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Research Progress of Kinesiophobia in Patients with Rheumatoid Arthritis

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Abstract: Kinesiophobia is recognized as one of the primary barriers for patients participating in physical rehabilitation. This fear can create psychological obstacles to engaging in rehabilitation exercises or daily activities, leading to a significant decline in health-related quality of life. Currently, kinesiophobia has primarily been studied in the context of chronic pain and cardiovascular diseases, while its awareness and intervention in the field of Rheumatoid Arthritis have not received sufficient attention. Assisting patients in overcoming kinesiophobia is particularly crucial for initiating physical activity in Rheumatoid Arthritis. This article aims to review the assessment tools, influencing factors, and intervention strategies for kinesiophobia in patients with Rheumatoid Arthritis, with the goal of providing clinical healthcare professionals with references and insights for developing and implementing interventions, thereby promoting active rehabilitation among patients.

Keywords: Rheumatoid Arthritis; Kinesiophobia; Influencing factors; Intervention Measures; Review

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1. Introduction

Rheumatoid arthritis (RA), a chronic autoimmune systemic disorder of undetermined etiology, is clinically characterized by symmetrical involvement of small joints, leading to synovial hyperplasia, pannus formation, and extra-articular manifestations [1]. Global epidemiological data indicates that in 2020, approximately 17.6 million individuals were afflicted with this condition, with projections estimating a rise to 31.7 million cases by 2050 [2]. Notably, the disease exhibits a 2–3 times higher prevalence in female populations compared to males [3]. Chronic arthralgia not only impairs physical functionality in RA patients but also precipitates comorbidities including anxiety, depressive, and diminished quality of life indices [4, 5]. In 2007, the French National Authority for Health formally recommended structured moderate to vigorous aerobic exercise and personalized physical rehabilitation

programs for RA patients [6]. Subsequent research by Sokka *et al.* substantiated that prescribed Physical Activity (PA) regimens demonstrate therapeutic efficacy in disease progression modulation, while concurrently alleviating fatigue, affective disorders, and nociceptive perception [7]. Paradoxically, adherence to PA recommendations remains suboptimal in this patient population. Studies reveal significantly reduced PA engagement levels among RA patients compared to normative population data, with this discrepancy strongly correlated with kinesiophobia [8]. The clinical phenomenon of kinesiophobia represents a prevalent psychological barrier in RA therapeutics. Severe manifestations of this phobic response adversely impact rehabilitation outcomes and long-term prognosis, posing substantial challenges to comprehensive biopsychosocial health management. This review systematically examines contemporary research advancements regarding kinesiophobia in RA populations, aiming to inform evidence-based nursing interventions and facilitate the development of optimized clinical management protocols.

2. Related concepts of kinesiophobia

In 1990, Kori conceptualized the phenomenon of movement-related fear in pain populations as "kinesiophobia" through the lens of the fear-avoidance model, defining it as "an exaggerated, irrational dread of physical activity stemming from heightened pain sensitivity caused by injury or tissue damage" [9]. Notably, the manifestation of movement fear in RA patients diverges from that observed in general chronic pain populations. This distinction arises from dual mechanisms: Firstly, the erosive nature of RA involving both articular destruction and systemic complications predisposes individuals to kinesiophobic responses; Secondly, the elevated cardiovascular mortality risk in RA engenders patient apprehension regarding exercise-induced adverse events, including potential fatality. Consequently, clinicians must adopt a dual focus, not only managing the underlying RA pathology but also addressing disease-associated risk factors contributing to movement fear, thereby developing targeted preventive interventions.

3. Research status of kinesiophobia in patients with rheumatoid arthritis

Current research on kinesiophobia in RA populations remains limited in scope. Öztürk *et al.* conducted a cross-sectional study of 100 Turkish RA patients, revealing a 70% prevalence rate of clinically significant kinesiophobia [1]. Complementary findings by Yildirim found that 77.4% of patients exhibited elevated kinesiophobia levels [10]. Comparative analysis in the study further substantiated that RA patients' mean kinesiophobia scores significantly surpassed those of healthy controls ($P < 0.05$) [11]. Importantly, the study establishes kinesiophobia as a prognostic determinant, correlating with functional impairment, accelerated disability progression, psychiatric comorbidities (anxiety/depression), and unfavorable clinical outcomes [8]. While existing data indicate substantial variation in kinesiophobia prevalence across studies, the consensus confirms its high burden in RA populations. Future research directions should prioritize multicenter cohort studies with expanded sample sizes to enhance epidemiological precision.

4. Assessment tools for kinesiophobia in rheumatoid arthritis patients

Current assessment instruments for kinesiophobia in RA patients predominantly consist of generic scales. The most widely implemented include: the Tampa Scale of Kinesiophobia Score(TSK), the Fear-Avoidance Beliefs Questionnaire(FABQ), and the Fear Assessment in Inflammatory Rheumatic diseases questionnaire(FAIR).

4.1. Tampa scale of kinesiophobia score (TSK)

Originally developed by Kori , this 17-item instrument remains the gold standard for assessing activity-related fear across multiple pathologies [9]. It was originally used to assess patients with chronic musculoskeletal pain and has now been introduced and applied by scholars in many countries. The results have shown that the scale has good psychometric properties. Cross-cultural validation studies in various populations have confirmed its robust psychometric properties translated and revised into Chinese, and validated it in people with degenerative low back and leg pain [12]. The scale contains four dimensions: fear avoidance, fear of work and activities, fear of movement, and fear of re-injury. It has 17 items and a total score of 17 to 68 points. The higher the score, the higher the degree of fear of movement. The TSK can identify psychological barriers in RA patients during exercise [1]. The Chinese adaptation (TSK-11) demonstrated excellent internal consistency (Cronbach's $\alpha = 0.803$) when applied to elderly RA patients, effectively capturing cognitive and behavioral dimensions of exercise avoidance [11] . Clinicians should note the existence of multiple TSK versions (e.g. TSK-11, TSK-17) when interpreting comparative data.

4.2. Fear-avoidance beliefs questionnaire (FABQ)

Developed by Waddell *et al.* in 1993 to measure patients' fear-avoidance beliefs about work and physical activity, this dual-component scale distinguishes between physical activity avoidance (FABQ-PA subscale) and occupational avoidance (FABQ-W subscale), with 16 items [13]. Higher scores indicate stronger fear-avoidance beliefs. Modified versions demonstrate particular utility in RA populations, where elevated FABQ scores correlate strongly with activity restriction behaviors [14]. As the most validated instrument for quantifying maladaptive movement beliefs, FABQ implementation facilitates the identification and modification of disability-perpetuating cognitive patterns [15].

4.3. Fear assessment in inflammatory rheumatic diseases questionnaire (FAIR)

FAIR was developed by Gossec *et al.* in 2017 to assess fear in patients with chronic inflammatory rheumatic diseases [16]. The questionnaire includes two dimensions related to fear: disease outcomes and treatment. It consists of 10 items with a total score of 0–100. Higher scores indicate greater fear or more severe psychological distress. Strong correlations with established psychological distress markers (Arthritis Helplessness Index ≥ 20; HADS anxiety ≥ 10; HADS depression ≥ 8) validate its clinical applicability [17, 18]. FAIR enables systematic monitoring of RA-associated psychopathology, informing targeted psychosocial interventions.

5. Determinants of kinesiophobia in RA

5.1. Demographic moderators

Key sociodemographic predictors of kinesiophobia encompass age, gender, socioeconomic status, and educational attainment. Clinical evidence demonstrates a positive association between advancing age and elevated TSK scores in RA patients [19]. With progressive decline in physical function, aging patients frequently develop heightened apprehension that exercise may exacerbate complications, thereby amplifying kinesiophobic responses. Gender disparities reveal significantly higher kinesiophobia prevalence among female patients compared to males, potentially attributable to women's increased susceptibility to anxiety spectrum disorders, within which kinesiophobia may represent a clinical manifestation [1, 20]. Paradoxically, contradictory findings identify male gender as a robust predictor of elevated fear-avoidance beliefs , though the neurobiological and psychosocial

mechanisms underlying this sexual dimorphism remain inadequately elucidated [21]. Socioeconomic status exhibits a direct correlation with kinesiophobia severity, particularly among individuals from lower socioeconomic backgrounds. This association may stem from constrained health literacy and limited access to comprehensive disease management information, impeding effective coping strategies. Conversely, educational attainment demonstrates an inverse relationship with kinesiophobia intensity [22]. Patients with advanced education typically exhibit enhanced capacity to comprehend therapeutic exercise benefits, demonstrate greater treatment adherence, and consequently manifest attenuated kinesiophobic responses. While current research presents conflicting evidence regarding the magnitude of sociodemographic influences on kinesiophobia, these variables remain clinically significant. Future investigations should prioritize the development of stratified intervention protocols tailored to distinct demographic cohorts, particularly through longitudinal studies controlling for confounding variables.

5.2. Disease-related variables

5.2.1. The disease itself

A seminal study revealed that patients with RA exhibit a significantly higher prevalence of kinesiophobia compared to systemic lupus erythematosus (SLE) cohorts, potentially attributable to the more pronounced destructive nature of articular involvement in RA [11]. These findings underscore disease severity as a critical determinant in the pathogenesis of movement-related anxiety. With disease progression, RA patients demonstrate progressive intensification of fatigue, nociception, affective disorders, and psychosomatic symptoms, culminating in maladaptive movement avoidance behaviors. This pathological trajectory creates a self-perpetuating cycle, where symptom exacerbation leads to a kinesiophobic response, which in turn results in activity restriction. This restriction further contributes to clinical deterioration, reinforcing the cycle.

Notably, a positive correlation exists between the TKS scores and Disease Activity Score-28 (DAS-28) indices [1]. Heightened inflammatory activity in RA joints frequently precipitates catastrophic cognitions regarding physical exertion. Baday-Keskin *et al.* substantiated that cohorts with moderate-to-high disease activity exhibited elevated kinesiophobia scores relative to controls [22]. These collective findings highlight the need for clinical implementation of comprehensive disease parameter monitoring, particularly focusing on articular destruction patterns, disease duration, and inflammatory activity indices. In addition, personalized exercise prescription protocols should be incorporated to help mitigate the development of kinesiophobia.

5.2.2. Fatigue

Fatigue represents a predominant clinical manifestation in RA, exerting detrimental effects on patients' self-management capacity and psychosocial functioning [23]. Empirical evidence from Baday-Keskin *et al.* demonstrated significantly elevated fatigue severity indices in RA populations, with quantitative analysis revealing a dose-dependent relationship between fatigue intensity and kinesiophobia levels [22]. This association may be mediated through fatigue-induced reductions in movement motivation, substantial impairment of physical activity tolerance, and subsequent amplification of exercise-related apprehension. Notably, multivariate regression models identify fatigue scores as independent predictive factors for kinesiophobia development. These findings are corroborated by Özlü *et al.* whose longitudinal cohort study confirmed bidirectional interactions between fatigue progression and phobic avoidance behaviors [24]. Current evidence substantiates fatigue as a pivotal mediator in the pathophysiology of activity avoidance, suggesting that targeted fatigue mitigation strategies could effectively

modulate kinesiophobia trajectories in RA management. From a translational perspective, future investigations should prioritize the development of fatigue-directed therapeutic strategies, particularly through multimodal interventions combining pharmacologic management with graded exercise protocols. Such approaches hold potential for disrupting the fatigue-kinesiophobia continuum, thereby ameliorating its associated clinical sequelae.

5.2.3. Pain

Pain constitutes a cardinal symptom in RA, with epidemiological data indicating that 45% of patients experience moderate-to-severe nociceptive burden [14]. Quantitative analyses reveal significant positive correlations between visual analog scale (VAS) pain scores and TKS metrics [1]. The debilitating nature of arthralgia substantially compromises functional capacity, precipitating activity avoidance behaviors through maladaptive cognitive appraisal of movement-related risks. Empirical evidence from Özlü *et al.* elucidates the nociception-kinesiophobia axis, wherein patients develop catastrophic interpretations of physical exertion, particularly the erroneous belief that activity exacerbates articular damage [24]. This fear-avoidance paradigm is further substantiated by longitudinal studies from Lööf *et al.* and Kinikli *et al.* demonstrating dose-dependent relationships between elevated pain indices and progression of phobic movement patterns [14, 19]. Mechanistically, the algogenic-kinesiophobic cycle operates through bidirectional pathways. Heightened nociceptive input diminishes exercise adherence, while activity restriction exacerbates central sensitization. This self-reinforcing pathophysiology necessitates clinical implementation of comprehensive pain phenotyping, encompassing both quantitative intensity measures and qualitative cognitive appraisal assessments. From a therapeutic perspective, multimodal analgesia strategies integrating pharmacologic interventions with cognitive behavioral therapy (CBT) demonstrate particular efficacy in disrupting this maladaptive cycle. Clinicians should prioritize early identification of pain catastrophizing tendencies and implement graded exposure protocols to restore functional movement patterns.

5.3. Physical activity and fear of falling

PA demonstrates significant inverse dose-response relationships with kinesiophobia severity, indicating sedentary behavior patterns serve as robust predictors for developing this pathological anxiety [8]. The deconditioning cycle manifests when RA patients implement maladaptive activity restriction strategies to prevent symptomatology exacerbation, paradoxically amplifying kinesiophobia through reciprocal reinforcement mechanisms. Clinical management protocols should prioritize the identification of hypokinetic RA subpopulations. Rehabilitation specialists must employ motivational interviewing techniques to enhance patients' understanding of PA's therapeutic potential, coupled with individualized exercise prescription frameworks incorporating graded exposure principles. These interventions aim to recalibrate maladaptive movement schemas and facilitate neuroplastic reconditioning. Notably, kinesiophobia exerts more profound functional consequences than nociceptive stimuli per se, emerging as the predominant determinant of disability progression in RA populations [25, 26]. Longitudinal analyses reveal bidirectional causality between functional impairment and phobic avoidance behaviors, establishing a self-perpetuating disablement cascade [14, 19]. This pathomechanism necessitates multidimensional assessment protocols evaluating both biomechanical limitations and psychogenic movement barriers.

Mechanistically, adiposity-related comorbidities mediate the BMI-kinesiophobia association [22]. Excess adiposity contributes to musculoskeletal overload, which in turn exacerbates mechanical allodynia and gait instability—both of which are key triggers of movement-related catastrophizing. Therapeutic strategies should therefore integrate evidence-based nutritional protocols with low-impact neuromuscular training to optimize body

composition parameters [25]. There is a positive correlation between kinesiophobia and fear of falling [1]. Yildirim *et al.* also reported that fear of falling is an effective factor in kinesiophobia [11]. RA patients' biomechanical vulnerability and post-fall complications foster hypervigilant movement patterns. Implementing cognitive-functional rehabilitation programs that combine virtual reality exposure therapy with proprioceptive enhancement training may effectively disrupt this fear reinforcement loop.

5.4. Psychosocial factors

Patients with RA often exhibit pronounced anxiety and depression, which heighten their sensitivity to pain and other bodily discomforts, leading to the avoidance of physical activities. Research indicates that 26% to 46% of RA patients experience anxiety symptoms, while 14.8% to 34.2% suffer from depression [27, 28] . Öztürk *et al.* highlighted the correlation between depression and exercise phobia in RA patients, attributing their reluctance and avoidance of physical activity to psychological factors [1]. Elevated levels of anxiety or depression are also identified as predictors of fear-avoidance beliefs among these patients [21]. To address these issues, it is crucial to establish dedicated communication platforms that facilitate interaction among patients, alleviate anxiety, and enhance their understanding of the benefits of exercise, thereby boosting their motivation.

Moreover, social support plays a pivotal role in mitigating exercise phobia in RA patients. The degree of satisfaction with social support inversely correlates with internal stress and the severity of exercise phobia [12]. It is advisable for family members to provide supportive encouragement and information on exercise methods and benefits. Additionally, community health workers should actively engage in health education, guiding both patients and their families towards cultivating healthier lifestyles and improving functional capabilities. In conclusion, healthcare professionals should focus on addressing the negative emotions of RA patients and improving their social support systems. This approach will help build their confidence in engaging in physical activities and enhance their overall participation in exercise regimes.

6. Intervention strategies for kinesiophobia in patients with rheumatoid arthritis

6.1. Exercise intervention

Exercise intervention has been demonstrated to effectively alleviate patients' kinesiophobia [29]. Compared to the general population, the sedentary lifestyle of RA patients elevates the risk of cardiovascular disease mortality by 50% [30]. PA serves as a primary non-pharmacological approach for cardiovascular rehabilitation and is sufficiently effective as an intervention method for RA patients [31]. In healthy individuals, elevated levels of C-reactive protein (CRP) are associated with an increased risk of cardiovascular disease. A randomized controlled trial examining the benefits of exercise for RA patients observed a significant reduction in CRP levels in the exercise group [32]. These findings, alongside accumulating evidence that exercise can reduce cardiovascular disease incidence, mitigate disability, and alleviate pain, fatigue and negative emotions, underscore the pivotal role of exercise in managing kinesiophobia in RA patients [33, 34]. Nevertheless, there is currently no standardized exercise regimen tailored for RA patients. Future research involving large sample sizes combined with clinical practice is essential to develop scientifically validated and effective intervention strategies.

6.2. Social support

Social support can alleviate patients' negative attitudes toward disease, thereby enhancing prognosis and quality

of life [35]. Tan *et al.* highlighted that social support exerts a negative predictive effect on kinesiophobia [12]. Specifically, the higher the satisfaction of RA patients with social support, the lower their kinesiophobia level. These findings provide valuable insights for mitigating kinesiophobia in RA patients. Consequently, effective social support, including professional guidance from healthcare providers, peer encouragement and experience sharing, and familial care, plays a crucial role in alleviating the burden of RA patients, promoting exercise engagement, and improving prognosis. Moving forward, it is essential to develop intervention strategies, establish implementation frameworks, and conduct efficacy assessments based on social support theory, aiming to holistically enhance social support levels and reduce kinesiophobia among RA patients.

6.3. Cognitive behavioral therapy(CBT)

Cognitive Behavioral Therapy is a psychological approach that integrates behavioral and cognitive therapies to modify an individual's maladaptive behavior [36]. It primarily focuses on reshaping the patient's distorted beliefs and behaviors, rectifying negative cognitions, and subsequently alleviating negative emotions and behaviors. Kinesiophobia, or movement phobia, is predominantly influenced by factors that alter cognitive structure [14, 19]. Lööf *et al.* highlighted that patients with RA exhibit pain-related avoidance behaviors and advocated for the implementation of cognitive behavioral therapy in such cases [14]. CBT has demonstrated efficacy in reducing kinesiophobia among patients with chronic pain and contributes to favorable prognoses [37]. However, its effectiveness specifically in RA patients warrants further investigation. In the future, psychological cognitive interventions could be synergistically combined with behavioral interventions to ameliorate patients' fear of movement, foster accurate exercise perceptions, and thereby enhance their exercise self-efficacy.

6.4. Virtual reality technology

Virtual reality technology has been extensively utilized in the treatment of phobias, psychological disorders, and anxiety-related conditions, yielding significant therapeutic outcomes [38]. Research indicates that VR can effectively mitigate fear of movement and accelerate recovery in individuals suffering from chronic low back pain [39]. Moreover, integrating VR with physical exercise demonstrates superior efficacy in alleviating kinesiophobia compared to VR interventions alone [40]. This multimodal approach not only enhances balance and gait, reduces the fear of falling, and facilitates limb functional recovery but also diminishes adverse reactions and attentional responses to noxious stimuli through immersive VR experiences.

Future research should focus on conducting large-scale, multi-sample studies on RA patients to elucidate the relationship between the disease and VR-based interventions. This will enable the development of tailored therapeutic strategies to better address patient needs. Additionally, collaboration with multidisciplinary experts in designing sports rehabilitation programs for RA patients is essential to alleviate their exercise-related fear beliefs and behaviors, improve their psychological resilience and disease prognosis, and ultimately enhance their overall quality of life. In conclusion, there is currently a paucity of specific interventions aimed at reducing exercise-related fear in RA patients. Therefore, evaluating the efficacy of existing methods in diminishing such fear and exploring novel, disease-specific approaches remain critical areas for future investigation.

7. Conclusion

The heightened prevalence of kinesiophobia among RA patients stems from a confluence of multifactorial

influences. Beyond the aforementioned factors, pre-existing exercise habits and healthcare professionals' attitudes toward kinesiophobia must also be considered. Presently, the body of research in this domain is limited, necessitating further investigation and empirical evidence to substantiate the detrimental impact of kinesiophobia on RA patients' exercise adherence, participation, physical recovery, mental health, and quality of life. Consequently, clinicians should proactively identify risk factors associated with kinesiophobia in RA patients, integrate diverse research methodologies, and explore its determinants from multifaceted perspectives. Emphasizing the application and advancement of innovative technologies, coupled with multidisciplinary intervention strategies, will enable the formulation of personalized therapeutic measures that address both psychological and physiological dimensions. Furthermore, future studies should focus on developing culturally adapted assessment tools to accurately gauge the severity of kinesiophobia in RA patients, thereby providing robust scientific support for deeper exploration in this field.

Disclosure statement

The authors declare no conflict of interest.

References

[1] Öztürk IB, Garip Y, Sivas F, et al., 2021, Kinesiophobia in Rheumatoid Arthritis Patients: Relationship with Quadriceps Muscle Strength, Fear of Falling, Functional Status, Disease Activity, and Quality of Life. Archives of Rheumatology, 36(3): 427–434. http://doi.org/10.46497/ArchRheumatol.2021.8535.

[2] Black RJ, Cross M, Haile LM, et al., 2023, Global, Regional, and National Burden of Rheumatoid Arthritis, 1990–2020, and Projections to 2050: A Systematic Analysis of the Global Burden of Disease Study 2021. Lancet Rheumatology, 5(10): E594–E610. http://doi.org/10.1016/s2665-9913(23)00211-4.

[3] Smolen JS, Aletaha D, McInnes IB, 2016, Rheumatoid Arthritis. Lancet, 388(10055): 2023–2038. http://doi.org/10.1016/s0140-6736(16)30173-8.

[4] Albayrak Gezer İ, Balkarli A, Can B, et al., 2017, Pain, Depression Levels, Fatigue, Sleep Quality, and Quality of Life in Elderly Patients with Rheumatoid Arthritis. Turk J Med Sci, 47(3): 847–853. http://doi.org/10.3906/sag-1603-147.

[5] Rosa-Gonçalves D, Bernardes M, Costa L, 2018, Quality of Life and Functional Capacity in Patients with Rheumatoid Arthritis - Cross-Sectional Study. Reumatol Clin (Engl Ed), 14(6): 360–366. http://doi.org/10.1016/j.reuma.2017.03.002.

[6] Verhoeven F, Tordi N, Prati C, et al., 2016, Physical Activity in Patients with Rheumatoid Arthritis. Joint Bone Spine, 83(3): 265–270. http://doi.org/10.1016/j.jbspin.2015.10.002.

[7] Sokka T, Toloza S, Cutolo M, et al., 2009, Women, Men, and Rheumatoid Arthritis: Analyses of Disease Activity, Disease Characteristics, and Treatments in the QUEST-RA Study. Arthritis Res Ther, 11(1): R7. http://doi.org/10.1186/ar2591.

[8] Peres D, Tordi N, Demartino AM, et al., 2023, Relationships Between Physical Activity Levels and Disease Activity, Functional Disability and Kinesiophobia in Chronic Rheumatic Diseases. Science & Sports, 38(5–6): 607–615. http://doi.org/10.1016/j.scispo.2022.07.013.

[9] SH K, 1990, Kinesiophobia: A New View of Chronic Pain Behavior. Pain Manage, 3: 35–43.

[10] Yildirim N, 2023, Comparison of Kinesiophobia in Patients with Rheumatoid Arthritis and Systemic Lupus Erythematosus. Eur Rev Med Pharmacol Sci, 27(23): 11508–11516. http://doi.org/10.26355/eurrev_202312_34589.

[11] Tan M, Liu Y, Zhao R, Li H, 2023, The Effect of Pain Social Support on Kinesiophobia in Older Patients with Rheumatoid Arthritis: The Mediating Role of Self-Perceived Burden. Geriatr Nurs, 50: 52–57. http://doi.org/10.1016/j.gerinurse.2022.12.011.

[12] Hu W, 2012, Cross-Cultural Adaptation of Simplified Chinese Version of TSK/FABQ, and Its Clinical Application in the Assessment of Fear Avoidance for Patients with Low Back Pain, thesis, Naval Medical University.

[13] Waddell G, Newton M, Henderson I, et al., 1993, A Fear-Avoidance Beliefs Questionnaire (FABQ) and the Role of Fear-Avoidance Beliefs in Chronic Low Back Pain and Disability. Pain, 52(2): 157–168. http://doi.org/10.1016/0304-3959(93)90127-b.

[14] Lööf H, Demmelmaier I, Henriksson EW, et al., 2015, Fear-Avoidance Beliefs About Physical Activity in Adults with Rheumatoid Arthritis. Scandinavian Journal of Rheumatology, 44(2): 93–99. http://doi.org/10.3109/03009742.2014.932432.

[15] Lundberg M, Grimby-Ekman A, Verbunt J, et al., 2011, Pain-Related Fear: A Critical Review of the Related Measures. Pain Res Treat, 2011: 494196. http://doi.org/10.1155/2011/494196.

[16] Gossec L, Chauvin P, Saraux A, et al., 2018, Development and Psychometric Validation of a Patient-Reported Outcome Measure to Assess Fears in Rheumatoid Arthritis and Axial Spondyloarthritis: The Fear Assessment in Inflammatory Rheumatic Diseases (FAIR) Questionnaire. Annals of the Rheumatic Diseases, 77(2): 258–263. http://doi.org/10.1136/annrheumdis-2017-212000.

[17] Dickens C, McGowan L, Clark-Carter D, et al., 2002, Depression in Rheumatoid Arthritis: A Systematic Review of the Literature with Meta-Analysis. Psychosom Med, 64(1): 52–60. http://doi.org/10.1097/00006842-200201000-00008.

[18] Pincus T, Griffith J, Pearce S, et al., 1996, Prevalence of Self-Reported Depression in Patients with Rheumatoid Arthritis. Br J Rheumatol, 35(9): 879–883. http://doi.org/10.1093/rheumatology/35.9.879.

[19] Kınıklı Gİ, Deniz HG, Karahan S, et al., 2018, Predictors of Fear of Movement in Patients with Rheumatoid Arthritis. Fizyoterapi Rehabilitasyon, 29(2): 11–17.

[20] Watad A, Bragazzi NL, Adawi M, et al., 2017, Anxiety Disorder Among Rheumatoid Arthritis Patients: Insights from Real-Life Data. J Affect Disord, 213: 30–34. http://doi.org/10.1016/j.jad.2017.02.007.

[21] Demmelmaier I, Björk A, Dufour AB, et al., 2018, Trajectories of Fear-Avoidance Beliefs on Physical Activity Over Two Years in People with Rheumatoid Arthritis. Arthritis Care & Research, 70(5): 695–702. http://doi.org/10.1002/acr.23419.

[22] Baday-Keskin D, Ekinci B, 2022, The Relationship Between Kinesiophobia and Health-Related Quality of Life in Patients with Rheumatoid Arthritis: A Controlled Cross-Sectional Study. Joint Bone Spine, 89(2): 105275. http://doi.org/10.1016/j.jbspin.2021.105275.

[23] Santos EJF, Duarte C, da Silva JAP, et al., 2019, The Impact of Fatigue in Rheumatoid Arthritis and the Challenges of Its Assessment. Rheumatology (Oxford), 58(Suppl 5): v3–v9. http://doi.org/10.1093/rheumatology/kez351.

[24] Özlü A, Akdeniz Leblebicier M, 2022, Does Remission in Rheumatoid Arthritis Bring Kinesiophobia, Quality of Life, Fatigue, and Physical Activity Closer to Normal? Arch Rheumatol, 37(4): 603–612. http://doi.org/10.46497/ArchRheumatol.2022.9552.

[25] Vincent HK, Adams MC, Vincent KR, et al., 2013, Musculoskeletal Pain, Fear Avoidance Behaviors, and Functional Decline in Obesity: Potential Interventions to Manage Pain and Maintain Function. Reg Anesth Pain Med, 38(6):

481–491. http://doi.org/10.1097/aap.0000000000000013.

[26] Vlaeyen JWS, Kole-Snijders AMJ, Rotteveel AM, et al., 1995, The Role of Fear of Movement/(Re)Injury in Pain Disability. Journal of Occupational Rehabilitation, 5(4): 235–252. http://doi.org/10.1007/BF02109988.

[27] Katchamart W, Narongroeknawin P, Chanapai W, et al., 2020, Prevalence of and Factors Associated with Depression and Anxiety in Patients with Rheumatoid Arthritis: A Multicenter Prospective Cross-Sectional Study. Int J Rheum Dis, 23(3): 302–308. http://doi.org/10.1111/1756-185x.13781.

[28] Ng CYH, Tay SH, McIntyre RS, et al., 2022, Elucidating a Bidirectional Association Between Rheumatoid Arthritis and Depression: A Systematic Review and Meta-Analysis. J Affect Disord, 311: 407–415. http://doi.org/10.1016/j.jad.2022.05.108.

[29] Martinez-Calderon J, Flores-Cortes M, Morales-Asencio JM, et al., 2020, Conservative Interventions Reduce Fear in Individuals with Chronic Low Back Pain: A Systematic Review. Arch Phys Med Rehabil, 101(2): 329–358. http://doi.org/10.1016/j.apmr.2019.08.470.

[30] Aviña-Zubieta JA, Choi HK, Sadatsafavi M, et al., 2008, Risk of Cardiovascular Mortality in Patients with Rheumatoid Arthritis: A Meta-Analysis of Observational Studies. Arthritis Rheum, 59(12): 1690–1697. http://doi.org/10.1002/art.24092.

[31] Rausch Osthoff A-K, Niedermann K, Braun J, et al., 2018, 2018 EULAR Recommendations for Physical Activity in People with Inflammatory Arthritis and Osteoarthritis. Annals of the Rheumatic Diseases, 77(9): 1251–1260. http://doi.org/10.1136/annrheumdis-2018-213585.

[32] Church TS, Barlow CE, Earnest CP, et al., 2002, Associations Between Cardiorespiratory Fitness and C-Reactive Protein in Men. Arterioscler Thromb Vasc Biol, 22(11): 1869–1876. http://doi.org/10.1161/01.atv.0000036611.77940.f8.

[33] Ye H, Weng H, Xu Y, et al., 2022, Effectiveness and Safety of Aerobic Exercise for Rheumatoid Arthritis: A Systematic Review and Meta-Analysis of Randomized Controlled Trials. BMC Sports Science, Medicine and Rehabilitation,14(1):17. http://doi.org/10.1186/s13102-022-00408-2.

[34] Azevedo Da Silva M, Singh-Manoux A, Brunner EJ, et al., 2012, Bidirectional Association Between Physical Activity and Symptoms of Anxiety and Depression: The Whitehall II Study. Eur J Epidemiol, 27(7): 537–546. http://doi.org/10.1007/s10654-012-9692-8.

[35] Sun NN, Wei LQ, Wang HY, et al., 2021, Qualitative Study of the Psychological Experience of COVID-19 Patients During Hospitalization. Journal of Affective Disorders, 278: 15–22. http://doi.org/10.1016/j.jad.2020.08.040.

[36] YCH L, 2024, Research Progress of Kinetophobia in Patients After Shoulder Arthroscopy. Chinese Journal of Sports Medicine, 43(02): 149–154.

[37] Richmond H, Hall AM, Copsey B, et al., 2015, The Effectiveness of Cognitive Behavioural Treatment for Non-Specific Low Back Pain: A Systematic Review and Meta-Analysis. Plos One, 10(8), e0134192. http://doi.org/10.1371/journal.pone.0134192.

[38] Campo-Prieto P, Cancela JM, Rodríguez-Fuentes G, 2021, Immersive Virtual Reality as Physical Therapy in Older Adults: Present or Future (Systematic Review). Virtual Reality, 25(3): 801–817. http://doi.org/10.1007/s10055-020-00495-x.

[39] Nambi G, Abdelbasset WK, Alrawaili SM, et al., 2021, Virtual Reality or Isokinetic Training; Its Effect on Pain, Kinesiophobia and Serum Stress Hormones in Chronic Low Back Pain: A Randomized Controlled Trial. Technol Health Care, 29(1): 155–166. http://doi.org/10.3233/thc-202301.

[40] Wang S, Sun J, Yin X, et al., 2023, Effect of Virtual Reality Technology as Intervention for People with

Kinesiophobia: A Meta-Analysis of Randomised Controlled Trials. Journal of Clinical Nursing, 32(13–14): 3074–3086. http://doi.org/10.1111/jocn.16397.