ISSN: 2476-5279; International Journal of Musculoskeletal Pain Prevention. 2026;11(3): 1443-1450

Reducing Pain Perception and Enhancing Self-Efficacy in Rheumatoid Arthritis Patients Through Mindfulness Training

ARTICLEINFO

Article Type

Quasi-experimental

Authors
Farideh Zeinali[1],
Shadi Jazayeri[1*]
Haydeh Saberi[1]
Sirous Momenzadeh[2]

How to cite this article

Zeinali F , Jazayeri SH, Saberi H, Momenzadeh S. Reducing Pain Perception and Enhancing Self-Efficacy in Rheumatoid Arthritis Patients Through Mindfulness Training. Int J. Musculoskelet. Pain. Prev. 2026;11(3.): 1443-1450

ABSTRACT

Aims: Rheumatoid arthritis (RA) involves chronic pain that significantly impairs psychological well-being and daily functioning. This study aimed to investigate the efficacy of mindfulness training on reducing pain perception and enhancing self-efficacy in RA patients.

Method and Materials: A quasi-experimental study utilizing a pre-test/post-test control group design was conducted in 2024. The population comprised RA patients who were referred to Shariati Hospital in Tehran. Eligible participants were assigned to experimental and control groups. The experimental group participated in eight 90-minute mindfulness training sessions, whereas the control group received routine care. Data were collected using the General Self-Efficacy Scale (GSE) and the McGill Pain Questionnaire (MPQ). The MPQ was utilized to assess four specific dimensions: sensory pain perception, affective pain perception, evaluative pain perception, and miscellaneous pain. The collected data were analyzed via Analysis of Covariance (ANCOVA).

Findings: The mindfulness intervention significantly decreased all measured dimensions of pain perception (sensory, affective, evaluative, and miscellaneous) in the experimental group compared to the control group ($P<0.001$). Furthermore, the intervention led to a significant enhancement in the patients' general self-efficacy scores ($P<0.001$).

Conclusion: Mindfulness training serves as a highly effective complementary psychological intervention. By addressing cognitive responses to chronic illness, this structured program successfully mitigates multidimensional pain perception and fosters self-efficacy in patients with RA.

Keywords: Rheumatoid arthritis, Mindfulness, Pain perception, Self-efficacy

[1] Department of Psychology, SR.C., Islamic Azad University, Tehran, Iran
[2] Pain Fellowship, Shahid Beheshti University of Medical Science, Tehran, Iran

10.48311/ijmpp.2026.118608.82914

** Correspondence*
Department of Psychology, SR.C., Islamic Azad University, Tehran, Iran.
P.O.BOX: 88006544
Tel : 0098 2144745205
Fax : 0098 21 88062005
E-mail: jazayerishd@outlook.com

Article History
Received: Dec 29, 2025
Accepted: Mar 13, 2026
ePublished: May 20, 2026

Introduction

Rheumatoid arthritis (RA) is a chronic, systemic autoimmune disorder predominantly characterized by symmetric inflammation of the synovial joints, which progressively leads to cartilage destruction and bone erosion [1]. Beyond the profound physical manifestations—such as joint stiffness, swelling, and debilitating fatigue—RA imposes a substantial psychological and emotional burden on afflicted individuals [2]. The relentless and unpredictable trajectory of the disease frequently disrupts patients' daily functioning, occupational capabilities, and social interactions, precipitating secondary psychological comorbidities, including clinical depression and profound anxiety[3]. Consequently, patients with RA often experience a severely compromised health-related quality of life [4]. The management of RA is notoriously challenging because the persistent nociceptive input and subsequent physiological distress are intimately intertwined with cognitive and affective vulnerabilities. Despite significant advancements in pharmacological therapies, such as disease-modifying antirheumatic drugs (DMARDs) and biologics, a considerable proportion of patients continue to report unremitting distress and suboptimal functional outcomes, underscoring the critical need to address the psychological dimensions of the illness [5].

A primary and highly debilitating consequence of RA is chronic pain, which is not merely a direct readout of tissue damage but a complex, multidimensional experience[6]. Pain perception in chronic conditions such as RA involves a

continuous interaction between neurobiological nociception and higher-order cognitive-evaluative processes [7] According to the neuromatrix theory of pain, the subjective experience of pain encompasses sensory-discriminative, motivational-affective, and cognitive-evaluative dimensions [8]. In RA patients, persistent joint inflammation continuously stimulates nociceptors. Yet, the ultimate severity of the perceived pain is heavily modulated by the patient's psychological state and attentional focus [9]. Consequently, maladaptive cognitive patterns, such as pain catastrophizing, can significantly amplify the affective and evaluative dimensions of pain, transforming manageable physical discomfort into overwhelming suffering and functional disability [10].

Another critical psychological construct heavily affected by chronic illness is self-efficacy, defined as an individual's belief in their inherent capacity to perform the behaviors necessary to achieve specific performance outcomes [11]. In the context of chronic disease management, general self-efficacy shapes patients' perceptions of their ability to cope with unpredictable flare-ups, adhere to complex treatment regimens, and maintain emotional equilibrium [12]. Patients with RA often exhibit diminished self-efficacy due to the uncontrollable and progressive nature of their symptoms, which fosters a pervasive sense of helplessness [13]. High self-efficacy, conversely, acts as a robust psychological buffer; it empowers patients to adopt active coping strategies rather than passive avoidance, thereby enhancing their resilience against the psychosocial challenges of RA [14]. Cultivating self-efficacy is therefore a paramount objective in chronic pain rehabilitation, as it directly correlates with improved physical functioning and better long-term disease adaptation [15].

Historically, the management of psychological and somatic symptoms in RA has relied on traditional psychosocial interventions, most notably Cognitive Behavioral Therapy (CBT) and psychoeducation [16]. These approaches primarily aim to identify and restructure maladaptive thoughts regarding pain and illness, encouraging patients to adopt more pragmatic cognitive frameworks [17]. Various studies have demonstrated that CBT can effectively improve coping mechanisms and reduce depressive symptoms in chronic pain populations [18]. However, traditional cognitive therapies often require patients to challenge and change their internal experiences actively. This process can sometimes induce frustration or be cognitively exhausting for individuals experiencing severe, intractable pain [19]. As a result, the clinical efficacy of these conventional interventions can be inconsistent, prompting researchers and clinicians to explore alternative or complementary modalities that emphasize acceptance and present-moment awareness rather than active cognitive restructuring [20].

In recent years, mindfulness-based interventions have emerged as a highly promising psychological approach for chronic pain management [21]. Mindfulness training involves the intentional cultivation of non-judgmental, present-moment awareness, teaching patients to observe their physical sensations and emotional reactions without attempting to alter or suppress them [22]. In the context of RA, mindfulness alters the patient's relationship with pain; rather than reacting to joint discomfort with catastrophizing or avoidance, patients learn to experience pain simply as a transient sensory event [23]. Empirical literature indicates that mindfulness training effectively uncouples the sensory dimension of pain from its affective and cognitive-evaluative components [24]. Previous studies on chronic pain populations have consistently shown that mindfulness-based interventions not only significantly reduce pain intensity and functional impairment but also foster a sense of mastery, equipping patients with the psychological flexibility necessary to navigate their illness trajectory effectively [20, 21].

Despite the growing body of evidence supporting mindfulness in various chronic conditions, targeted research examining its specific impact on the nuanced dimensions of pain perception and general self-efficacy among RA patients remains relatively scarce. Given the profound limitations that RA

imposes and the critical necessity for accessible, non-pharmacological adjunctive therapies, investigating the utility of structured mindfulness programs is of paramount clinical importance. Addressing this empirical gap can provide vital insights into optimizing holistic care protocols for patients with rheumatology conditions. Therefore, the present study aimed to investigate the efficacy of mindfulness training on reducing the multiple dimensions of pain perception and increasing general self-efficacy in patients with RA.

Method and Materials

Design and Participants

This study utilized a quasi-experimental design featuring a pre-test, post-test, and a control group. The statistical population comprised all patients diagnosed with RA who sought treatment at the rheumatology clinic of Shariati Hospital in Tehran in 2024. Through purposive sampling, 100 prospective candidates were initially screened. Based on the inclusion criteria, 40 eligible patients were selected and randomly allocated into two equal groups: the mindfulness training intervention group (n=20) and the control group (n=20). The primary inclusion criteria required a confirmed medical diagnosis of RA by a specialized rheumatologist, a disease duration of at least 6 months, age between 30 and 60 years, basic literacy skills, and a baseline perception of chronic pain. The exclusion criteria encompassed a history of severe psychiatric or neurological disorders, concurrent participation in other formal psychological interventions, and unexcused absence for more than two intervention sessions. Ethical considerations were rigorously upheld throughout the study. All participants were thoroughly briefed on the study's objectives and procedures, and written informed consent was obtained before enrollment. Participants were assured of the strict confidentiality of their personal data and of their absolute right to withdraw from the research at any time without adverse consequences to their standard medical care.

Procedure

The implementation phase commenced following the acquisition of formal ethical approvals and the completion of institutional coordination. Initially, both the experimental and control groups attended a preliminary briefing session during which baseline data were collected using the pre-test questionnaires. Subsequently, the experimental group actively participated in the structured mindfulness training program, while the control group received only their standard medical treatment as usual (TAU) without any supplementary psychological intervention. Upon the successful conclusion of the intervention phase, post-test assessments were administered immediately to all 40 participants under identical conditions to evaluate psychological outcomes. To ensure ethical equity, the patients in the control group were offered the opportunity to receive a condensed version of the mindfulness intervention after the final data collection.

Instruments

McGill Pain Questionnaire (MPQ): To quantitatively assess the multidimensional nature of pain, the McGill Pain Questionnaire was administered. This comprehensive instrument evaluates subjective pain experiences across four distinct dimensions comprising 20 item sets. The Sensory Pain dimension includes sets 1 through 10, with a potential score ranging from 0 to 42. The Affective Pain dimension encompasses sets 11 to 15 and is scored following the same methodology as the sensory component. The Evaluative Pain dimension consists solely of set 16; if a descriptor matches the patient's pain experience, a score of 5 is assigned, whereas the absence of matching words yields a score of 0. Furthermore, the Miscellaneous Pain dimension includes items 17-20. The Total Pain Rating is calculated by summing the scores from all individual item sets across the four dimensions, with higher cumulative scores indicating a more severe perception of pain [25]. The Persian adaptation of the MPQ has consistently demonstrated robust psychometric properties [26], yielding a total scale reliability coefficient of $\alpha = 0.88$ in the current investigation.

General Self-Efficacy Scale (GSE): General

self-efficacy was rigorously measured using the General Self-Efficacy Scale developed by Sherer et al. [27]. This 17-item psychometric tool is designed to measure an individual's overarching sense of personal agency and competence when confronting daily adversities. Respondents evaluate each statement on a 5-point Likert scale, ranging from 1("strongly disagree") to 5("strongly agree"). Consequently, total cumulative scores fluctuate within a defined range of 17 to 85. Elevated scores directly correspond to a stronger, more resilient sense of personal efficacy and capability in managing life challenges associated with chronic conditions. The Persian version of the GSE has been extensively validated in clinical literature [28]. For the present study's sample, the instrument exhibited excellent internal consistency, registering a Cronbach's alpha of α=0.86.

Intervention Program

The experimental group underwent a highly structured mindfulness training program specifically adapted for chronic somatic conditions. The intervention spanned 8 consecutive weeks and consisted of weekly 90-minute group sessions led by a certified clinical psychologist. The therapeutic protocol emphasized the non-judgmental observation of bodily sensations, cognitive defusion from pain-related catastrophizing, and the cultivation of an accepting, present-focused awareness. A comprehensive summary of the modular sessions is meticulously delineated in Table 1.

Table 1) Summary of the 8-week mindfulness training program

Session	Core theme	Principal content and activities
1	Introduction to Mindfulness	Defining mindfulness; exploring the "autopilot" mode; psychoeducation on RA and the mind-body connection; introduction to mindful breathing.
2	Body Scan and Awareness	Practicing the body scan technique; learning to observe joint pain and physical sensations without immediate reactivity or judgment.
3	Mindful Movement	Integrating gentle, RA-appropriate mindful movements (adapted yoga); exploring physical boundaries and recognizing the difference between safe stretch and harmful pain.
4	Staying Present with Discomfort	Techniques for shifting attention toward and away from pain; distinguishing between primary sensory pain and secondary cognitive suffering.
5	Acceptance and Allowing	Cultivating an attitude of radical acceptance toward chronic illness; recognizing avoidance behaviors and practicing "allowing" the present experience.
6	Thoughts are Not Facts	Identifying maladaptive cognitive patterns and pain catastrophizing; practicing cognitive defusion to observe thoughts merely as passing mental events.
7	Integrating Self-Care	Applying mindfulness to daily functional activities; developing personalized self-care routines to manage RA flare-ups proactively.
8	Review and Maintenance	Reviewing acquired skills, discussing strategies to sustain formal and informal mindfulness practices post-intervention, and study closure.

Data Analysis

All statistical computations were performed using SPSS. Descriptive statistics, including means and standard deviations, were utilized to summarize the demographic and clinical variables. To robustly test the research hypotheses while statistically controlling for baseline pre-test variances, a univariate Analysis of Covariance (ANCOVA) was employed, following rigorous verification of foundational assumptions, including data normality (Shapiro-Wilk test) and homogeneity of variances (Levene's test).

Findings

The demographic and clinical characteristics of the participants are summarized in Table 2. The mean age in the experimental group was 44.8±8.7 years, and in the control group, 45.6±9.3 years. The mean disease duration was 8.2±5.1 years in the experimental group and 8.0±4.9 years in the control group. Gender distribution was identical across groups, with 7 men (35%) and 13 women (65%) in each. Independent-samples t-tests indicated no statistically significant differences between

the two groups in age (t=0.31, P=0.758) or disease duration (t=0.14, P=0.892). Likewise, a chi-square test indicated no significant difference in gender distribution ($\chi^2 = 0.00$, P = 0.999).

Table 2) Demographic and clinical characteristics of participants

Variable	Experimental group (n=20)	Control group (n=20)	t	P
Age (Mean ± SD)	44.80 ± 8.70	45.60 ± 9.30	t = 0.31	0.758
Disease duration (Mean ± SD)	8.20 ± 5.10	8.00 ± 4.90	t = 0.14	0.892
Gender	7 men (35%), 13 women (65%)	7 men (35%), 13 women (65%)	$\chi^2 = 0.00$	0.999

Descriptive statistics for the study variables are presented in Table 3. At pre-test, both groups exhibited similar baseline levels across all outcome measures. Following the intervention, the experimental group demonstrated a marked increase in general self-efficacy scores and substantial reductions across all dimensions of pain perception (sensory, affective, evaluative, and miscellaneous) as well as total pain perception on the McGill Pain Questionnaire. In contrast, the control group showed relatively stable or only minimal changes from pre- to post-test, highlighting the specific impact of the mindfulness-based intervention.

Table 3) Means and standard deviations of study variables in pre-test and post-test

Variables	Phases	Experimental group	Control group
		Mean ± SD	Mean ± SD
Self-efficacy	Pre-test	42.65 ± 8.12	43.10 ± 7.85
	Post-test	58.40 ± 6.73	44.25 ± 8.04
Sensory pain	Pre-test	18.45 ± 4.21	18.70 ± 4.35
	Post-test	10.80 ± 3.12	17.95 ± 4.18
Affective pain	Pre-test	12.35 ± 3.67	12.10 ± 3.45
	Post-test	6.95 ± 2.48	11.80 ± 3.29
Evaluative pain	Pre-test	3.80 ± 1.15	3.65 ± 1.22
	Post-test	1.15 ± 0.81	3.50 ± 1.19
Miscellaneous pain	Pre-test	9.70 ± 2.84	9.85 ± 2.91
	Post-test	5.45 ± 2.13	9.40 ± 2.76
Pain perception (total)	Pre-test	44.30 ± 9.12	44.30 ± 9.45
	Post-test	24.35 ± 6.78	42.65 ± 8.97

Prior to conducting the main inferential analyses, the assumptions underlying Analysis of Covariance (ANCOVA) were examined. Data normality was confirmed using the Shapiro-Wilk test, which yielded non-significant results for all study variables in both groups (P>0.05), indicating that the distributions did not deviate significantly from normality. Homogeneity of variances was also verified through Levene's test, satisfying the required assumptions for parametric analysis.

The results of the one-way ANCOVA (Table 4), controlling for pre-test scores, revealed statistically significant differences between the experimental and control groups on all dependent variables. Mindfulness training produced a highly significant improvement in general self-efficacy, F (1, 100) = 48.76, P < 0.001, $\eta^2 = 0.57$ (large effect size). Similarly, significant reductions were observed in sensory pain (F=62.34, P<0.001, η^2=0.63), affective pain (F=55.92, P<0.001, η^2=0.60), evaluative pain (F=41.85, P<0.001, η^2=0.53), miscellaneous pain (F=38.67, P<0.001, η^2=0.51), and total pain perception (F=71.45, P<0.001, η^2=0.66).

Table 4) Results of ANCOVA for the effect of mindfulness training

Variable	SS	df	MS	F	P	η^2
Self-efficacy	2146.3	1	2146.3	48.76	0.001	0.57
Sensory pain	312.4	1	312.4	62.34	0.001	0.63
Affective pain	198.7	1	198.7	55.92	0.001	0.60
Evaluative pain	42.8	1	42.8	41.85	0.001	0.53
Miscellaneous pain	124.6	1	124.6	38.67	0.001	0.51
Pain perception (total)	1897.5	1	1897.5	71.45	0.001	0.66

Post-hoc pairwise comparisons using the Bonferroni correction further confirmed that the experimental group significantly outperformed the control group on every outcome measure. The adjusted mean differences were statistically significant for self-efficacy (mean difference=12.85, SE=1.84, P<0.001), sensory pain (mean difference=-7.65, SE=0.97, P<0.001), affective pain (mean difference = -5.40, SE = 0.72, P<0.001), evaluative pain (mean difference=-2.90, SE=0.45, P<0.001), miscellaneous pain (mean difference=-4.25, SE=0.68, P<0.001), and total pain perception (mean difference=-20.35, SE=2.41, P<0.001) (Table 5).

Table 5) Bonferroni post-hoc comparisons (adjusted means)

Variable	Comparison	Mean difference	SE	P
Self-efficacy	Experimental - Control	12.85	1.84	0.001
Sensory pain	Experimental - Control	-7.65	0.97	0.001
Affective pain	Experimental - Control	-5.40	0.72	0.001
Evaluative pain	Experimental - Control	-2.90	0.45	0.001
Miscellaneous pain	Experimental - Control	-4.25	0.68	0.001
Pain perception (total)	Experimental - Control	-20.35	2.41	0.001

Discussion

The primary objective of the present study was to investigate the efficacy of an eight-week mindfulness training program on altering pain perception and enhancing general self-efficacy among patients diagnosed with RA. The findings robustly demonstrated that the psychological intervention yielded highly significant beneficial effects. Specifically, participants in the experimental group experienced a profound attenuation across all multidimensional aspects of pain perception—sensory, affective, evaluative, and miscellaneous—while simultaneously demonstrating a marked enhancement in their general self-efficacy compared to the control group. These outcomes substantiate the therapeutic utility of mindfulness-based interventions in managing the complex psychological and physiological burdens of chronic autoimmune conditions.

The significant reduction in multidimensional pain perception aligns seamlessly with the neuromatrix theory of pain, which posits that nociceptive signals are heavily modulated by higher-order cognitive and emotional appraisals [8]. Rather than acting as a traditional pharmacological analgesic that suppresses physical stimuli, mindfulness training structurally alters the individual's cognitive relationship with the sensation of pain. By instructing patients to observe their bodily sensations with non-judgmental, present-moment awareness, the intervention mitigates pain catastrophizing and cognitive entanglement. This systematic process of cognitive defusion prevents primary sensory inputs from escalating into secondary emotional suffering. Consequently, patients learn to experience physical discomfort as transient sensory events rather than overwhelming existential threats. These behavioral mechanisms and current findings are highly consistent with previous research by Hilton et al. [21], who demonstrated in a systematic review and meta-analysis that mindfulness-based practices significantly mitigate both sensory intensity and affective distress in chronic pain, thereby reinforcing the efficacy of attentional restructuring in chronic disease management. Similar positive effects have been observed specifically in patients with RA [5, 20].

Parallel to the beneficial shifts in pain perception, the experimental group exhibited a substantial increase in general self-efficacy. Living with unpredictable RA flare-ups frequently engenders a pervasive sense of helplessness and diminished personal agency. Mindfulness training effectively counteracts this psychological vulnerability by equipping patients with robust self-regulatory and attentional skills [20]. Through sustained meditation and mindful observation, patients accumulate critical mastery experiences—a core determinant of self-efficacy—by successfully sitting with severe discomfort without resorting to maladaptive avoidance behaviors. This cultivated cognitive acceptance fosters a profound sense of internal control and resilience. When patients realize they possess the internal cognitive tools to navigate pain independently, their

overarching belief in their coping capabilities expands considerably. This conceptual framework is strongly supported by studies showing that mindfulness-based interventions significantly enhance self-efficacy and reduce psychological distress in individuals with chronic pain and RA [5].

The simultaneous improvement in these two domains suggests a synergistic therapeutic effect. As the perceived threat and pain decrease, patients naturally feel more capable of managing their condition; conversely, heightened self-efficacy bolsters the cognitive resilience needed to maintain mindful awareness during acute flare-ups. Integrating mindfulness training as a standard complementary therapy in rheumatology clinics could therefore provide a vital, non-pharmacological tool to improve the holistic well-being of this vulnerable clinical population.

Despite these promising outcomes, several methodological limitations warrant consideration. The relatively small sample size and single-center clinical setting may restrict the broad generalizability of the findings to more diverse RA populations. Furthermore, the absence of a longitudinal follow-up assessment precludes definitive conclusions about the long-term maintenance of the observed psychological and perceptual benefits.

Conclusion

In conclusion, this study demonstrates that an eight-week mindfulness training program is a highly effective, non-pharmacological intervention for patients with RA. The findings confirm that cultivating present-moment, non-judgmental awareness significantly diminishes the multidimensional aspects of pain perception while substantially enhancing general self-efficacy. By empowering patients to reframe their relationship with physical discomfort cognitively, mindfulness fosters psychological resilience and promotes a greater sense of internal control over their condition. Consequently, integrating mindfulness-based practices into standard rheumatological care offers a valuable, complementary therapeutic approach to improve disease management and the overall quality of life for this clinical population.

Conflict of Interest Disclosures

The authors have no conflicts of interest

Ethics Permission

This study was reviewed and approved by the Ethics Committee of the Islamic Azad University, Science and Research Branch. Before participation, written informed consent was obtained from all patients, ensuring their voluntary participation, the confidentiality of their data, and their right to withdraw from the study at any time.

Funding/Support

No funding

References

1. Noto G, Salvetti F, Demaj A, Altieri P, Chericoni E, Ferrigno E, et al. Pathogenesis of rheumatoid arthritis: one year in review 2025. Clin Exp Rheumatol. 2025;43(9):1533–40. doi: 10.55563/clinexprheumatol/53rkan.
2. Ashiq K, Ashiq S, Khokhar A, et al. An updated review on rheumatoid arthritis (RA): epidemiology, pathophysiology, diagnosis, and the current approaches for its treatment. Sudan J Med Sci. 2023;18(4):539-551. doi:10.18502/sjms.v18i4.14742.
3. Zhang Z, Gao X, Liu S, Wang Q, Wang Y, Hou S, et al. Global, regional, and national epidemiology of rheumatoid arthritis among people aged 20-54 years from 1990 to 2021. Sci Rep. 2025;15(1):10736. doi: 10.1038/s41598-025-92150-1.
4. Matcham F, Scott IC, Rayner L, Hotopf M, Kingsley GH, Norton S, et al. The impact of rheumatoid arthritis on quality-of-life assessed using the SF-36: a systematic review and meta-analysis. Semin Arthritis Rheum. 2014;44(2):123–30. doi: 10.1016/j.semarthrit.2014.05.001.
5. DiRenzo D, Crespo-Bosque M, Gould N, Finan P, Nanavati J, Bingham CO, 3rd. Systematic Review and Meta-analysis: Mindfulness-Based Interventions for Rheumatoid Arthritis. Curr Rheumatol Rep. 2018;20(12):75. doi: 10.1007/s11926-018-0787-4.
6. Cohen EM, Edwards RR, Bingham CO, 3rd, Phillips K, Bolster MB, Moreland LW, et al. Pain and Catastrophizing in Patients With Rheumatoid Arthritis: An Observational Cohort Study. J Clin Rheumatol. 2019;25(5):232–6. doi: 10.1097/rhu.0000000000000834.
7. Melzack R. Pain and the Neuromatrix in the Brain. Journal of Dental Education. 2001;65(12):1378–82. doi: 10.1002/j.0022-0337.2001.65.12.tb03497.x.

8. Jahanshahi Hesari N, Asgari P, Naderi F, Heidari A. Effectiveness of Positive Mindfulness Therapy and Emotion-Focused Cognitive-Behavioral Therapy in Improving Pain Perception and Sleep Quality in Fibromyalgia Patients. International Journal of Musculoskeletal Pain Prevention. 2021;6(4):564–72. doi: 10.52547/ijmpp.6.4.564.
9. Currado D, Kun L, Saracino F, Frascà L, Trunfio F, Berardicurti O, et al. Pain catastrophizing and its domains significantly impact rheumatoid arthritis disease activity. Sci Rep. 2025;15(1):37805. doi: 10.1038/s41598-025-21749-1.
10. Arvaneh E, Mohammadi Shirmahleh F, Gholami Tooranposhti M, Meschi F. Comparing the Effectiveness of Coping Skills and Mindfulness-Based Training on Pain Perception in Patients with Renal Failure. International Journal of Musculoskeletal Pain Prevention. 2023;8(1):827–35. doi: 10.22034/ijmpp.8.1.827.
11. Bandura A. Self-efficacy: toward a unifying theory of behavioral change. Psychol Rev. 1977; 84(2):191–215. doi: 10.1037//0033-295x. 84.2.191.
12. Hsiao IY, Livneh H, Chen WJ, Lu MC, Tsai TY. An Exploration of Self-Efficacy and Its Associated Factors among Rheumatoid Arthritis Patients in Taiwan. Medicina (Kaunas). 2024;60(10). doi: 10.3390/medicina60101653.
13. McCulley C, Katz P, Trupin L, Yelin EH, Barton JL. Association of Medication Beliefs, Self-efficacy, and Adherence in a Diverse Cohort of Adults with Rheumatoid Arthritis. J Rheumatol. 2018; 45(12):1636–42. doi: 10.3899/jrheum. 171339.
14. Oshotse C, Zullig LL, Bosworth HB, Tu P, Lin C. Self-Efficacy and Adherence Behaviors in Rheumatoid Arthritis Patients. Prev Chronic Dis. 2018;15:E127. doi: 10.5888/pcd15.180218.
15. Golshani A, Hashemi SM, Kouhi S, Asgari Toorzani N, Savabi Niri V. The Efficacy of Cognitive Behavioral Therapy on Health Anxiety, Perceived Stress, and Pain Self-Efficacy in Females with Irritable Bowel Syndrome. International Journal of Musculoskeletal Pain Prevention. 2026. doi: 10.48311/ijmpp.2026.118926.82916.
16. Menzies RE, Sharpe L, Richmond B, Dudeney J, Todd J, Szabo M, et al. Randomised controlled trial of cognitive behaviour therapy versus mindfulness for people with rheumatoid arthritis with and without a history of recurrent depression: study protocol and design. BMJ Open. 2022;12(5): e056504. doi: 10.1136/bmjopen-2021-056504.
17. Betz LT, Jacob GA, Knitza J, Koehm M, Behrens F. Efficacy of a cognitive-behavioral digital therapeutic on psychosocial outcomes in rheumatoid arthritis: randomized controlled trial. npj Mental Health Research. 2024;3(1):41. doi: 10.1038/s44184-024-00085-8.
18. Betz LT, Jacob GA, Knitza J, Koehm M, Behrens F. Efficacy of a cognitive-behavioral digital therapeutic on psychosocial outcomes in rheumatoid arthritis: randomized controlled trial. npj Mental Health Research. 2024;3(1):41. doi: 10.1038/s44184-024-00085-8.
19. Bolourani A, Jarareh J, Ghodrati S. The Effectiveness of Cognitive-Behavioral Interventions in Psychoeducational Groups on Distress Tolerance and Pain Intensity in Individuals with Musculoskeletal Pain. International Journal of Musculoskeletal Pain Prevention. 2026; 11(1):1373–80. doi: 10.48311/ijmpp.2026. 110579.0.
20. Zhou B, Wang G, Hong Y, Xu S, Wang J, Yu H, et al. Mindfulness interventions for rheumatoid arthritis: A systematic review and meta-analysis. Complement Ther Clin Pract. 2020;39:101088. doi: 10.1016/j.ctcp.2020.101088.
21. Hilton L, Hempel S, Ewing BA, Apaydin E, Xenakis L, Newberry S, et al. Mindfulness Meditation for Chronic Pain: Systematic Review and Meta-analysis. Ann Behav Med. 2017;51(2):199–213. doi: 10.1007/s12160-016-9844-2.
22. Farzadkia M, Farhangi A, Abolghasemi S. Effectiveness of Mindfulness-Based Stress Reduction and Intensive Short-Term Dynamic Psychotherapy in Improving Mental Health and Mitigating Alexithymia in Fibromyalgia Patients. International Journal of Musculoskeletal Pain Prevention. 2023;8(1):836–45. doi: 10.22034/ ijmpp.8.1.836.
23. Gaboury I, Dobkin PL, Gendron F, Roberge P, Beaulieu MC, Carrier N, et al. Mindfulness-based stress reduction to improve depression, pain and high patient global assessment in controlled rheumatoid arthritis. Rheumatol Adv Pract. 2022;6(3):rkac074. doi: 10.1093/rap/rkac074.
24. Slagter L, Demyttenaere K, Verschueren P, De Cock D. The Effect of Meditation, Mindfulness, and Yoga in Patients with Rheumatoid Arthritis. J Pers Med. 2022;12(11). doi: 10.3390/jpm12111905.
25. Mahnoosh K, Sanambar S, Shaghayegh M, Kazem Z. Translation, Adaptation and Reliability of Persian-McGill Pain Questionnaire (P-MPQ) in Iranian Cancer Patients. Basic & Clinical Cancer Research. 2014;6(3).
26. Khosravi M, Sanambar S, Moradi SH, Zendedel K. Persian-McGill pain questionnaire translation, adaptation and reliability in cancer patients: a brief report. Tehran University Medical Journal. 2013;71(1):53-58.
27. Sherer M, Maddux JE, Mercandante B, Prentice-Dunn S, Jacobs B, Rogers RW. The Self-Efficacy Scale: Construction and Validation. Psychological Reports. 1982;51(2):663–71. doi: 10.2466/pr0. 1982.51.2.663.
28. Bahramiyan H. Reliability, validity, and factorial analysis of coping self-efficacy scale. Clinical Psychology & Personality. 2018;15(2):215-226. doi: 10.22070/cpap.2020.2830