS (14, 15). Therefore physical exercise is one of the first-line treatments in the management of fibromyalgia, however, adherence to exercise is often low.

Although a decrease in IA has been reported in individuals with fibromyalgia, studies investigating the relationship between physical activity level and pain, IA and personal well-being (PWB) could not be found within our knowledge.

In this study, the effect of physical activity level on pain, interoceptive awareness and personal well-being in women with fibromyalgia was investigated.

MATERIAL AND METHODS

A cross-sectional study was conducted to investigate the relationship between pain, IA, PWB and physical activity levels in women with fibromyalgia. Fifty female patients aged 18-65 years diagnosed with FMS according to 1990 ACR criteria who applied to the physical medicine and rehabilitation outpatient clinic between May and December 2022 were included in the study.

Individuals with psychological, cardiovascular and neurological problems were excluded from the study.

The study protocol was approved by the Ethics Committee of İstanbul Medeniyet University Göztepe Training and Research Hospital (Date: 13.04.2022/ Approval number: 0224). Informed Consent Form was first presented to the participants participating in the research, and after this form was approved, the following data collection tools were used. The study was conducted according to the STROBE checklist for reporting observational studies.

Demographic Data

Age, occupational status and daily activity levels of the patients were recorded as demographic parameters. Daily activity levels of the patients were evaluated with an international physical activity questionnaire

Table 1. Characteristics of the participants (n=50)

	Mean	Median	Standart Deviation	Minimum	Maximum
Age	50.96	50.00	8.35	32.00	69.00
BMI	27.74	28.22	4.01	21.04	38.85
VAS	6.32	7.00	1.69	3.00	9.00
IPAQ	645.30	495.00	524.04	0.00	1866.00
PWI-A	4.85	4.81	1.99	1.75	8.50
MAIA-Noticing	4.13	4.00	0.30	3.50	5.00
MAIA-Not distracting	1.24	1.16	0.57	0.00	3.00
MAIA-Not worrying	1.30	1.20	0.88	0.00	3.20
MAIA-Attention regulation	2.58	2.49	0.86	0.14	4.00
MAIA-Emotional awareness	3.92	3.90	0.49	3.00	5.00
MAIA- Self regulation	2.22	2.00	0.91	0.25	4.00
MAIA-Body listening	2.74	2.83	0.80	1.66	5.00
MAIA-Trusting	1.95	2.00	0.94	0.00	3.66
MAIA-Total	20.10	19.44	3.73	13.69	27.18

BMI: Body mass index, VAS: Visual analogue scale, IPAQ: International Physical Activity Questionnaire, PWI-A: Personal Well-Being Index-

Table 2. Comparison of the PWI-A and MAIA scores between the physical activity groups

	IPAQ	Mean	Median	SD	Min	Max	p
PWI-A	low	3.66	3.37	1.56	1.75	7.25	<0.001
	moderate	6.24	6.62	1.47	3.50	8.50	
MAIA-Noticing	low	4.25	4.25	0.31	3.75	5.00	0.001
	moderate	3.98	4.00	0.23	3.50	4.50	
MAIA-Not distracting	low	1.26	1.33	0.53	0.00	2.00	0.454
	moderate	1.21	1.00	0.62	0.00	3.00	
MAIA-Not worrying	low	0.89	1.00	0.62	0.00	2.40	0.001
	moderate	1.77	2.00	0.91	0.20	3.20	
MAIA-Attention regulation*	low	2.06	2.00	0.69	0.14	3.28	<0.001
	moderate	3.20	3.42	0.59	2.00	4.00	
MAIA-Emotional awareness*	low	3.65	3.60	0.38	3.00	4.40	<0.001
	moderate	4.23	4.20	0.42	3.60	5.00	
MAIA-Self regulation*	low	1.76	1.75	0.70	0.50	3.25	<0.001
	moderate	2.75	2.75	0.86	0.25	4.00	
MAIA-Body listening	low	2.30	2.00	0.48	1.66	3.33	<0.001
	moderate	3.25	3.33	0.79	1.66	5.00	
MAIA-Trusting	low	1.30	1.00	0.73	0.00	3.00	<0.001
	moderate	2.70	3.00	0.46	1.66	3.66	
MAIA-Total*	low	17.52	17.47	2.40	13.69	23.61	<0.001
	moderate	23.14	23.55	2.53	18.05	27.18	

* The assumption of normal distribution is provided. SD: standart deviation, IPAQ: International Physical Activity Questionnaire, PWI-A: Personal Well-Being Index-Adult, MAIA: Multidimensional Assessment of Interoceptive Awareness

Table 3. Spearman correlation analysis between BMI, VAS, IPAQ scores and PWI-A and MAIA scores

		BMI	VAS	IPAQ	
Spearman's rho	PWI-A	R	-0.303	-0.780	0.755
		p	0.033	<0.001	<0.001
		N	50	50	50
	MAIA-Noticing	r	-0.101	0.380	-0.489
		p	0.486	0.007	<0.001
		N	50	50	50
	MAIA-Not distracting	r	0.086	0.272	-0.081
		p	0.553	0.056	0.574
		N	50	50	50
	MAIA-Not worrying	r	-0.249	-0.585	0.586
		p	0.081	<0.001	<0.001
		N	50	50	50
	MAIA-Attention regulation	r	-0.445	-0.698	0.729
		p	0.001	<0.001	<0.001
		N	50	50	50
	MAIA-Emotional awareness	r	-0.313	-0.648	0.637
		p	0.027	<0.001	<0.001
		N	50	50	50
	MAIA-Self regulation	r	-0.257	-0.675	0.543
		p	0.072	<0.001	<0.001
		N	50	50	50
	MAIA-Body listening	r	-0.237	-0.710	0.612
		p	0.097	<0.001	<0.001
		N	50	50	50
	MAIA-Trusting	r	-0.146	-0.735	0.753
p		0.311	<0.001	<0.001	
N		50	50	50	
MAIA-Total	r	-0.349	-0.839	0.806	
	p	0.013	<0.001	<0.001	
	N	50	50	50	
VAS	r	0.391	1	-0.796	
	p	<0.001		<0.001	
	N	50		50	

IPAQ: International Physical Activity Questionnaire, PWI-A: Personal Well-Being Index-Adult, MAIA: Multidimensional Assessment of Interoceptive Awareness, VAS: Visual analogue scale, N: sample size, r: sample correlation coefficient

(IPAQ) short form (16). Physical activity scores were noted as MET/minutes a week and also classified categorically (low/moderate/high).

Body Weight and Height Measurements

After the weight measurement was adjusted to zero on a flat surface with a digital scale, the weight of the person being measured was evenly distributed on both feet with light clothing and bare feet.

Height was measured with an anthropometric measurement set (Harpenden, Holtain Ltd., Crymych,

UK). The anthropometry instrument was held at the same angle as the person's position, while the person to be measured was in a vertical position on a flat surface with bare feet together and parallel, body weight evenly distributed on both feet, head upright and eyes facing forward, arms hanging freely from the shoulders to the sides. During the measurement, the person was asked to take a deep breath and keep his upright position without leaving the heels on the ground, then descending the instrument to the top of the head and the measurement was performed.

BMI was calculated using the formula kg/m^2 from body weight and height measurements.

Pain

In the study, the Visual Analogue Scale (VAS) scored between 0 and 10 was used to question pain. The pain experienced by the patients at rest, during movement, and at night was questioned. They were asked to rate "0" for no pain and "10" for the most severe pain they have ever experienced in their life (17).

Personal Well-Being

Personal well-being index-adult form (PWI-A) is an 11-point Likert (0-10) questionnaire that aims to measure subjective well-being. Living areas measured by the PWI-A form; standard of living, personal health, success in life, personal relationships, personal security, social affiliation/belonging, confidence in the future, and spirituality/religion. Each of the eight areas of life that the PWI-A form aims to measure is measured with a total of eight questions over a single question. The psychometric properties of the PWI-A form on the adult sample in Turkey were examined by Meral in 2014 (18).

Interoceptive Awareness

Multidimensional Assessment of Interoceptive Awareness (MAIA) contains items on inner awareness and various mind-body dimensions. It consists of 37 items and eight subscales: (1) Noticing, (2) Not distracting; (3) Not worrying; (4) Attention Regulation; (5) Emotional Awareness; (6) Self-regulation; (7) Body Listening and (8) Trusting. Participants answer each item on a Likert-type scale ranging from "(0) never" to "(5) always". Higher scores represent higher levels of inner perception sensitivity. The validity and reliability study of the Turkish adaptation was carried out by Özpınar et al. in 2021 (19).

Statistical Analyses

The descriptive statistics of the qualitative variables in the study are given as numbers and percentages, and the descriptive statistics of the quantitative variables are given as mean, median, standard deviation, minimum, and maximum. The conformity of the quantitative variables to the normal distribution was evaluated with the Kolmogorov-Smirnov test. The homogeneity

of variance was examined by Levene's test. In the mean comparison of two independent groups, the t-test (student t-test) was used, and the Mann-Whitney U test was used in the median comparison of the two independent groups. Pearson and Spearman correlation coefficients were used when evaluating the relationships between quantitative variables. The statistical significance level was taken as 0.05, and Statistical Package for the Social Sciences package program version 26.0 (SPSS Inc., Chicago, IL, USA) was used.

RESULTS

Demographic and clinical data of the participants are given in Table 1.

While 45 (90%) of the participants were unemployed/retired, 5 (10%) were full-time working.

According to physical activity levels, 27 of the participants (54%) had low physical activity, 23 (46%) had moderate physical activity, and there was no participant with high physical activity.

Table 2 shows the descriptive statistics and p values obtained as a result of comparing the mean values of the PWI-A and MAIA scores between the physical activity groups.

There was no significant difference between the mean values of PWI-A and MAIA scores between the unemployed/retired and full-time working groups ($p>0.05$).

Table 3 shows the results of the correlation analysis between BMI, VAS, IPAQ scores, and PWI-A and MAIA scores.

When the correlation analysis was examined; Moderate negative statistically significant relationship between BMI and PWI-A ($p<0.05$, $r=-0.326$), MAIA attention regulation ($p<0.01$, $r=-0.445$), emotional awareness ($p<0.05$, $r=-0.313$), and total scores ($p<0.05$, $r=-0.349$) and moderate positive statistically significant relationship between BMI and VAS ($p<0.01$, $r=0.391$) was found.

Large negative statistically significant relationship between VAS and PWI-A ($p<0.001$, $r=-0.780$), VAS and all subscores and total scores of MAIA ($p<0.001$) except no relationship with not distracting ($p>0.05$) and moderate positive relationship with noticing scores ($p<0.01$, $r=0.380$) was found.

Large positive statistically significant relationship between IPAQ and PWI-A ($p < 0.001$, $r = 0.755$), IPAQ and all subscores and total scores of MAIA ($p < 0.001$) except no relationship with not distracting ($p > 0.05$) and moderate negative relationship with noticing scores ($p < 0.001$, $r = -0.489$) and large negative relationship between IPAQ and VAS ($p < 0.001$, $r = -0.796$) was found.

DISCUSSION AND CONCLUSION

In this study, the relationship between physical activity status and pain, personal well-being, and interoceptive awareness in women with fibromyalgia was investigated.

The demographic data of our study sample is similar to the literature (20).

Interoceptive awareness is the conscious perception of the senses that create the physiological sensations of the body, such as heartbeat, respiration, satiety, and the autonomic nervous system sensations related to emotions. Decreased interoceptive awareness in chronic painful conditions such as fibromyalgia has been reported in the literature (20-22).

Valenzuela-Moguillansky et al. compared women with fibromyalgia and the control group in their study and found MAIA noticing scores to be significantly higher, and noted distracting and trusting scores to be significantly lower in women with fibromyalgia (20). When the MAIA scores were compared with our study, it was seen that the noticing and attention regulation scores of the sample in this study were higher, and the trusting score was lower. In the same study, a significant negative correlation was shown between pain severity and MAIA not distracting, self-regulation, and trusting scores. In our study, on the other hand, MAIA noticing, not worrying, attention regulation, emotional awareness, and self regulation scores were correlated with VAS. Due to the differences in our study sample, some relationships may be exaggerated or not demonstrated. The sociodemographic differences of the Turkish patient group may also have caused this situation.

These results suggest that although fibromyalgia patients have greater awareness of uncomfortable body sensations, they are unable to use this awareness

to regulate distress. The increase in noticing in patients with fibromyalgia may be an expression of increased attention to the body, increased alertness to bodily signals, and overfocus on oneself. This could also explain the low scores in trusting. For fibromyalgia sufferers, bodily signals are a concern. Interoceptive awareness is actually an alarm and can result in a process called objectification of body sensations. Accordingly, bodily sensations now become foreign objects to which patients must protect themselves. Therefore, although attention to bodily sensations has increased, it also leads the person to distance himself from his own body. This process underlies the portrayal of fibromyalgia patients as an "alien" body by various authors (23, 24).

Borg et al also investigated interoception in women with fibromyalgia and reported BMI as one of the determining factors for heartbeat score (22). In our study, BMI was also found to be associated with attention regulation and emotional awareness subscores of personal well-being, pain, and interoceptive awareness. It is an expected result that BMI would lead to this result due to its negative effect on body image and its close relation with low physical activity.

Physical activity has an impact on health and is an important component of energy expenditure. It has a huge impact on energy balance and body composition. It provides an increase in the mass of skeletal muscle, which enables the activity to occur, resulting in an increase in lean body mass. In addition, physical activity is thought to be beneficial for emotional well-being. Advances in neuroimaging techniques have shown that exercise makes changes in brain structure and function (25). Many studies have shown that physical activity reduces symptoms of depression and anxiety and raises the mood of individuals (26, 27).

Physical activity decreases in individuals with fibromyalgia due to decreased muscle strength and fear of movement (kinesiophobia) and the severity of kinesiophobia is related to severity of pain (28). Also more than half of our participants was in low activity group. Again, consistent with the literature, a high correlation was found between physical activity score, pain severity and personal well-being.

There is evidence that exercise creates positive changes in the perception of physical self and identity. Davis and Mahindru reported that exercise increases

body awareness and expectations, making it difficult to build self-esteem and satisfaction (27, 29).

Physical activity, on the other hand, improves body image through fat loss and improved muscle fitness (30). The use of interoceptive awareness in physiotherapy is in the form of interventions for awareness of how the body works in terms of body function, behavior and interaction with oneself and others. Body awareness therapy (BAT) was first used by the physiotherapist Roxendal on schizophrenic patients and is now used as a relatively new approach for the multiple clinical settings in physiotherapy. Based on this information, BAT, which is widely used in chronic pain and psychiatric patients in northern European countries, has also started to be used in our country. BAT started to be used in fibromyalgia with the hypothesis of impaired body awareness and the positive results of body awareness therapy based on a holistic treatment approach in fibromyalgia patients are available in the literature (31, 32). Therefore, in fibromyalgia exercises that will increase IA, regulate stability and posture (such as Tai-Chi) and body awareness therapy (BAT) can be recommended.

The strength of this study is that it is the first study to investigate the relationship between physical activity and pain, IA and PWB in women with fibromyalgia. However, the study has some limitations. The small sample size of the study is the primary limitation. Since the study sample was not homogeneously distributed in terms of occupational status, no relationship was found between occupation, pain, IA and PBW. This relationship may be demonstrated in a more homogeneous group.

In conclusion, interoceptive awareness is impaired in women with fibromyalgia. Decreased interoceptive awareness and well-being are closely associated with physical activity level. Regular exercise and optimal physical activity along with physical benefits are also necessary to increase interoceptive awareness and improve quality of life in individuals with fibromyalgia, therefore they are of great importance in treatment processes.

Conflict-of-interest and financial disclosure

The authors declare that they have no conflict of interest to disclose. The authors also declare that they did not receive any financial support for the study.

REFERENCES

1. Walitt B, Katz RS, Bergman MJ, Wolfe F. Three-Quarters of Persons in the US Population Reporting a Clinical Diagnosis of Fibromyalgia Do Not Satisfy Fibromyalgia Criteria: The 2012 National Health Interview Survey. *PLoS One*. 2016;11(6):e0157235.
2. Bellato E, Marini E, Castoldi F, et al. Fibromyalgia syndrome: etiology, pathogenesis, diagnosis, and treatment. *Pain Res Treat*. 2012;2012:426130.
3. Dragesund T, Ljunggren AE, Kvåle A, Strand LI. Body Awareness Rating Questionnaire – Development of a self-administered questionnaire for patients with long-lasting musculoskeletal and psychosomatic disorders. *Adv Phys*. 2010;12:87-94.
4. Pisella L, Havé L, Rossetti Y. Body awareness disorders: dissociations between body-related visual and somatosensory information. *Brain*. 2019;142(8):2170-3.
5. Onieva-Zafra MD, Parra-Fernández ML, Fernandez-Martinez E. Benefits of a Home Treatment Program Using Guided Imagery Relaxation Based on Audio Recordings for People With Fibromyalgia. *Holist Nurs Pract*. 2019;33(2):111-20.
6. Hassett AL, Gevirtz RN. Nonpharmacologic treatment for fibromyalgia: patient education, cognitive-behavioral therapy, relaxation techniques, and complementary and alternative medicine. *Rheum Dis Clin North Am*. 2009;35(2):393-407.
7. The World Health Organization Quality of Life assessment (WHOQOL): position paper from the World Health Organization. *Soc Sci Med*. 1995;41(10):1403-9.
8. Campos RP, Vázquez Rodríguez MI. Health-related quality of life in women with fibromyalgia: clinical and psychological factors associated. *Clin Rheumatol*. 2012;31(2):347-55.
9. Homann D, Stefanello JM, Góes SM, Breda CA, Piva Edos S, Leite N. Stress perception and depressive symptoms: functionality and impact on the quality of life of women with fibromyalgia. *Rev Bras Reumatol*. 2012;52(3):319-30.
10. Penny KI, Purves AM, Smith BH, Chambers WA, Smith WC. Relationship between the chronic pain grade and measures of physical, social and psychological well-being. *Pain*. 1999;79(2-3):275-9.
11. Schleicher H, Alonso C, Shirtcliff EA, Muller D, Lovinge BL, Coe CL. In the Face of Pain: The Relationship between Psychological Well-Being and Disability in Women with Fibromyalgia. *Psychother Psychosom*. 2005;74(4):231-9.

12. Culos-Reed SN, Brawley LR. Fibromyalgia, physical activity, and daily functioning: the importance of efficacy and health-related quality of life. *Arthritis Care Res.* 2000;13(6):343-51.
13. Tüzün EH, Albayrak G, Eker L, Sözü S, Daşkapan A. A comparison study of quality of life in women with fibromyalgia and myofascial pain syndrome. *Disabil Rehabil.* 2004;26(4):198-202.
14. Soriano-Maldonado A, Ruiz JR, Aparicio VA, et al. Association of Physical Fitness With Pain in Women With Fibromyalgia: The al-Ándalus Project. *Arthritis Care Res (Hoboken).* 2015;67(11):1561-70.
15. Estévez-López F, Gray CM, Segura-Jiménez V, et al. Independent and combined association of overall physical fitness and subjective well-being with fibromyalgia severity: the al-Ándalus project. *Qual Life Res.* 2015;24(8):1865-73.
16. Lee PH, Macfarlane DJ, Lam TH, Stewart SM. Validity of the International Physical Activity Questionnaire Short Form (IPAQ-SF): a systematic review. *Int J Behav Nutr Phys Act.* 2011;8:115.
17. Gallagher EJ, Liebman M, Bijur PE. Prospective validation of clinically important changes in pain severity measured on a visual analog scale. *Ann Emerg Med.* 2001;38(6):633-8.
18. Meral BF. Psychometric properties of Turkish form of the Personal Well-Being Index-Adult. *The Journal of Happiness&Well-Being* 2014;2(2):119-31.
19. Özpınar S, Dunder E, Demir Y, Akyol M. Multidimensional assessment of interoceptive awareness (MAIA 2): psychometric properties of the Turkish version. *Journal of Health Sciences and Medicine.* 2021;4:132-6.
20. Valenzuela-Moguillansky C, Reyes-Reyes A, Gaete MI. Exteroceptive and Interoceptive Body-Self Awareness in Fibromyalgia Patients. *Front Hum Neurosci.* 2017;11:117.
21. Duschek S, Montoro CI, Reyes Del Paso GA. Diminished Interoceptive Awareness in Fibromyalgia Syndrome. *Behav Med.* 2017;43(2):100-7.
22. Borg C, Chouchou F, Dayot-Gorlero J, et al. Pain and emotion as predictive factors of interoception in fibromyalgia. *J Pain Res.* 2018;11:823-835.
23. Valenzuela Moguillansky C. Pain and Body Awareness An Exploration of the Bodily Experience of Persons Suffering from Fibromyalgia *Constr. Found.* 2013;8:339.
24. Calsius J, Courtois I, Stiers J, De Bie J. How Do Fibromyalgia Patients With Alexithymia Experience Their Body? A Qualitative Approach. *SAGE Open.* 2015;5(1):2158244015574631.
25. Hillman CH, Erickson KI, Kramer AF. Be smart, exercise your heart: exercise effects on brain and cognition. *Nat Rev Neurosci.* 2008;9(1):58-65.
26. Sharma A, Madaan V, Petty FD. Exercise for mental health. *Prim Care Companion J Clin Psychiatry.* 2006;8(2):106.
27. Mahindru A, Patil P, Agrawal V. Role of Physical Activity on Mental Health and Well-Being: A Review. *Cureus.* 2023;15(1):e33475.
28. Koçyiğit BF, Akaltun MS. Kinesiophobia Levels in Fibromyalgia Syndrome and the Relationship Between Pain, Disease Activity, Depression. *Arch Rheumatol.* 2020;35(2):214-9.
29. Fox KR. *The physical self: From motivation to well-being.* Champaign, IL: Human Kinetics; 1997.
30. Gaddad P, Pemde HK, Basu S, Dhankar M, Rajendran S. Relationship of physical activity with body image, self esteem sedentary lifestyle, body mass index and eating attitude in adolescents: A cross-sectional observational study. *J Family Med Prim Care.* 2018;7(4):775-9.
31. Bravo C, Skjaerven LH, Espart A, Guitard Sein-Echaluze L, Catalan-Matamoros D. Basic Body Awareness Therapy in patients suffering from fibromyalgia: A randomized clinical trial. *Physiother Theory Pract.* 2019;35(10):919-29.
32. Courtois I, Cools F, Calsius J. Effectiveness of body awareness interventions in fibromyalgia and chronic fatigue syndrome: a systematic review and meta-analysis. *J Bodyw Mov Ther.* 2015;19(1):35-56.