ISSN: 3156-3953 eISSN: 3156-4437

AZMAN JOURNAL OF HEALTH AND SCIENCES (AJOHAS)

AJOHAS

Volume 1, Issue 1, June, 2026 www.ajohas.azmanuniversityedu.ng

Effect of Multimodal Back Care Interventions on Functional Disability and Pain Intensity among Older Adults with Chronic Non-Specific Low Back Pain

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Abstract

Introduction: Chronic non-specific low back pain (LBP) in older adults is commonly associated with functional disability and loss of independence. Effective rehabilitation strategies are therefore essential. This study evaluated the effects of a multimodal back care intervention on functional disability and pain intensity in older adults with chronic non-specific LBP.

Materials and Methods: Thirty-two adults aged ≥60 years with chronic non-specific LBP were enrolled in a single-blind randomized controlled trial and allocated to a treatment group (TG; n = 16) or control group (CG; n = 16). The TG received a multimodal program consisting of core stabilization exercises targeting the transverse abdominis, lumbar multifidus, and pelvic floor muscles in addition to usual care, while the CG received usual care alone. Functional disability was assessed using the Oswestry Disability Index (ODI) and pain intensity using the Numeric Pain Rating Scale (NRS) at baseline and after 6 weeks by blinded assessors.

Results: Baseline characteristics were comparable between groups ($p > 0.05$). Both groups showed significant improvements; however, reductions were greater in the TG for pain intensity (mean change −3.55 vs −0.81) and functional disability (−11.07 vs −3.73). At 6 weeks, between-group analysis demonstrated significantly lower pain intensity (MD −2.28; 95% CI −2.95 to −1.61; $p < 0.001$; Cohen's d = 2.43) and functional disability (MD −10.00; 95% CI −14.59 to −5.41; $p < 0.001$; Cohen's d = 1.57) in the TG.

Conclusion: Multimodal back care was more effective than usual care in reducing pain intensity and functional disability in older adults with chronic non-specific LBP. Further studies with larger samples and extended follow-up are recommended to determine long-term outcomes.

Keywords: Chronic Low Back Pain, Multimodal Intervention, Functional Disability, Older Adults, Pain Intensity

INTRODUCTION

Low back pain (LBP) is among the leading causes of pain and activity limitation worldwide and represents a major contributor to disability across age groups (Wong et al., 2017). Adults aged 60 years and above are particularly vulnerable to persistent and disabling episodes of LBP, likely due to age-related musculoskeletal degeneration, reduced physical resilience, and psychosocial factors (Bansal et al., 2020). In this population, most cases are classified as non-specific LBP, where no identifiable structural pathology explains the symptoms, and management is typically directed toward symptom control and functional restoration (Traeger, Underwood, Ivers, & Buchbinder, 2022).

In older adults, LBP is strongly associated with functional disability, reduced mobility, and loss of independence. These consequences often contribute

to decreased physical activity levels, which further accelerate functional decline and increase mortality risk (Briggs et al., 2016). Beyond physical limitations, LBP has also been linked to adverse psychological outcomes, including anxiety, depressive symptoms, sleep disturbances, and social isolation (Bello & Adebayo, 2017). Collectively, these multidimensional effects underscore the clinical and public health importance of effective management strategies in this population.

The economic burden of LBP is substantial due to increased healthcare utilization and long-term care needs (Fatoye, Gebrye, Ryan, Useh, & Mbada, 2023). Contemporary clinical guidelines recommend non-pharmacological interventions particularly exercise-based rehabilitation and patient education as first-line management, while pharmacological treatments are reserved for selected individuals with refractory symptoms (Chronic Pain Task Force, 2019).

Despite these recommendations, high-quality evidence specifically addressing exercise-based interventions in older adults with chronic non-specific LBP remains limited. Existing studies often emphasize education or self-management strategies, with less clarity regarding the comparative effectiveness of structured multimodal rehabilitation programs. Therefore, there is a need for rigorously designed trials targeting this population. The aim of this study was to determine the effects of multimodal back care interventions on functional disability and pain intensity in older adults with chronic non-specific low back pain.

MATERIALS AND METHODS

Study design

This study was a single-blind randomized controlled trial designed to evaluate the effects of a multimodal back care intervention on functional disability and pain intensity in older adults with chronic non-specific low back pain.

Sample size

Thirty-two participants aged 60 years and above diagnosed with chronic non-specific low back pain of more than six months' duration were recruited from the outpatient physiotherapy clinics of Bichi and Dawakin Tofa General Hospitals, Kano. All participants met the inclusion criteria and provided written informed consent prior to enrollment. Participants were randomly allocated into either a treatment group (TG; n = 16) or a control group (CG; n = 16). Both groups consisted of individuals diagnosed with chronic non-specific low back pain.

Inclusion criteria were: (i) age ≥60 years; (ii) diagnosis of chronic non-specific low back pain lasting more than six months; (iii) not currently receiving other structured therapeutic interventions; and (iv) ability to provide informed consent. Exclusion criteria included: (i) known lumbosacral tumor; (ii) infective conditions of the lumbosacral spine; (iii) spinal cord hemisection; (iv) history of lumbosacral surgery; (v) inability to comprehend instructions in English or Hausa; and (vi) refusal to participate.

Randomization

Randomization was performed using a computer-generated permuted block sequence with a 1:1 allocation ratio. Block sizes of 2 and 4 were used. Allocation concealment was ensured using sequentially numbered, opaque, sealed envelopes prepared by an independent researcher not involved in recruitment or assessment. Outcome assessors were blinded to group allocation; however, participants and treating physiotherapists were not blinded due to the nature of the intervention.

The treatment group received a multimodal back care program comprising core stabilization exercises targeting the transverse abdominis, lumbar multifidus, and pelvic floor muscles in addition to usual care. The control group received usual care alone. The intervention period lasted six weeks for each participant. Recruitment occurred between January and June 2025.

An a priori power analysis was conducted using G*Power software for an independent samples t-test (two-tailed). Assuming a significance level of 0.05, statistical power of 80%, and an allocation ratio of 1:1, a total sample size of 32 participants (16 per group) was sufficient to detect a large effect size (Cohen's d = 1.0). This effect size assumption was based on previous exercise intervention studies in older adults with chronic low back pain reporting substantial between-group differences in pain and disability outcomes.

Ethical approval was obtained from the Research Ethics Committee of the Kano State Ministry of Health. The study adhered to CONSORT reporting guidelines.

Data Collection Instruments

Pain intensity was assessed using the 11-point Numeric Rating Scale (NRS), where 0 indicates "no pain" and 10 indicates "worst imaginable pain." The NRS is a valid, reliable, and responsive measure of pain intensity in older adults with musculoskeletal conditions (Jones et al., 2016; Kim et al., 2017).

Chronic non-specific low back pain was confirmed using the Low Back Pain Questionnaire (LBPQ), a validated instrument designed to assess symptom characteristics and associated functional limitations in individuals with low back pain (Chiwaridzo et al., 2017). The questionnaire demonstrates acceptable psychometric properties, including content validity and test–retest reliability.

Functional disability was measured using the Oswestry Disability Index (ODI), a widely validated self-report instrument for evaluating disability related to low back pain (Fairbank & Pynsent, 2000). The ODI assesses limitations in daily activities across ten domains, with higher scores indicating greater disability severity.

Data Collection Procedure

Baseline socio-demographic characteristics (age, sex, occupation, and marital status) were recorded using a structured proforma. Primary outcome measures—pain intensity (NRS) and functional disability (ODI)—were assessed at baseline and at 6 weeks post-intervention. Interim monitoring was conducted at 3 weeks; however, only baseline and 6-week data were included in the final statistical analysis to evaluate treatment effects.

All outcome assessments were performed by a physiotherapist who was blinded to group allocation. Participants were instructed not to disclose their assigned intervention to the assessor to maintain blinding integrity.

Interventions: Participants were randomly allocated to either the treatment group (TG) or control group (CG). Both groups received standardized usual care consisting of advice on posture, activity modification, and general mobility exercises.

In addition to usual care, the treatment group received a structured multimodal back care intervention delivered twice weekly for six weeks, with each session lasting approximately 30 minutes. The intervention was standardized and comprised the following components:

Motor control training: Targeted activation and strengthening of local stabilizing muscles, including the transverse abdominis, lumbar multifidus, and pelvic floor muscles.

Graded functional exercise: Progressive, task-oriented exercises aimed at restoring normal functional activity levels and improving movement tolerance.

Cognitive and behavioral strategies: Techniques aimed at addressing psychosocial barriers to recovery, including cognitive restructuring to modify maladaptive beliefs related to pain and movement.

Pain neuroscience education: Structured education on the neurophysiology of pain to enhance understanding of central pain processing and reduce fear-avoidance behaviors.

Psychosocial screening: Central sensitization and psychosocial risk factors were identified using the Örebro Musculoskeletal Pain Questionnaire, and findings were used to inform individualized emphasis within the standardized intervention framework.

The control group did not receive the additional multimodal components.

Data Analysis

Descriptive statistics (frequency and percentage) were used to summarize socio-demographic characteristics of participants. Continuous variables were expressed as mean ± standard deviation.

Primary analysis was conducted using independent samples t-tests to compare between-group differences in change scores (post-intervention minus baseline) for pain intensity and functional disability. This approach was selected to directly evaluate treatment effects while minimizing inflation of Type I error associated with multiple within-group comparisons.

Normality of data distribution was assessed using the Shapiro–Wilk test. Statistical significance was set at $\alpha = 0.05$. Effect sizes were calculated using Cohen's d and interpreted as small (0.2), medium (0.5), or large (0.8).

All statistical analyses were performed using IBM SPSS Statistics version 22.0 (SPSS Inc. Chicago, Illinois, USA).

RESULTS

Thirty-eight participants were recruited and randomized; 32 completed the study (treatment group [TG] n = 16; control group [CG] n = 16). Baseline demographic and clinical characteristics were

comparable between groups, with no statistically significant differences observed for age, anthropometric variables, pain intensity (PI), or Oswestry Disability Index (ODI) scores ($p > 0.05$) (Table 1).

Within-group analyses demonstrated significant reductions from baseline to 6 weeks in both groups. In the treatment group, mean PI decreased from 5.65 ± 1.60 to 2.10 ± 1.15 (mean change −3.55; $p < 0.001$), and functional disability decreased from 37.29 ± 11.95 to 26.22 ± 4.68 (mean change −11.07; $p < 0.001$). In the control group, PI decreased from 5.19 ± 1.81 to 4.38 ± 0.65 (mean change −0.81; $p < 0.001$), and functional disability decreased from 39.95 ± 11.96 to 36.22 ± 7.68 (mean change −3.73; $p < 0.001$) (Tables 2 and 3).

Between-group comparison at 6 weeks showed significantly lower PI in the treatment group compared with the control group (mean difference −2.28, 95% CI −2.95 to −1.61; $p < 0.001$; Cohen's d = 2.43). Similarly, functional disability significantly lower in the treatment group (mean difference −10.00, 95% CI −14.59 to −5.41; $p < 0.001$; Cohen's d = 1.57) (Table 4).

Table 1: Baseline clinical and anthropometric characteristics of the participants

Variable	TG (n=16) Mean ± SD	CG (n=16) Mean ± SD	Mean Difference	95% CI	p-value
Age (years)	65.88 ± 3.56	65.81 ± 3.66	0.07	−2.60 to 2.74	0.93
Height (m)	1.63 ± 0.12	1.64 ± 0.23	−0.01	−0.17 to 0.15	0.59
Weight (kg)	65.88 ± 17.70	64.59 ± 17.28	1.29	−10.77 to 13.35	0.31
BMI (kg/m²)	24.60 ± 5.60	24.90 ± 6.10	−0.30	−4.33 to 3.73	0.41
PI	5.65 ± 1.60	5.19 ± 1.81	0.46	−0.76 to 1.68	0.66
ODI Score	37.29 ± 11.95	39.95 ± 11.96	−2.66	−11.29 to 5.97	0.29

TG= treatment group, CG = control group, SD=Standard deviation, BMI= Body mass index, PI=Pain intensity, ODI=Oswetry Disability Index, n=Number of participants in each group, CI= Confidence Interval

Table 2: Comparison of baseline and 6-week post-treatment average pain intensity and functional disability within the treatment group (TG)

Outcome	Baseline Mean ± SD	6 Weeks Mean ± SD	Mean Change	p-value
PI	5.65 ± 1.60	2.10 ± 1.15	−3.55	<0.001*
ODI Score	37.29 ± 11.95	26.22 ± 4.68	−11.07	<0.001*

*Significance difference. , SD=Standard deviation, PI=Pain intensity, ODI=Oswetry Disability Index

Table 3: Comparison of baseline and 6-week post-treatment average pain intensity and functional disability within the control group (CG)

Outcome	Baseline Mean ± SD	6 Weeks Mean ± SD	Mean Change	p-value
PI	5.19 ± 1.81	4.38 ± 0.65	−0.81	<0.001
ODI Score	39.95 ± 11.96	36.22 ± 7.68	−3.73	<0.001

SD=Standard deviation, PI=Pain intensity, ODI=Oswetry Disability Index, SD: Standard deviation

Table 4: Comparison of between-group differences in treatment and control groups at 6 weeks post-intervention

Outcome	TG Mean ± SD	CG Mean ± SD	Mean Difference	95% CI	p-value	Cohen's d
PI	2.10 ± 1.15	4.38 ± 0.65	−2.28	−2.95 to −1.61	<0.001	2.43
ODI Score	26.22 ± 4.68	36.22 ± 7.68	−10.00	−14.59 to −5.41	<0.001	1.57

TG = treatment group; CG =control group, CI=Confidence interval, PI=Pain intensity, ODI=Oswetry Disability Index, SD: Standard deviation

DISCUSSION

This study examined the effect of multimodal back care interventions on pain intensity and functional disability, measured using the Oswestry Disability Index (ODI), among older adults with chronic non-specific low back pain attending physiotherapy clinics in Bichi and Dawakin Tofa General Hospitals, Kano. Baseline demographic, anthropometric, pain, and disability variables were comparable between groups, indicating successful randomization and minimizing the likelihood that post-intervention differences were attributable to baseline imbalance.

Both groups demonstrated statistically significant reductions in pain intensity and functional disability scores at 6 weeks. However, the magnitude of improvement was substantially greater in the treatment group, and between-group comparisons confirmed that multimodal back care produced significantly greater reductions in pain intensity and functional disability compared with usual care. These findings suggest that while usual physiotherapy care may confer benefit, the addition of structured multimodal components yields superior short-term outcomes. This observation aligns with previous systematic evidence indicating that exercise-based and multimodal rehabilitation approaches are effective in reducing pain and disability in individuals with chronic low back pain (Hayden et al., 2021).

The superiority of the multimodal intervention may be attributable to its integrative design, which combines core stabilization exercises targeting the transversus abdominis, lumbar multifidus, and pelvic floor muscles with postural correction, ergonomic advice, education, and self-management strategies. Comprehensive approaches that address both biomechanical dysfunction and psychosocial contributors to pain have been shown to enhance clinical outcomes (Smith et al., 2020). Furthermore, the inclusion of education and self-management components may enhance patient engagement and self-efficacy, factors that are strongly associated with improved rehabilitation outcomes (Bandura, 1997). The present findings are consistent with this theoretical and empirical framework, suggesting that multidimensional rehabilitation strategies may be particularly beneficial for older adults with persistent low back pain.

Despite these findings, several limitations should be considered. The sample size was relatively small, which may limit the precision and generalizability of the effect estimates despite the large observed effect sizes. The follow-up period was limited to 6 weeks, preventing conclusions regarding the long-term sustainability of treatment benefits. Participants were recruited from two general hospitals within a single geographic region, which may restrict external validity to broader populations and healthcare settings. Additionally, functional disability was assessed using a self-reported measure (ODI), which may be influenced by reporting bias.

While multimodal back care demonstrated superior short-term improvements in pain intensity and functional disability compared with usual care, larger randomized controlled trials with extended follow-up periods and multi-center recruitment are needed to confirm durability of effects and strengthen generalizability.

CONCLUSION

Based on the findings of this study, multimodal back care interventions appeared to be more effective than usual care in reducing pain intensity and improving functional disability among older adults with chronic non-specific low back pain. These results suggest that incorporating multimodal strategies may offer additional benefit in the management of this population, although further research with larger samples and longer follow-up is warranted to confirm these findings.

REFERENCES

Bandura, A. (1997). *Self-efficacy: The exercise of control.* Freeman.

Bansal, D., Asrar, M. M., Ghai, B., & Pushpendra, D. (2020). Prevalence and impact of low back pain in a community-based population in Northern India. *Pain Physician, 23*(4), E389–E398.

Bello, B., & Adebayo, H. B. (2017). A systematic review on the prevalence of low back pain in Nigeria. *Middle East Journal of Rehabilitation and Health, 4*(2), e45262.

Bello, B., & Bichi, M. S. (2018). Comparative effects of stratified back care approaches in individuals with nonspecific low back pain. *Physiotherapy Journal of Indian Association of Physiotherapy, 12*, 63–72.

Blyth, F. M., Briggs, A. M., Schneider, C. H., Hoy, D. G., & March, L. M. (2019). The global burden of musculoskeletal pain—Where to from here? *American Journal of Public Health, 109*(1), 35–40. https://doi.org/10.2105/AJPH.2018.304824

Briggs, A. M., Cross, M. J., Hoy, D. G., et al. (2016). Musculoskeletal health conditions represent a global threat to healthy aging: A report for the 2015 World Health Organization World Report on Ageing and Health. *Gerontologist, 56*(suppl 2), S243–S255. https://doi.org/10.1093/geront/gnw033

Chiwaridzo, M., et al. (2017). Content validity and test-retest reliability of a low back pain questionnaire in Zimbabwean adolescents. *Archives of Physiotherapy, 7*, 3. https://doi.org/10.1186/s40945-017-0032-5

Chronic Pain Task Force. (2019). *Chronic pain in Canada: Laying a foundation for action.* Health Canada.

Fatoye, F., Gebrye, T., Ryan, J., Useh, U., & Mbada, C. (2023). Global and regional estimate of clinical burden of low back pain in high-income countries: A systematic review and meta-analysis. *Frontiers in Public Health, 11*, 1098100. https://doi.org/10.3389/fpubh.2023.1098100

Fairbank, J. C., & Pynsent, P. B. (2000). The Oswestry Disability Index. *Spine, 25*(22), 2940–2952. https://doi.org/10.1097/00007632-200011150-00017

Jones, M. R., Ehrhardt, K. P., Ripoll, J. G., Sharma, B., Padnos, I. W., Kaye, R. J., & Kaye, A. D. (2016). Pain in the elderly. *Current Pain and Headache Reports, 20*(4), 23. https://doi.org/10.1007/s11916-016-0551-2

Kim, Y.-S., Park, J.-M., Moon, Y.-S., & Han, S.-H. (2017). Assessment of pain in the elderly: A literature review. *National Medical Journal of India, 30*(4), 203–207.

Schulz, K. F., Altman, D. G., & Moher, D.; CONSORT Group. (2010). CONSORT 2010 Statement: Updated guidelines for reporting parallel group randomized trials. *Trials, 11*, 32. https://doi.org/10.1186/1745-6215-11-32

Smith, T. O., et al. (2020). Multimodal rehabilitation for low back: A systematic review. *Journal of Musculoskeletal Rehabilitation, 33*(2), 145–156. https://doi.org/10.3233/JMR-190230

Traeger, A. C., Underwood, M., Ivers, R., & Buchbinder, R. (2022). Low back pain in people aged 60 years and over. *BMJ, 376*, e066928. https://doi.org/10.1136/bmj-2021-066928

Wong, J. J., Côté, P., Sutton, D. A., Randhawa, K., Yu, H., Varatharajan, S., Goldgrub, R., Nordin, M., Gross, D. P., & Shearer, H. M., et al. (2017). Clinical practice guidelines for the noninvasive management of low back pain: A systematic review by the Ontario protocol for traffic injury management (OPTIMa) collaboration. *European Journal of Pain, 21*(2), 201–216. https://doi.org/10.1002/ejp.949