European Journal of Clinical Pharmacy
Print ISSN: 2385-409X **Online ISSN**: 3105-0409
Website: https://farmclin.com/

Original Research Article

The effective demographic and clinical predictors of Quality of Life in Chronic Musculoskeletal Disorders

Article History:

Name of Author:
Dr. Hari Babu K V[1*] and Dr. Sateesh Biradar[2]

Affiliation: *[1*]Principal, School of Physiotherapy, P P Savani University, Surat, India,*
[2]Registrar, P P Savani University, Surat, India.

Corresponding Author:
Dr. Hari Babu K V

Received: 07-01-2026
Revised: *28*-01-2026
Accepted: 12-02-2026
Published: 27-02-2026

Abstract: ***Background***: The main reason of disability worldwide is chronic musculoskeletal illnesses (MSDs). Finding the most powerful predictors of Health-Related Quality of Life (HRQoL) is crucial for efficient bio analytical and clinical management, even though clinical evaluations frequently concentrate on physical impairment ***Objective***: To determine the predictive value of pain intensity, balance, fall history, age, and gender on the quality of life in patients with chronic MSDs. ***Methods***: Eighty participants with low back pain (LBA), cervical spondylitis, and osteoarthritis (OA) of the knee were included in a long-term study. The Berg Balance Scale (BBS), the Timed Up and Go (TUG) test, the Numeric Pain Rating Scale (NPRS), and the SF-12 Health Survey (PCS and MCS scores) were among the assessments. Multiple linear regression and Pearson correlation were used in the statistical study. ***Results***: Important factors affecting of physical quality of life were identified to be balance (BBS) ($r = 0.235$, $p = 0.036$). Balance and pain management have an important effect on HR QoL as compared demographic characteristics like age and gender, according to multiple regression analysis. ***Conclusion***: These findings of the study emphasize importance of central role of pain in shaping patient-perceived health status and explains the underscore prioritising of pain management in physiotherapy and rehabilitation. Addressing pain effectively through key pathway can play an important role in improvements in physical function and psychological wellbeing are in MSDs.

Keywords: Chronic Pain, Postural Balance, Quality of Life, Fall Risk, Bio analytical Assessment.

INTRODUCTION

Chronic musculoskeletal disorders (MSDs) and chronic spinal conditions, are important factors causing disability around the globe and healthcare expenditure [5, 6]. In the field of applied bioanalysis and clinical rehabilitation, the focus has been shifted purely from structural assessments to holistic markers of patient well-being, specifically Health-Related Quality of Life (HRQoL) [16].

Patients with chronic MSDs usually present with a complex interplay of physical impairment, persistent pain, and decrease in functional mobility [12]. On Reviewing various literatures, we can explain that that while pain is an important factor, physiological variables such as postural balance and fall risk also play an important role in the patient's perception of health [8, 9]. Although, relative weight of these factors —and how they affect demographic factors like age and gender—is yet to be studied [13]. This study is focused to on to find out the key indicators of physical and mental quality of life in participants with chronic musculoskeletal disorders. Specifically, it assesses and studies the relation between pain, balance, falls, age, and gender with the Physical Component Score (PCS) and Mental Component Score (MCS). The study also finds which could be the most important factor of quality of life using multivariable regression analysis.

MATERIALS AND METHODS

Study Design and Participants A cross-sectional study was done with 80 patients (N=80) diagnosed with chronic MSDs (Cervical Spondylosis: 50%; OA Knee: 25%; Low Back Ache: 25%). The patients that were included in the study were from various clinical rehabilitation centres in and around the city

Outcome Measures

1. Pain Intensity: Was evaluated by using 11-point Numeric Pain Rating Scale (NPRS) [4].

1. 2. Postural Balance: Assessed by using Berg Balance Scale (BBS), a 14-item validated scale [2].
2. Fall Risk: Assessed by Timed Up and Go (TUG) test, with a threshold of >= 13.5$ seconds indicating high fall risk [3, 10].
3. Quality of Life: Assessed by using SF-12 Health Survey, divided into Physical Component Summary (PCS) and Mental Component Summary (MCS) [1, 20].

Statistical Analysis

The data was studied and analysed using Jamovi software of version 2.3.28. To find out the independent predictors of QoL we used Pearson correlation and multiple linear regressions.

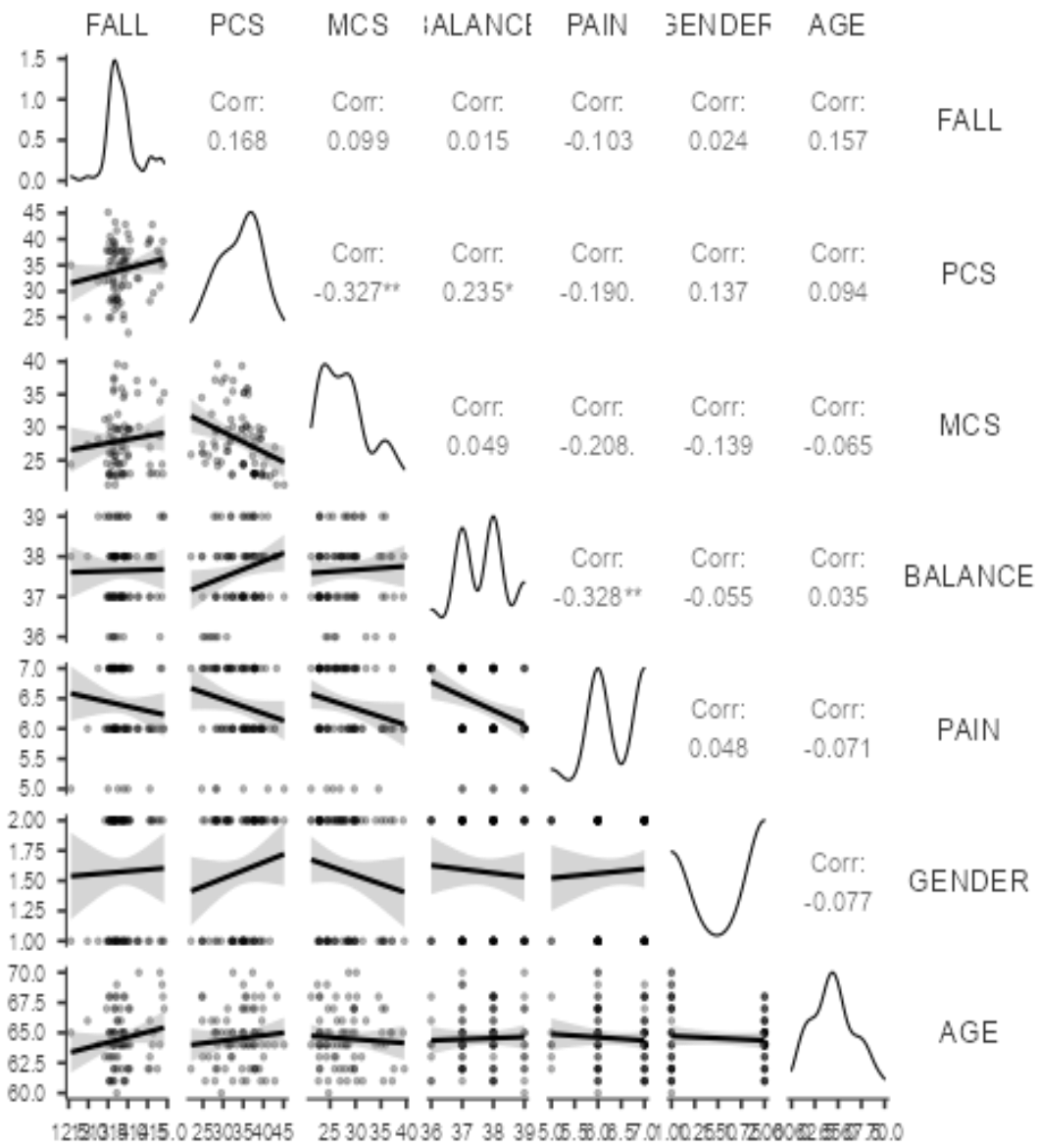
RESULTS

A total of 80 participants with chronic musculoskeletal disorders were included, studied and analysis was done. The mean age group of participant of the study was found be 64.53 ± 2.37 years. The sample included 57.5% participants from female participants and 42.5% male participants . The mean PCS score was found to be 34.18 ± 5.12 and the mean MCS score was found to be 28.02 ± 4.73. Multiple linear regression analysis was done to find out the important predictors of Physical Component Summary (PCS) and Mental Component Summary (MCS) scores using pain, balance, falls, age, and gender as independent variables. For PCS, the model explained 12% of the variance (R^2 = 0.12). Among the important predictors, balance is found to show a near-significant positive association with PCS (B = 1.19, p = 0.083), explaining that better balance tends to be associated with higher physical quality of life. Pain, falls, age, and gender did not show significant independent contributions to PCS.

For MCS, the model explained 7.8% of the variance (R^2 = 0.078). Pain showed a near-significant negative association with MCS (B = −1.56, p = 0.087), which suggests that higher pain levels are associated with poor mental quality of life. Also this model suggests that Balance, falls, age, and gender were not important predictors of MCS.

Table 1. Demographic and Descriptive Statistics

Variable	Mean ± SD	Range
Balance	37.65 ± 0.87	36–39
Pain	6.39 ± 0.63	5–7
Falls	13.88 ± 0.43	12.56–14.92
Age (years)	64.53 ± 2.37	60–70
PCS	34.18 ± 5.12	22.05–45.16
MCS	28.02 ± 4.73	21.27–39.58
Gender	Frequency	Percentage
Male	34	42.5%
Female	46	57.5%



[Note. * p < .05, ** p < .01, *** p < .001]

Figure 1: correlation matrix of outcome variables

Table 2. Linear Regression: Predictors of PCS

Predictor	B (Coef)	Std. Error	t	p value
Constant	-39.70	36.33	-1.09	0.278
Pain	-0.92	0.95	-0.97	0.337
Balance	1.19	0.68	1.75	0.083
Falls	1.65	1.31	1.25	0.214
Age	0.15	0.24	0.62	0.538
Gender	1.60	1.13	1.42	0.160
				Model R^2 = 0.12

Table 3. Linear Regression: Predictors of MCS

Predictor	B (Coef)	Std. Error	t	p value
Constant	43.56	34.34	1.27	0.209
Pain	-1.56	0.90	-1.74	0.087
Balance	-0.13	0.64	-0.21	0.838

Falls	1.08	1.24	0.87	0.389
Age	-0.21	0.23	-0.92	0.360
Gender	-1.34	1.07	-1.25	0.214
				Model $R^2 = 0.078$

Overall, balance came as the strongest factor affecting physical quality of life, and pain appeared to be the most important factor for mental quality of life in participants with chronic musculoskeletal disorders, although these associations were found but did not reach conventional statistical significance. Multiple linear regressions was performed including pain, balance, falls, age, and gender as predictors of PCS and MCS. The full model showed less explanatory power with many non-significant predictors, indicating potential overfitting and multicollinearity. A backward stepwise regression procedure (removal criterion $p > 0.10$) was therefore conducted to find out a parsimonious and statistically robust model.For PCS, the final adjusted model retained pain as the only independent predictor ($R^2 = 0.055$, $F = 4.576$, $p = 0.035$). Pain demonstrated a negative association with PCS ($B = -1.57$, $p = 0.064$), explaining that higher pain levels was associated with poor physical quality of life. Similarly, for MCS, stepwise regression confirmed pain as the single predictor, showing a consistent negative association with mental quality of life among the participants of the study

DISCUSSION

This study assessed if pain, balance, falls, age, and gender independently predict physical (PCS) and mental (MCS) components of quality of life in participants with chronic musculoskeletal disorders (MSDs). The initial multivariable regression model showed low explanatory power along with several non-significant predictors, suggesting model overfitting and shared variance among variables. To confirm this, a backward stepwise regression approach was used; this explains a parsimonious and statistically defensible model. In both PCS and MCS models, pain was found to be as the only independent predictor, balance, falls, age, and gender did not contribute significantly once pain was accounted for.
The findings of the study are clinically and theoretically accepted within the biopsychosocial framework of chronic pain. Pain is not only a symptom but also a central driver of functional limitation, psychological distress, and decreased participation. The fact that pain alone retained predictive value for both physical as well as mental quality of life underscores its pervasive impact across domains of health. While balance impairment and falls are important clinical factors in CMSDs, their effect on quality of life appears to be mediated through pain rather than showing as independent determinants.

The non-significance of balance and falls in the adjusted model suggests that these variables may represent downstream consequences of persistent pain. Chronic pain often leads to deconditioning, fear of movement, altered motor control, and cautious gait patterns, which in turn affect balance and increase fall risk. However, when pain is statistically controlled, the independent contribution of balance and falls diminishes. These findings of the study aligns with current evidence indicating that motor and postural impairments in chronic musculoskeletal pain are frequently secondary to pain-related behavioural and neuromuscular adaptations rather than primary determinants of perceived health status.

Also age and gender did not independently predict PCS or MCS in the presence of pain. Although demographic factors are often reported as they correlate about quality of life, their predictive role weakens when clinical severity variables are included in the regression models. These findings of the study suggest that the lived experience of pain has a more immediate and powerful effect on quality of life as compared to demographic characteristics in Chronic MSDs.

The modest R^2 value observed in the final models indicates that while pain is a significant predictor, quality of life in chronic MSDs is multifactorial. Psychological constructs such as fear-avoidance beliefs, catastrophizing, self-efficacy, coping strategies, and social participation were not included in this model but are known to be the contributors of quality-of-life outcomes. Therefore, the present findings do not suggest that pain explains all variance in PCS and MCS but rather it suggests that among the selected variables for the study , pain seems to be the important independent factor.

From a clinical point of view, these findings carry important implications in the field of physiotherapy practice. Rehabilitation programs often emphasize balance training, fall prevention, and physical reconditioning. While these components are important, the results suggest that without effective pain modulation, improvements in balance or fall risk may not translate into meaningful enhancements in quality of life. Pain education, graded activity, pacing, cognitive-behavioural approaches, and central sensitisation-oriented interventions may have a more direct influence on patient-perceived health outcomes. The results also reinforce the need for clinicians practising physiotherapy to prioritise pain assessment and management as a primary therapeutic target rather than viewing it as a secondary symptom. Take pain into consideration as an effective means on physical function, psychological wellbeing, and overall participation.

Methodologically, the use of stepwise regression strengthened the validity of the findings by decreasing model noise and removing redundant predictors. This approach helped avoid over interpretation of non-significant variables and produced a clear, interpretable model. The absence of multi collinearity in the final model further supports the robustness of the analysis.

However, many limitations must be acknowledged. The cross-sectional design of our study limits causal inference; the directionality between pain and quality of life cannot be definitively established through the study findings. The sample size, while adequate for regression, may limit generalizability in population. Additionally, the exclusion of psychosocial variables means the model captures only part of the complex determinants of quality of life in CMSDs.

Future research should be conducted including psychological and behavioural variables into regression models to provide a more comprehensive understanding of quality of life determinants. Longitudinal studies are also needed to examine whether decrease in pain over time lead to proportional improvements in PCS and MCS.

CONCLUSION

This study explains that out of pain, balance, falls, age, and gender, pain is the only independent predictor of both physical and mental quality of life in participants with chronic musculoskeletal disorders. Balance impairment, fall history, and demographic factors do not independently affect quality of life when pain is taken into consideration. These findings of the study emphasize the central role of pain in designing patient-perceived health status and underscore the significance of prioritising pain management in physiotherapy and rehabilitation. Taking in account pain effectively may be the key pathway through which improvements in physical function and psychological wellbeing are achieved in MSDs.

REFERENCES

1. Ware JE, et al. A 12-Item Short-Form Health Survey: construction of scales and preliminary tests of reliability and validity. Med Care. 1996;34(3):220-33.
2. Berg KO, et al. Measuring balance in the elderly: validation of an instrument. Can J Public Health. 1992;83 Suppl 2:S7-11.
3. Podsiadlo D, et al. The timed "Up & Go": a test of basic functional mobility for frail elderly persons. J Am Geriatr Soc. 1991;39(2):142-8.
4. Hawker GA, et al. Measures of adult pain. Arthritis Care Res. 2011;63 Suppl 11:S240-52.
5. Woolf AD, et al. Burden of major musculoskeletal conditions. Bull World Health Organ. 2003;81(9):646-56.
6. Salaffi F, et al. Health-related quality of life in patients with musculoskeletal conditions. Clin Exp Rheumatol. 2005;23(6):823-8.
7. Gobbens RJ, et al. The prediction of quality of life by physical, psychological and social components. Qual Life Res. 2014;23(8):2289-300.
8. Hermans J, et al. Predictors of health-related quality of life in patients with knee osteoarthritis. BMC Musculoskelet Disord. 2012;13:102.
9. Kovacs FM, et al. Correlation between pain, disability, and quality of life in patients with common low back pain. Spine. 2004;29(2):206-10.
10. Shumway-Cook A, et al. Predicting the probability for falls in community-dwelling older adults using TUG. Phys Ther. 2000;80(9):896-903.
11. Messier SP, et al. Effects of intensive diet and exercise on knee osteoarthritis. JAMA. 2013;310(12):1263-73.
12. Al-Otaibi ST. Prevention of occupational back pain. J Family Community Med. 2015;22(2):73-7.
13. Daffner SD, et al. Impact of neck and arm pain on overall health status. Spine. 2003;28(17):2030-5.
14. Vincent KR, et al. Resistance training for knee osteoarthritis. PM R. 2012;4(5 Suppl):S45-52.
15. Rose DJ, et al. Development of a multidimensional balance scale. Arch Phys Med Rehabil. 2006;87(11):1478-85.
16. Gandhi R, et al. Relationship between patient satisfaction and self-reported function. J Arthroplasty. 2009;24(4):515-20.
17. Liddle SD, et al. Exercise and chronic low back pain: what works? Pain. 2004;107(1-2):176-90.
18. Geneen LJ, et al. Physical activity and exercise for chronic pain in adults. Cochrane Database Syst Rev. 2017;4(4):CD011279.
19. Overend TJ, et al. Reliability and validity of the Berg Balance Scale in patients with knee osteoarthritis. J Geriatr Phys Ther. 2010;33(2):69-77.
20. Jenkinson C, et al. Assessment of the SF-36 version 2 in the UK. J Epidemiol Community Health. 1999;53(1):46-50.

