

# ASSOCIATION OF WORK-RELATED MUSCULOSKELETAL DISORDERS WITH DEPRESSION, ANXIETY AND STRESS AMONG FARMERS

*Original Research*

Hafsa Khan<sup>1</sup>, Laraib Ghani<sup>1</sup>, Amina Kousar<sup>1</sup>, Zarlish Manzoor<sup>1\*</sup>, Komal Iftikhar<sup>2</sup>, Anwasha Mushtaq<sup>1</sup>

<sup>1</sup>Lahore College of Pharmaceutical Sciences (Affiliated with University of Sargodha), Lahore, Pakistan.

<sup>2</sup>Lecturer, Lahore College of Pharmaceutical Sciences (Affiliated with University of Sargodha), Lahore, Pakistan.

**Corresponding Author:** Zarlish Manzoor, Lahore College of Pharmaceutical Sciences (Affiliated with University of Sargodha), Lahore, Pakistan.

[dr.zarlishmanzoor@gmail.com](mailto:dr.zarlishmanzoor@gmail.com)

**Acknowledgement:** The authors extend their gratitude to all the farmers who participated in this study.

Conflict of Interest: None

Grant Support & Financial Support: None

## ABSTRACT

**Background:** Agriculture is a labor-intensive occupation that demands prolonged physical exertion, making farmers highly susceptible to musculoskeletal disorders (MSDs). Repetitive movements, prolonged awkward postures, and carrying heavy loads contribute to pain in the neck, shoulders, and back. Additionally, psychosocial factors, such as occupational stress, economic instability, and lack of healthcare access, can exacerbate biomechanical strain, leading to a heightened risk of mental health disorders. Understanding the interplay between work-related MSDs and psychological distress is essential for developing targeted interventions to improve farmers' health and productivity.

**Objective:** To explore the association between work-related musculoskeletal disorders and psychological distress, including depression, anxiety, and stress, among farmers in Punjab, Pakistan.

**Methods:** A cross-sectional study was conducted among 189 farmers selected using a non-probability quota sampling technique from multiple villages in Punjab. Participants were male farmers aged 20–65 years with at least two years of work experience and a daily working duration of 4–5 hours. Data were collected from March 2024 to September 2024 using the Modified Nordic Musculoskeletal Questionnaire (NMQ) and the Depression, Anxiety, and Stress Scale-21 (DASS-21). Statistical analysis was performed using IBM SPSS Statistics 26, with chi-square tests and logistic regression applied to determine associations. Statistical significance was set at  $p < 0.05$ .

**Results:** Musculoskeletal pain was prevalent among participants, with 52.9% reporting back pain, 45.5% experiencing shoulder pain, 31.7% suffering from neck pain, and 24.3% reporting knee pain. The study identified a significant association between MSDs and psychological distress, with stress reported by 62.2% of participants ( $p = 0.001$ ), anxiety by 39.2% ( $p < 0.001$ ), and depression by 57.9% ( $p = 0.009$ ). Higher levels of MSD discomfort correlated with increased severity of psychological symptoms, emphasizing the need for integrated physical and mental health interventions.

**Conclusion:** This study confirms a significant correlation between work-related musculoskeletal disorders and psychological distress among farmers. Addressing both physical and mental health challenges through workplace ergonomics, preventive healthcare strategies, and mental health support can improve overall well-being and productivity in the agricultural sector.

**Keywords:** Anxiety, Depression, Farmers, Musculoskeletal Disorders, Occupational Health, Psychological Stress, Work-Related Disorders.

## INTRODUCTION

Farming is an essential occupation that sustains global food production and economic stability, yet it exposes workers to significant occupational health risks. Among these risks, musculoskeletal disorders (MSDs) are highly prevalent, characterized by pain, discomfort, and functional impairment in various body regions, including the neck, shoulders, back, hips, knees, and wrists (1,2). These disorders are often linked to repetitive motions, forceful exertions, prolonged awkward postures, and exposure to environmental stressors such as heat and vibration from machinery (3,4). Additionally, the interplay between physical strain and psychosocial factors—such as stress, anxiety, and depression—exacerbates the burden of work-related musculoskeletal disorders (WMSDs), impacting both physical health and overall well-being (3,5). The relationship between mental health and MSDs is well-documented, with evidence suggesting that psychological distress, including depression, anxiety, and occupational stress, contributes to the onset and progression of musculoskeletal conditions (6,7). Depression, characterized by a persistent low mood and loss of interest in daily activities, is commonly observed among individuals experiencing chronic pain (6). Anxiety, which manifests as excessive fear and nervousness, disrupts normal functioning and increases susceptibility to MSDs through heightened muscle tension and altered pain perception (8). Furthermore, chronic stress leads to increased cortisol production, which in turn accelerates muscle fatigue, weakens tendons, and heightens inflammation, all of which exacerbate musculoskeletal dysfunction (9).

Agricultural work is physically demanding, requiring sustained physical effort, prolonged working hours, and heavy manual labor. Studies indicate that farmers frequently experience low back pain, shoulder pain, and cervical discomfort due to poor ergonomic postures during tasks such as weeding, harvesting, and carrying heavy loads (9,10). Research has highlighted that MSD prevalence is notably high among farmers aged 35–50 and above 60, with those working 4–6 hours daily being particularly vulnerable (11–13). Commonly reported conditions include back pain (37%), neck and shoulder pain (25%), knee and wrist pain (9%), and hip pain (8%) (5). Beyond the physical strain, the agricultural sector is associated with high job demands, financial instability, and limited control over work conditions, which contribute to increased psychological distress among farmers compared to other occupational groups (14,15). Studies conducted in the United States, the United Kingdom, Australia, Norway, and Finland reveal that farmers experience significant levels of anxiety and depression, with male farmers particularly affected (14,15). The persistent stressors of agricultural work, including economic uncertainty, occupational hazards, and limited healthcare access, further compound the risk of both physical and mental health deterioration (16). The bidirectional relationship between musculoskeletal pain and psychological distress underscores the necessity of addressing both aspects simultaneously. Chronic pain contributes to poor sleep quality, fatigue, and reduced coping ability, while heightened psychological distress exacerbates pain perception and impairs recovery (17,18). Workplace interactions and environmental conditions play a crucial role in the development of WMSDs, as the nature of repetitive, physically strenuous tasks combined with mental stress leads to functional impairment and reduced quality of life (19). Effective management strategies, including physical therapy, acupuncture, chiropractic care, hydrotherapy, and occupational therapy, have been employed to alleviate musculoskeletal discomfort, improve mobility, and enhance overall well-being (19). However, comprehensive interventions that integrate both ergonomic modifications and mental health support remain lacking in the agricultural sector.

This study aims to examine the association between work-related musculoskeletal disorders and psychological distress, including depression, anxiety, and stress, among farmers. By identifying the interplay between these conditions, the research seeks to contribute to the development of holistic preventive and management strategies that improve both physical and mental health outcomes in agricultural workers.

## METHODS

An observational cross-sectional study was conducted to assess the association between work-related musculoskeletal disorders and psychological distress, including depression, anxiety, and stress, among farmers. The study was carried out in selected villages of Punjab, including Kahna Purana, Baddoki, Pajian, Bhamba Khurd, Balloki, Manhala, Bedian, Lallo Pind, and Lakhawal. The sample size was determined using an appropriate statistical formula considering a confidence level of 95% and a margin of error of 5%, resulting in a required sample of 189 participants. The sampling technique was clarified as a non-probability quota sampling method, ensuring representation across different age groups and work durations within the farming population (20). The inclusion criteria encompassed

male farmers aged 20 to 65 years who had been engaged in agricultural work for at least the past two years and worked a minimum of 4–5 hours per day. Exclusion criteria included individuals with congenital heart disease, cancer, disabilities, a history of spinal surgery, or those classified as seasonal farmers to maintain homogeneity and reduce confounding variables (21).

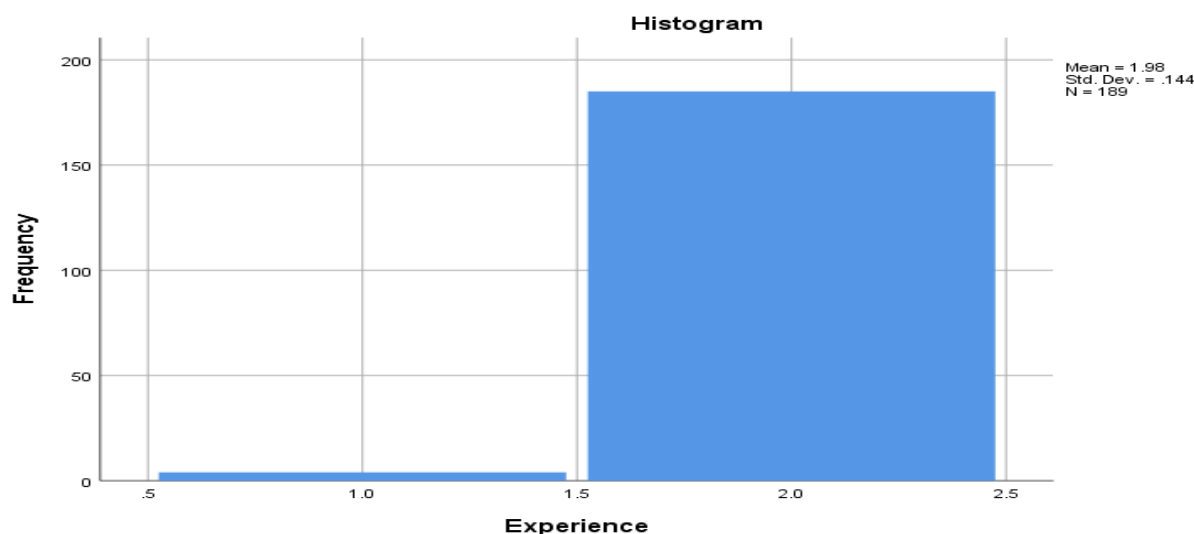
Data collection was conducted using validated assessment tools. The Depression, Anxiety, and Stress Scale (DASS-21) was employed to evaluate psychological distress, while musculoskeletal discomfort was assessed using the Nordic Musculoskeletal Questionnaire (NMQ), which is widely recognized for identifying musculoskeletal symptoms across different body regions. Standardized procedures were followed to ensure consistency in data collection. Ethical approval was obtained from the relevant Institutional Review Board (IRB), and all participants provided written informed consent before their inclusion in the study. Confidentiality and anonymity were maintained throughout the research process (22). Statistical analysis was performed using SPSS version 26. Descriptive statistics, including means and standard deviations, were used to summarize demographic and clinical characteristics. The normality of the data was assessed using the Shapiro-Wilk test, and appropriate parametric or non-parametric tests were applied accordingly. Pearson's chi-square test and logistic regression analysis were used to determine associations between work-related musculoskeletal disorders and psychological distress variables. Statistical significance was set at  $p < 0.05$  (23). To ensure methodological rigor, strategies were implemented to address missing data, response bias, and potential confounders. Incomplete responses were handled using multiple imputation techniques where necessary, and efforts were made to minimize selection bias by diversifying participant recruitment across different farming communities. Additionally, confounding factors such as age, work duration, and socioeconomic status were accounted for in the analysis through stratification and multivariate adjustments. These measures aimed to enhance the validity and reliability of the study findings (12).

## RESULTS

Among the 189 participants, the age distribution showed that 47 (24.9%) were between 20–30 years, 41 (21.7%) were between 30–40 years, 49 (25.9%) were between 40–50 years, 38 (20.1%) were between 50–60 years, and 14 (7.4%) were between 60–65 years. Regarding working hours, 38 (20.1%) worked for 4 hours per day, 66 (34.9%) worked for 5 hours, while 85 (45.0%) worked for more than 5 hours per day. The analysis of musculoskeletal pain revealed that among all participants, 60 (31.7%) experienced neck pain, 86 (45.5%) reported shoulder pain, 18 (9.5%) had elbow pain, and 32 (16.9%) suffered from wrist and hand pain. Additionally, 100 (52.9%) reported back pain, 24 (12.7%) experienced hip pain, 46 (24.3%) had knee pain, and 21 (11.1%) suffered from pain in the ankles and feet. The assessment of psychological distress indicated that among participants who found it difficult to wind down, 74 (39.2%) reported no difficulty, 23 (12.2%) experienced some degree of difficulty, 54 (28.6%) faced considerable difficulty, and 38 (20.1%) reported experiencing this most of the time. Regarding awareness of mouth dryness, 119 (63.0%) did not experience it at all, 45 (23.8%) experienced it to some degree, 22 (11.6%) faced it considerably, and 3 (1.6%) experienced it most of the time. Among those who reported an inability to experience positive feelings, 91 (48.1%) did not experience this symptom, 58 (30.7%) faced it to some degree, 22 (11.6%) experienced it considerably, and 18 (9.5%) suffered from it most of the time. Regarding difficulty in initiating tasks, 62 (32.8%) did not experience this issue, 44 (23.3%) faced it to some degree, 65 (34.4%) experienced it considerably, and 18 (9.5%) reported experiencing this difficulty most of the time. The relationship between musculoskeletal disorders and stress was examined, revealing that 10 participants had low musculoskeletal discomfort, of whom 4 had normal stress levels, 1 had severe stress, and 5 experienced extremely severe stress. Among the 42 participants with moderate musculoskeletal discomfort, 15 had normal stress levels, 4 had mild stress, 6 had moderate stress, 7 had severe stress, and 10 experienced extremely severe stress. Among the 137 participants with high musculoskeletal discomfort, 63 had normal stress levels, 31 had mild stress, 32 had moderate stress, 7 had severe stress, and 4 had extremely severe stress. The analysis indicated that 62.29% of participants experienced some level of stress. The statistical analysis showed a significant association between musculoskeletal disorders and stress ( $p = 0.001$ ).

The relationship between musculoskeletal disorders and anxiety revealed that among the 10 participants with low musculoskeletal discomfort, 2 had normal anxiety levels, 2 had mild anxiety, 1 had moderate anxiety, 1 had severe anxiety, and 4 had extremely severe anxiety. Among the 42 participants with moderate musculoskeletal discomfort, 17 had normal anxiety levels, 6 had mild anxiety, 8 had moderate anxiety, 4 had severe anxiety, and 7 had extremely severe anxiety. Among the 137 participants with high musculoskeletal discomfort, 106 had normal anxiety levels, 12 had mild anxiety, 13 had moderate anxiety, 2 had severe anxiety, and 4 had extremely severe anxiety. The findings indicated that 39.23% of participants experienced some level of anxiety, with a statistically significant association between musculoskeletal disorders and anxiety ( $p = 0.000$ ). The relationship between musculoskeletal disorders and depression demonstrated that among the 10 participants with low musculoskeletal discomfort, 4 had normal depression levels, 1 had

moderate depression, 1 had severe depression, and 4 had extremely severe depression. Among the 42 participants with moderate musculoskeletal discomfort, 18 had normal depression levels, 9 had mild depression, 4 had moderate depression, 4 had severe depression, and 7 had extremely severe depression. Among the 137 participants with high musculoskeletal discomfort, 75 had normal depression levels, 27 had mild depression, 30 had moderate depression, 2 had severe depression, and 3 had extremely severe depression. In total, 57.85% of participants experienced some level of depression, with a statistically significant association between musculoskeletal disorders and depression ( $p = 0.009$ ).



**Table 1: Frequency & Percentage of Musculoskeletal Pain**

Pain Type	Frequency (%)	No Pain (%)	Total
Neck Pain	60 (31.7%)	129 (68.3%)	189
Shoulder Pain	86 (45.5%)	103 (54.5%)	189
Elbow Pain	18 (9.5%)	171 (90.5%)	189
Wrist and Hand Pain	32 (16.9%)	157 (83.1%)	189
Back Pain	100 (52.9%)	89 (47.1%)	189
Hips Pain	24 (12.7%)	165 (87.3%)	189
Both Knees Pain	46 (24.3%)	143 (75.7%)	189
Both Ankle and Feet Pain	21 (11.1%)	168 (88.9%)	189

**Table 2: Musculoskeletal Disorders and Stress**

MSK Categories	Normal	Mild	Moderate	Severe	Extremely Severe	Total	P value
Low Discomfort	4	0	0	1	5	10	.001
Moderate Discomfort	15	4	6	7	10	42	
High Discomfort	63	31	32	7	4	137	
Total	82	35	38	15	19	189	

Chi Square 14.574

**Table 3: Musculoskeletal Disorders and Anxiety**

MSK Categories	Normal	Mild	Moderate	Severe	Extremely Severe	Total	P value
Low Discomfort	2	2	1	1	4	10	.000
Moderate Discomfort	17	6	8	4	7	42	
High Discomfort	106	12	13	2	4	137	
Total	125	20	22	7	15	189	

Chi Square 34.056

**Table 4: Musculoskeletal Disorders and Depression**

MSK Categories	Normal	Mild	Moderate	Severe	Extremely Severe	Total	P value
Low Discomfort	4	0	1	1	4	10	.009
Moderate Discomfort	18	9	4	4	7	42	
High Discomfort	75	27	30	2	3	137	
Total	97	36	35	7	14	189	

Chi Square 9.476

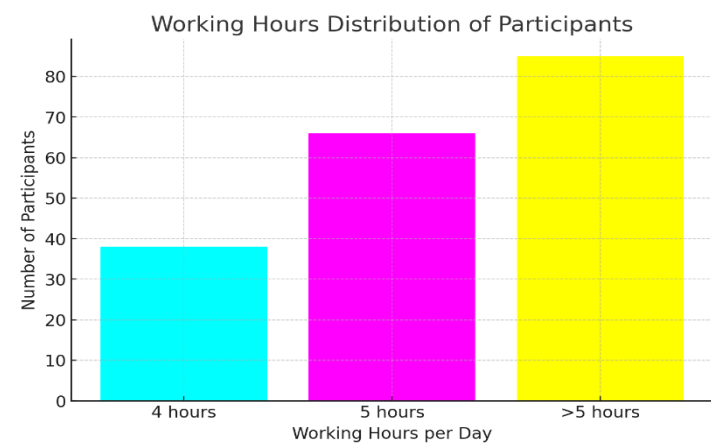


Figure 2 Working Hours Distribution of Participants

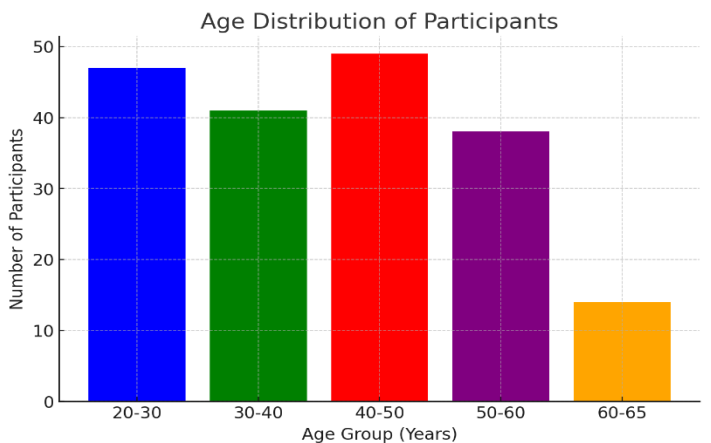


Figure 1 Age Distribution of Participants

**DISCUSSION**

The findings of this study demonstrated a significant association between work-related musculoskeletal disorders and psychological distress, including stress (p=0.001), anxiety (p<0.001), and depression (p=0.009). Higher levels of musculoskeletal discomfort correlated with increased severity of these psychological conditions, emphasizing the need for a comprehensive approach that addresses both physical and mental health in agricultural workers. These results align with previous research that has documented the high prevalence of anxiety and stress among farmers experiencing musculoskeletal pain, reinforcing the notion that occupational strain extends beyond physical discomfort and affects psychological well-being as well (5,24). Similar studies have highlighted the widespread occurrence of depression among farmers, attributing it to a combination of occupational, sociodemographic, and professional dissatisfaction factors. The findings of the current study, which revealed that 57.9% of the participants suffered from depression linked to work-related musculoskeletal problems, further support this evidence. The impact of long working hours and sustained physical exertion in farming has been previously linked to increased stress levels, with research showing a direct relationship between prolonged fieldwork and the prevalence of musculoskeletal disorders. This study corroborates such findings, demonstrating that musculoskeletal pain, particularly in the shoulder (45%) and back (52.9%), was highly prevalent among the participants (9,13,25).

Psychosocial factors have been increasingly recognized as contributing to the exacerbation of musculoskeletal disorders, with evidence indicating that stress and fatigue resulting from chronic pain can lead to sleep deprivation and further impair functional capacity. The current study found that 62.2% of the farmers experienced stress associated with musculoskeletal disorders, a trend that has been similarly observed in research conducted on agricultural workers in other regions. Occupational stress in farming has been linked to multiple risk factors, including older age, prolonged years in agriculture, increased workload, and limited access to healthcare resources. The findings of this study further support the view that musculoskeletal disorders contribute significantly to the overall strain experienced by farmers, reinforcing the need for targeted interventions to mitigate both physical and psychological distress (18,26). The strengths of this study include its robust sample size, the use of validated assessment tools, and the focus on a high-risk occupational group often overlooked in health research. However, certain limitations should be acknowledged. The cross-sectional design restricts the ability to infer causality between musculoskeletal disorders and psychological distress, highlighting the need for longitudinal studies to establish temporal relationships. Additionally, potential response bias cannot be ruled out, as self-reported measures may lead to underestimation or overestimation of symptoms. The study also did not account for other confounding variables such as socioeconomic status, dietary habits, and pre-existing health conditions, which could influence the severity of musculoskeletal disorders and mental health outcomes (27,28).

Future research should consider a longitudinal approach to better understand the progression of musculoskeletal disorders and their psychological impact over time. Investigating the role of ergonomic modifications, stress management programs, and access to healthcare services in mitigating these conditions could provide valuable insights for developing targeted interventions. Integrating both physical and mental health strategies in occupational health policies for farmers could enhance their overall well-being and productivity. Addressing musculoskeletal discomfort alongside psychological distress remains essential for improving the quality of life in agricultural workers, ensuring a more sustainable and health-conscious approach to farming labor.

## CONCLUSION

This study establishes a significant association between work-related musculoskeletal disorders and psychological distress, including stress, depression, and anxiety, among farmers in Punjab, Pakistan. The findings highlight the critical need for a dual approach that addresses both physical and mental health challenges in this occupational group. Musculoskeletal discomfort not only affects productivity and daily functioning but also contributes to psychological strain, emphasizing the importance of workplace ergonomics, preventive healthcare measures, and mental health support. Integrating targeted interventions, such as ergonomic improvements, stress management programs, and accessible healthcare services, can enhance the overall well-being of farmers and contribute to a healthier, more sustainable agricultural workforce.

## AUTHOR CONTRIBUTIONS

Author	Contribution
Hafsa Khan	Substantial Contribution to study design, analysis, acquisition of Data Manuscript Writing Has given Final Approval of the version to be published
Laraib Ghani	Substantial Contribution to study design, acquisition and interpretation of Data Critical Review and Manuscript Writing Has given Final Approval of the version to be published
Amina Kousar	Substantial Contribution to acquisition and interpretation of Data Has given Final Approval of the version to be published
Zarlish Manzoor*	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Komal Iftikhar	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Anwasha Mushtaq	Substantial Contribution to study design and Data Analysis Has given Final Approval of the version to be published



## REFERENCES

1. Organization WH. Anxiety Disorder. 2024.
2. Ouyang Y, Dai M. Anxiety disorders and adhesive capsulitis: a bidirectional Mendelian randomization study. *Front Immunol*. 2023;14:1297477.
3. Dukes JC, Chakan M, Mills A, Marcaurd M. Approach to Fatigue: Best Practice. *Med Clin North Am*. 2021;105(1):137-48.
4. Vitali M, Pironti P, Salvato D, Salini V. Can COVID-19 pandemic influence frozen shoulder outcomes? *Rehabilitacion (Madr)*. 2021;55(3):241.
5. Srinivasan ES, Than KD. Commentary: The Phenotypes of Anxiety and Depression: Analysis of Combined Comorbidity and Treatment in Patients Undergoing Spinal Fusion. *Neurosurgery*. 2022;91(1):e3-e4.
6. Escoda T, Jourde-Chiche N, Granel B, Cornec D, Chiche L. Complex relationships of type 2 and type 1 symptoms across various systemic autoimmune diseases. *Autoimmun Rev*. 2023;22(9):103390.
7. Trotter K, Espinosa J, Lucerna A. A curious case of a blue finger. *Jaapa*. 2023;36(1):25-7.
8. Organization WH. Depression. 2024.
9. Lane H, Walker MD. Depression and arthritis: What the panel data says. *Musculoskeletal Care*. 2024;22(1):e1864.
10. Zhou J, Xue Y. Depression and Bone Mineral Density. *J Bone Miner Res*. 2020;35(4):821.
11. Hušáková M, Levitová A, Daďová K, Domluvilová D, Pavelka K. Effect of group-based physiotherapy on pain and depression in patients with axial spondyloarthritis and non-specific low back pain: data of 1-year follow-up. *RMD Open*. 2023;9(2).
12. Lee JE, Akimoto T, Chang J, Lee HS. Effects of joint mobilization combined with acupuncture on pain, physical function, and depression in stroke patients with chronic neuropathic pain: A randomized controlled trial. *PLoS One*. 2023;18(8):e0281968.
13. Howren A, Bowie D, Choi HK, Rai SK, De Vera MA. Epidemiology of Depression and Anxiety in Gout: A Systematic Review and Metaanalysis. *J Rheumatol*. 2021;48(1):129-37.
14. Mehta R, Hochberg M, Shardell M, Ryan A, Dong Y, Beamer BA, et al. Evaluation of Dynamic Effects of Depressive Symptoms on Physical Function in Knee Osteoarthritis. *Arthritis Care Res (Hoboken)*. 2024;76(5):673-81.
15. Caneiro JP, Smith A, Bunzli S, Linton S, Moseley GL, O'Sullivan P. From Fear to Safety: A Roadmap to Recovery From Musculoskeletal Pain. *Phys Ther*. 2022;102(2).
16. Yang F, Liu Y, Chen S, Dai Z, Yang D, Gao D, et al. A GABAergic neural circuit in the ventromedial hypothalamus mediates chronic stress-induced bone loss. *J Clin Invest*. 2020;130(12):6539-54.
17. Brock J, Basu N, Schlachetzki JCM, Schett G, McInnes IB, Cavanagh J. Immune mechanisms of depression in rheumatoid arthritis. *Nat Rev Rheumatol*. 2023;19(12):790-804.
18. Smarr KL, Keefer AL. Measures of Depression and Depressive Symptoms. *Arthritis Care Res (Hoboken)*. 2020;72 Suppl 10:608-29.
19. Peng X, Lu Y, Chen PY, Wong CH. The mediating effect of depression on the relationship between osteoarthritis and cardiovascular disease mortality: A cohort study. *J Affect Disord*. 2023;341:329-34.
20. Chengane S, Beseler CL, Duysen EG, Rautiainen RH. Occupational stress among farm and ranch operators in the midwestern United States. *BMC Public Health*. 2021;21:1-11.
21. Itaya T, Torii M, Hashimoto M, Tanigawa K, Urai Y, Kinoshita A, et al. Prevalence of anxiety and depression in patients with rheumatoid arthritis before and during the COVID-19 pandemic. *Rheumatology (Oxford)*. 2021;60(4):2023-4.
22. Abideen Z-u, Sohail A, Perveen I, Faridi TA, Taj S. Prevalence of Musculoskeletal Disorders (msds) Among Farmers of District Vehari, Punjab, Pakistan. *Pakistan Journal of Physical Therapy (PJPT)*. 2021:25-30.

23. Bairwa RC, Meena M, Dangayach G, Jain R, editors. Prevalence of musculoskeletal disorders among the agricultural workers: A review. International Conference of the Indian Society of Ergonomics; 2021: Springer.
24. Tang KHD. The prevalence, causes and prevention of occupational musculoskeletal disorders. Glob Acad J Med Sci. 2022;4(2):56-68.
25. Ochs-Balcom HM, Bea JW, Hovey KM, Cauley JA. Reply to Depression and Bone Mineral Density. J Bone Miner Res. 2020;35(4):822.
26. Zhang F, Gong W, Cui Z, Li J, Lu Y. Rhabdomyolysis in a male adolescent associated with monotherapy of fluvoxamine. Eur J Hosp Pharm. 2023;30(5):302-4.
27. Organization WH. Stess. 2023.
28. Jones-Bitton A, Best C, MacTavish J, Fleming S, Hoy S. Stress, anxiety, depression, and resilience in Canadian farmers. Social psychiatry and psychiatric epidemiology. 2020;55:229-36.