



Effectiveness of community pharmacist-led interventions in osteoarthritis pain management: A cluster-randomized trial

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ABSTRACT

Background: Community pharmacists contribute in osteoarthritis management via evidence-based pain management services. However, their roles and impacts on osteoarthritis management in low- and middle-income countries have yet to be explored.

Objective: This study aims to evaluate the effectiveness of community pharmacist-led educational intervention and medication review among osteoarthritis patients.

Methods: A 6-month cluster-randomized controlled study was conducted in 22 community pharmacies of Nepal. Patients clinically diagnosed with osteoarthritis, aged 18 years and above, with a poor knowledge level of osteoarthritis and pain management were enrolled in the study. The intervention groups were educated on osteoarthritis and pain management, and had their medications reviewed while control group received usual care. Primary outcomes evaluated for the study were the change in pain levels, knowledge, and physical functional scores at 3 and 6 months. Repeated analyses of covariance were performed to examine the outcomes.

Results: A total of 158 participants were recruited for the study. The intervention group reported improvements in pain score (mean difference 0.473, 95 % CI 0.047 to 0.900) at 3 months and the end of the study (mean difference 0.469, 95 % CI 0.047 to 0.891) as compared to control. Similarly, improvement in knowledge scores were observed in the intervention group at 3 months (mean difference 5.320, 95 % CI 4.982 to 5.658) and 6 months (mean difference 5.411, 95 % CI 5.086 to 5.735). No differences were observed in other outcomes, including physical functional score, depression, and quality of life.

Conclusion: Community pharmacist-led intervention improved patients' knowledge of osteoarthritis and pain management. While pain scores improved, physical functional score, depression, and quality of life score remained unchanged.

Trial registration: [ClinicalTrials.gov](https://clinicaltrials.gov) identifier: NCT05337709.

1. Introduction

Osteoarthritis is one of the most prevalent chronic diseases globally and is a leading cause of disability, especially in low-middle-income countries (LMICs). Studies have determined that osteoarthritis affects

one in six to seven individuals globally.¹ Osteoarthritis is characterized by the progressive destruction of the cartilage, accompanied by pain, immobility, muscle weakness, and reduced ability to perform activities of daily living.² In people with osteoarthritis, it typically affects the hand, knee, hip, and feet; knee being the most commonly affected part.³

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Effective osteoarthritis management requires long-term treatment strategies for symptom management (pain and limitations in physical function) and joint structure changes, that can lead to disability.⁴ Current clinical guidelines prioritize non-surgical procedures with appropriate pharmacological care, including patient education, advice, physical activity, and weight management in osteoarthritis.^{4,5} However, there exists a gap in effective osteoarthritis management attributed to the complexity of health priorities, limited access to quality conservative care, underutilization of non-pharmacological therapies, resource constraints, and variation in models of care.^{6,7}

Health inequities, unaffordable osteoarthritis management, failure to recognize osteoarthritis as an important disease, lack of coordinated care, knowledge and skills among health care professionals, and low health literacy among people with osteoarthritis are the challenges in implementing osteoarthritis evidence-based care especially in LMICs.^{8,9} In particular, health literacy plays a pivotal role in patients engagement in self-management strategies for osteoarthritis, as it improves personal responsibility with corresponding behavior change.^{10,11} This can be partly explained using the biopsychosocial model, where a multidimensional, dynamic integration among physiological, psychological, and social factors reciprocally influence one another, resulting in chronic and complex pain syndromes.¹² To address this, the model recommends improving a person's functional capacity, resulting in better physical strength and mobility and thus improving affective state and self-esteem.

Patients must be educated on various self-management strategies in osteoarthritis as it enhances the patients' ability to manage diseases, symptoms, treatments, lifestyle, and cope with mental and physical changes.¹³ This can be achieved in several ways: via media, leaflets, videos, face-to-face counselling, or a web-based application.¹⁴ Studies have consistently shown that patient education improves health literacy, especially among people with chronic diseases such as diabetes, hypertension, and osteoarthritis.^{15–17} Among all the strategies, educational videos are the most widely used as they provide a multisensory approach that could deliver a better health education, especially among patients with low literacy skills.¹⁸ Egerton and colleagues reported that patients with osteoarthritic knee pain positively rated the education video in enjoyment, helpfulness, relevance, believability, and intentions for behavior change.¹⁵ Likewise, Lopez and colleagues reported that education videos improved patients' knowledge on osteoarthritis impact, medication and associated side effects, and self-care activities.¹⁹

Recently, several studies have examined the impact of pharmacists working collaboratively with a multidisciplinary pain management team to educate patients and conduct medication reviews.^{7,10,20,21} Darlow and colleagues evaluated the impact of providing an informational booklet to knee osteoarthritis patients in community pharmacies, which was reportedly influential in increasing patient knowledge of osteoarthritis.²² Hanson et al. in their study, provided patient education to osteoarthritic patients, which improved self-perceived health and function.²³ These encouraging results suggest that community pharmacists can help address the gap in osteoarthritis patient care,²⁰ especially in LMICs, via education and medication review.¹

Nepal is a LMIC located in South Asia where healthcare is provided through a two-tier system consisting of the publicly funded healthcare with a co-existing private healthcare systems.²⁴ However, healthcare is unequally distributed, and mostly concentrated in urban areas of the nation. As such, community pharmacies are often the first point of contact for most patients in Nepal due to their low costs for service, easy accessibility, and trust on provided health information.^{25,26} However, there are limited pharmacy services available in most community pharmacies of Nepal. Against this backdrop, this study aims to investigate the impact of a community pharmacist-led medication reviews and educational intervention on pain score, physical function, knowledge, depression, and quality of life among people with osteoarthritis.

2. Methods

2.1. Study design

This study was a multicenter, open-label cluster-randomized study of 22 community pharmacies located in Pokhara, Nepal. The study was conducted from February 2022 to November 2022. Community pharmacies (clusters) were randomized as the intervention involved the training of pharmacists and staffs at each of the community pharmacy. This design reduced the risk of contamination of the intervention effect.

2.2. Participating community pharmacies

Community pharmacies in the Pokhara Valley were randomly approached via telephone or in-person to inquire on their interest to participate in the study. In the event the community pharmacy was interested, information related to their daily customer load was obtained. Details of the study and its intervention was explained to the pharmacist. Community pharmacies who agreed to participate were then stratified into blocks according to the daily customer load; and randomly allocated 1:1 to intervention or control using a computer-generated permuted block design. Randomization was blinded and performed by an independent researcher. Owing to the nature of the study, blinding was not possible for participants or researcher.

2.3. Participants and recruitment

We recruited adults aged 18 years and above who had been clinically diagnosed with osteoarthritis and experienced chronic pain persisting for three months or more. Only individuals willing to participate in the study were included, while those unable to provide informed consent, individuals with a terminal illness, and individuals with a good osteoarthritis knowledge score (>80 % on the assessment tool) were excluded.

Potential participants were recruited using advertisements placed in community pharmacies. All potential participants were provided with an explanation of the study's purpose, procedures and detailed information about the study itself. Those who expressed willingness to enroll were asked to sign a written informed consent form specifically developed in Nepalese language to ensure easy comprehension.

2.4. Intervention group

In this study, education and medication review interventions were designed to promote behavioral change and aid in the appropriate use of medications among osteoarthritis patients, over a period of six weeks, for the management of pain. Our educational intervention (aided by leaflet and video) was anticipated to enhance the physical and psychological capabilities of the participants by improving their knowledge to manage the pain and associated symptoms of osteoarthritis. Community pharmacists from respective pharmacies were trained by the first author (PT) to deliver the intervention (counselling and medication review).

All participants assigned to the intervention group received individualized education counselling on osteoarthritis and pain management. In addition, participants had their medications reviewed. Patients were also inquired about their knowledge on medications (e.g., indication, appropriate use, adverse drug reactions, adherence issues, and self-medication practices). They were further assessed for the risk of development of adverse effects with NSAIDs. Patients were counselled and referred to the physician if any medication overuse, inappropriate dose, or risk of developing adverse effects with NSAIDs were identified.

Participants also watched a video vignette on osteoarthritis management between a patient and pharmacist to reinforce the educational content. During the six weeks period, participants had weekly calls with the community pharmacist to clarify any doubts on the educational materials and were counselled if needed ([Appendix Tables 1 and 3](#)).

2.5. Control group

Participants in the control group received as usual care provided by the community pharmacies. This included the dispensing of medications and instructions on when and how to take the medicines and basic counselling on osteoarthritis management. To ensure participants received the best available care, all participants received intervention education counselling materials (leaflet and video) and medication review at the end of the trial period.

2.6. Primary outcomes

The primary outcome of interest was the change in pain score, assessed using a numeric pain rating scale (NRS) on the 11-point scale from baseline to three months and the end of the study.^{27,28} In addition, we evaluated the change in physical functionality using the Western Ontario and McMaster Universities Arthritis Index (WOMAC),²⁹ which measures the pain, stiffness, and difficulties in performing daily activities among patients with osteoarthritis. This was supplemented with a change in participants' knowledge of osteoarthritis assessed using a knowledge assessment questionnaire developed by performing a thorough literature search^{30,31} and questions adapted from the validated osteoarthritis patient knowledge questionnaire (PKQ-OA) by Hill and colleagues.³² The final questionnaire was composed of 12 multiple choice questions; three questions each assessed the knowledge on osteoarthritis, risk factors for osteoarthritis, medication use, the importance of exercise, and self-care activities. To ensure content validity, expert opinions were obtained from the physicians and pharmacists, and the questionnaire was modified as suggested. A pilot study was conducted among 12 patients with osteoarthritis, and its internal consistency was established; a Cronbach alpha value of 0.825 was obtained.

2.7. Secondary outcome

Secondary outcomes of interest were the change in participants' depression scale and quality of life. Depression was assessed using the Patient-Reported Outcomes Measurement Information System (PROMIS) depression 8b short-form questionnaire.³³ The tool assesses the self-reported negative mood (sadness, guilt), views of self (self-criticism, worthlessness), social cognition (loneliness, interpersonal alienation), and decreased positive affect (loss of interest, meaning, and purpose). Quality of life was measured using the EuroQoL-five-dimension 3 levels instrument (EQ-5D-3L) and a visual analog scale.³⁴ (Appendix Table 2).

2.8. Sample size

We assumed that our intervention would result in a medium effect, with a reduction of 0.46 points on the pain score and 0.47 points on the physical functioning based upon results from a previous study.⁷ Assuming an 80 % power, a sample size of 128 patients was determined to achieve a significance level of 0.05.³⁵ After accounting for a 20 % dropout, a sample size of 154 participants was finalized (77 in each control and intervention groups).

2.9. Statistical analysis

All analyses were performed using a modified intention-to-treat (mITT). Descriptive analysis was used across the randomized groups, with categorical variables presented as frequencies and percentages. In contrast, continuous variables were presented as mean and standard deviation. A repeated measure of analysis of covariance (ANCOVA), was used to examine the differences in effects for both primary and secondary outcomes. Multiple imputation technique was used to replace the missing data in the follow-up periods. All analyses were conducted in the SPSS version 26.0 (Statistical Package for Social Science).³⁶

2.10. Fidelity monitoring

Adherence and fidelity were monitored using the phone call record and the data collection sheets. The principal investigator scheduled regular visits and meetings with the community pharmacists to ensure that the intervention was well delivered, and the data collection procedure followed the proposed protocol.

2.11. Ethics and dissemination

Ethical approval for the trial was obtained from Nepal Health Research Council (Reg. no. 211/2020). The protocol was registered at ClinicalTrials.gov, NCT05337709.

3. Results

3.1. Baseline demographic and clinical characteristics

A total of 158 participants (n = 80 for control group and n = 78 for intervention group) were recruited in the study (Fig. 1). The mean age of the participants was 58.8 years with majority females (n = 124, 78.5 %). More than half of the participants reported pain related to knee osteoarthritis (n = 90, 57.0 %) and had a low knowledge regarding osteoarthritis and pain management (mean score: 5.16 ± 1.92; range 0–12). The participants' pain and WOMAC scores (mean ± standard deviation) were 6.36 ± 1.71 and 63.85 ± 18.12, respectively. No significant differences in the baseline demographic and clinical characteristics were observed between groups (Tables 1 and 2).

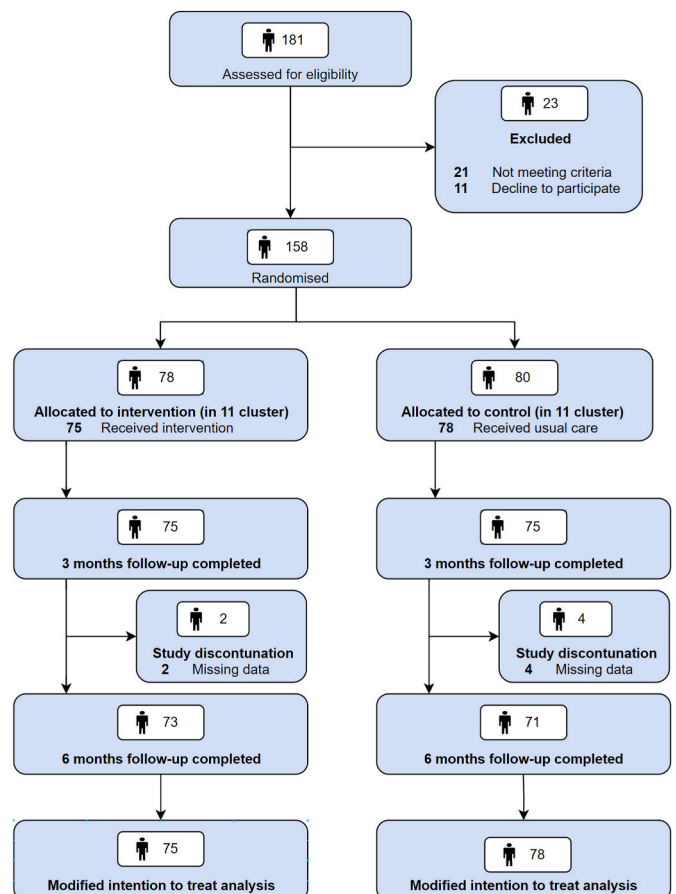


Fig. 1. Flow of participants through study.

Table 1
Baseline demographic details of the study participants.

Age (mean ± SD)	Control (n = 80)		Treatment (n = 78)		Total		P value
	59.8 ± 11.3		57.7 ± 12.6		58.8 ± 12		0.297
	n	%	n	%	n	%	
Gender							0.213
Male	14	17.5	20	25.6	34	21.5	
Female	66	82.5	58	74.4	124	78.5	
Education							0.291
No formal education	31	38.8	31	39.7	62	39.2	
Primary	14	17.5	10	12.8	24	15.2	
Secondary	22	27.5	20	25.6	42	26.6	
Higher secondary	5	6.3	11	14.1	16	10.1	
Bachelor	3	3.8	5	6.4	8	5.1	
Masters and above	5	6.3	1	1.3	6	3.8	
Occupation							0.437
Housewife	52	65.0	50	64.1	102	64.1	
Farmer	9	11.3	11	14.1	20	14.1	
Retired	5	6.3	1	1.3	6	3.8	
Administration/ Public services	3	3.8	1	1.3	4	2.5	
Teacher	4	5.0	4	5.1	8	5.1	
Others (Driver/ Labour)	2	2.5	1	1.3	3	1.9	
Business	5	6.3	10	12.8	15	9.5	
Pain Duration							0.080
3 months-1 year	10	12.5	21	26.9	31	19.6	
2-3 year	15	18.8	19	24.4	34	21.5	
4-5 year	24	30.0	20	25.6	44	27.9	
6-7 year	14	17.5	7	9.0	21	13.3	
8 years and more	17	21.3	11	14.1	28	17.7	
Pain sites							0.214
Knee	40	50.0	50	64.1	90	57.0	
Hip	28	35.0	23	29.49	51	32.3	
Hip and knee	10	12.5	4	5.13	14	8.9	
Multiple joints	2	2.5	1	1.28	3	1.9	
Presence of comorbidity							0.291
Hypertension	21	26.3	16	20.1	37	23.0	
Diabetes	6	7.5	8	10.3	14	8.9	
Asthma	3	3.8	4	5.1	7	4.4	
Thyroid disorder	7	8.8	7	9.0	14	8.9	
Cardiac problem	4	5.0	1	1.3	5	3.2	
GI disorder	8	10.0	1	1.3	9	5.7	

Table 2
Baseline primary and secondary outcomes of the study participants.

	Control (Mean ± SD)	Treatment (Mean ± SD)	Total (Mean ± SD)	P value
Knowledge score	5.19 ± 2.01	5.13 ± 1.83	5.16 ± 1.92	0.872
Pain score	6.56 ± 1.90	6.16 ± 1.48	6.36 ± 1.71	0.166
WOMAC score	66.17 ± 18.17	61.44 ± 17.87	63.85 ± 18.12	0.077
Depression score	51.77 ± 11.77	52.37 ± 9.54	52.05 ± 10.70	0.854
Quality of life score (EQ 5D)	0.61 ± 0.28	0.66 ± 0.25	0.64 ± 0.27	0.073
Visual Analog scale (EQ 5D)	57.75 ± 17.64	62.17 ± 21.35	59.80 ± 19.58	0.077

Pain scores: 0 = no pain, 10 = very much pain.
Higher scores of knowledge represent better knowledge.
Higher WOMAC score indicative of poor function.
Higher score of PROMIS depression scores are indicative of greater severity of depression.
Higher EuroQol-5D is indicative of a better quality of life.

3.2. Primary outcomes

Pharmacist-led intervention for providing education and medication review to osteoarthritis patients improved pain scores at 3 months (mean difference 0.473, 95 % CI 0.047 to 0.900) and at the end of the

study, 6 months (mean difference 0.469, 95 % CI 0.047 to 0.891) as compared to the control group. Similarly, improvement in knowledge score was observed in the intervention group at 3 months (mean difference 5.320, 95 % CI 4.982 to 5.658) and 6 months (mean difference 5.411, 95 % CI 5.086 to 5.735) compared to the control group. No statistically significant differences in the WOMAC score were noted between the intervention and control groups either at 3 months (mean difference 2.717, 95 % CI -0.300 to 5.734) or at the end of the study, 6 months (mean difference 2.717, 95 % CI -0.604 to 5.234) (Table 3, Fig. 2).

3.3. Secondary outcomes

At the end of the study at 6 months, no statistically significant differences in depression score (mean difference -0.181, 95 % CI -1.011 to 0.650) the quality-of-life score EQ 5D (mean difference -0.018, 95 % CI -0.053 to 0.018) and visual analog scale EQ 5D (mean difference -1.161, 95 % CI -3.236 to 0.017) were observed between the intervention and control groups (Table 3, Fig. 2).

3.4. Safety and adverse events

No adverse or severe adverse events related to our study were reported during the study period.

4. Discussion

In this randomized control trial, a community pharmacist-led intervention program was designed where the patients with osteoarthritis had their medications reviewed and received education on osteoarthritis and pain management that was compared to usual practice. The intervention effectively improved patient's knowledge and pain score, however physical functionality, depression, and quality of life remain unchanged.

Result of this study is consistent with the findings reported by Darlow and colleagues²² and Marra and colleagues²¹ which showed the effectiveness of education intervention and pharmacist-led intervention in improving the knowledge and pain score in osteoarthritic patients. This improvement in knowledge gained by the participants on osteoarthritis is important, as it might guide them in decision making, positive behavioral changes and improving health outcomes.³⁷ Against this, we attempted to reinforce the knowledge and self-care management practice of the participants in the intervention through the use of educational videos as well as counselling. Nevertheless, we do urge caution in the interpretation of the improvement in pain score as these changes were relatively small compared to the recommended minimum clinically importance difference of 1.41 points (versus 0.47 in our study).^{38,39}

In contrast, we did not identify any statistically significant difference in WOMAC, depression, and quality of life score between intervention and control group participants at both study periods for 3 and 6 months. Studies to date have similarly reported a mixed impact on these outcomes. Coleman and colleagues and Marra and colleagues reported a significant improvement in WOMAC score after a self-management education program and pharmacist-initiated intervention trial in osteoarthritis.^{21,40} Likewise, Hansson and colleagues also found a significant improvement in the quality of life of patients with osteoarthritis after education, contrary to our findings. While these studies had included the intervention modules relatively similar to us, the use of a multidisciplinary team approach with extensive exercise session might have resulted the positive outcomes as opposed to our study.²³

Conversely, Lawford and colleagues and Allen and colleagues found that the pain coping skills training provided online and over the telephone for osteoarthritis patients shows no effect on physical functioning, measured by WOMAC score after the intervention.^{41,42} Similarly, Taglietti and colleagues, in their randomized controlled trial, found no improvements in WOMAC score, quality of life score, and

Table 3
Comparisons of outcomes at 3 months and 6 months.

Outcomes	Mean Difference (I-J)	Std. Error	p-value	95 % Confidence Interval for Difference		Partial n square	Observed power
				Lower Bound	Upper Bound		
Pain score							
Three months	.473*	.216	.030	.047	.900	.032	0.589
Six months	.469*	.214	.030	.047	.891		
Knowledge score							
Three months	5.320*	.171	.001	4.982	5.658	.882	0.998
Six months	5.411*	.164	.001	5.086	5.735		
WOMAC SCORE							
Three months	1.789	1.524	.242	-1.223	4.800	.009	0.217
Six months	1.693	1.482	.255	-1.235	4.620		
Depression score							
Six months	-.181	.420	.668	-1.011	.650	.001	0.071
Quality of life score							
Six months	-.018	.018	.322	-.053	.018	.007	0.167
Visual Analog Score							
Six months	-1.61	.823	.052	-3.236	.017	.025	0.493

I = control, J = treatment, Analysis: Repeated measure Analysis of Co-variance (ANCOVA) with baseline value as covariates, * significant difference in scores between groups.

depressive symptoms score among participants assigned to the patient-education group,⁴³ similar to our findings. This could be attributed to the nature of the educational intervention which was insufficient to engage patients in physical activity and exercise, which have been found to be effective in improving physical function and, ultimately quality of life in osteoarthritis.⁴⁴

Our study offers several strengths. Few studies to date have examined the effectiveness of community pharmacist-initiated intervention with education and medication review among osteoarthritis patients.^{21,22} Acknowledging this gap, we designed a study which included verbal counselling, leaflet, and video for education and medication review for patients with osteoarthritis visiting community pharmacies. McLachlan and colleagues recently reported that the use of community pharmacist as the information source for osteoarthritis and pain management is limited and emphasized to train them for better management of the condition.⁴⁵ It is even more essential to strengthen the community pharmacy service in LMICs like Nepal to build trust in the community and expand the service beyond medication selling.⁴⁶ As such, continuous professional development modules on medication review and pain management in various conditions for community pharmacists might be beneficial to enhance the knowledge and skill for better patient services. To our knowledge, it is the first study on community pharmacist intervention among osteoarthritis patients in Nepal, a LMIC, where the services of community pharmacist may be a cost-effective option. This study serves as a reference for developing further interventions within community pharmacies for managing chronic conditions like osteoarthritis. However, further investigation is necessary to determine the sustainability and long-term effects of the intervention.

The coaching of osteoarthritis patients with multimedia for lifestyle changes, behavioral changes, and coping skill for pain to improve functioning and quality of life has been examined by several studies.^{19,41,47} Most studies have suggested that the intervention potentially improves all major outcomes in osteoarthritis; this could be due to the ideal research setting compared with the pragmatic design in this study. Furthermore, most of the studies are conducted in high-income countries, where health literacy among individuals are higher compared with the population in LMICs like Nepal.⁴⁸ Inadequate health literacy hinders patients' adherence to health instructions and medicines.⁴⁹ As such, further osteoarthritis pain management programs should focus on the appropriate development and implementation of the intervention that is context specific and tailored to the needs of the target communities being examined for positive outcomes of the intervention.

Nevertheless, this has to be taken in light of some of the study limitations. Firstly, individual experience, beliefs, expectations, perceptions

on health and illness and duration of pain can influence an individual's quality of life. As such, our intervention period of 6 months might not be sufficient to bring the changes on these factors resulting in insignificant changes in quality of life of the patients. Secondly, individualized and flexible exercise prescription with patient education and medication review have been suggested to provide optimal improvements in physical function and quality of life outcomes. Nevertheless, this design was not possible in our study due to the lack of expertise in our setting, which may have resulted in the indifference in WOMAC and quality of life scores. Likewise cognitive behavioral therapy, mind-body exercise, could help manage depressive symptoms in osteoarthritis,⁵⁰ which was lacking in our intervention. While a multimodal and multidisciplinary team approach with pharmacological and non-pharmacological intervention with patients' personal characteristics and preference could help better manage osteoarthritis and associated symptoms, this was not possible in our setting due to the healthcare resource constraints which may not have led to optimal results.⁵¹ As such, future studies should also include and examine these aspects. Finally, due to limited internet connectivity and smartphone users, video could not be circulated to all the participants, which might have affected the intervention.

5. Conclusion

Our study demonstrated the important role of community pharmacists in improving osteoarthritis patients' knowledge and pain management via targeted education interventions and comprehensive medication reviews. While our interventions improved pain score albeit clinically insignificant, it did not significantly impact physical functioning, quality of life, or depression. The findings highlight the importance of providing counselling and support to individuals with osteoarthritis in community settings. By combining educational initiatives, medication management, and personalized guidance, community pharmacists can empower patients to better understand their condition, optimize self-care activities, and achieve positive health outcomes such as improved pain control and enhanced overall well-being.

Author statement

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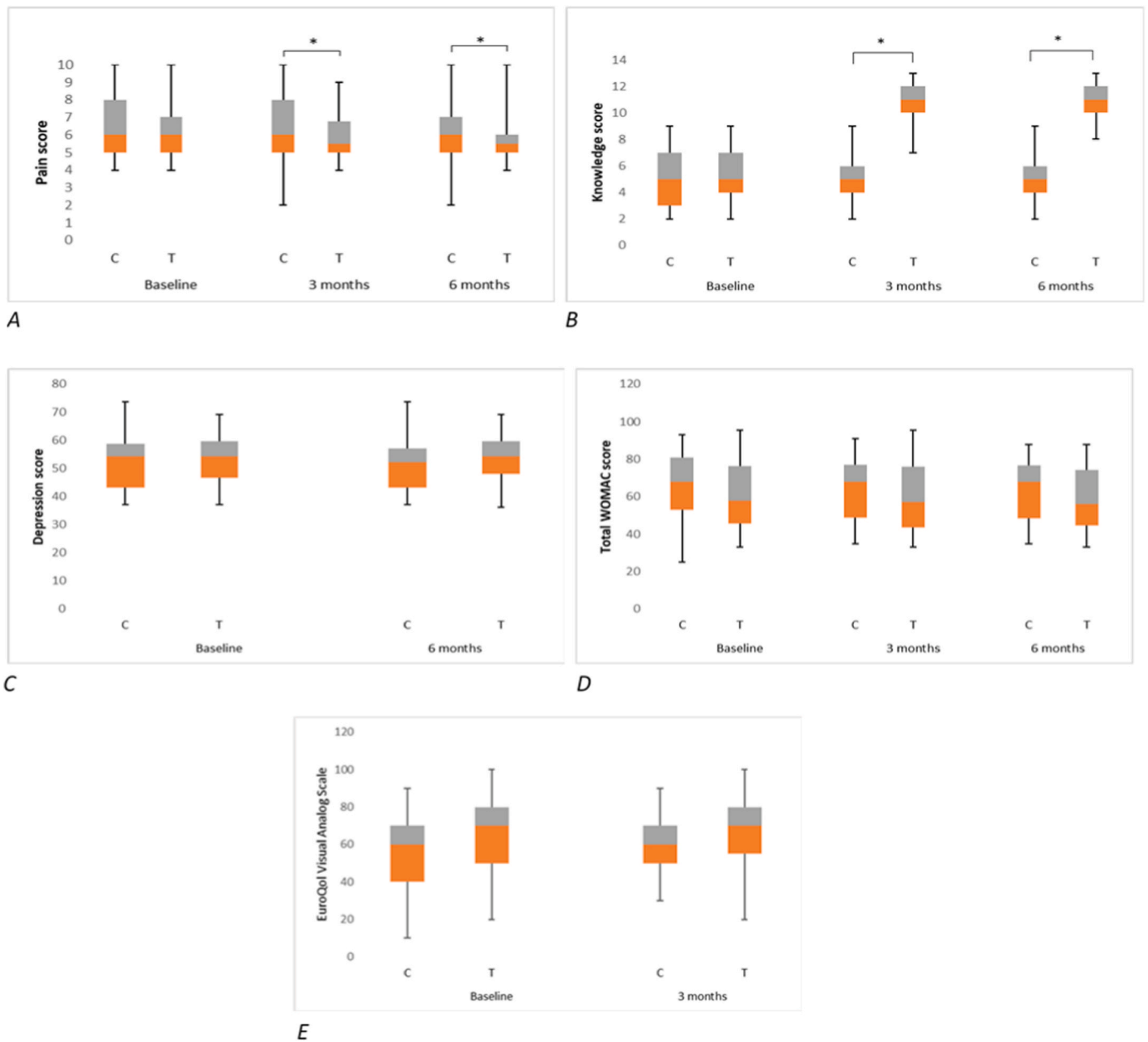


Fig. 2. Box plot on the changes on outcomes at baseline, 3 months and 6 months
 A: pain score; B: Knowledge score; C: Depression score; D: Total WOMAC score; E: EuroQoL Visual Analog Scale C = control, T = treatment, * significance at p value < 0.05.

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Appendix

Appendix Table 1

Description of intervention

Leaflet (Education)	
Osteoarthritis introduction	Brief introduction of osteoarthritis, risk factors, signs, and symptoms
Body mass index	Importance of BMI and formula to calculate, and interpretation with example
Treatment options for osteoarthritis	Enhance physical activity, medication to control inflammation and pain, physiotherapy, weight control, joint replacement therapy
Medication	Types of medication used (paracetamol and NSAIDs), side effects, duration, precaution to be applied, concern on prevalent comorbid condition, and concomitant medication use issued to be discussed with health care professionals.
Food to be consumed	Details on the food to be consumed

(continued on next page)

Appendix Table 1 (continued)

Leaflet (Education)	
Self-care activities	Importance of active life and exercise, hot and cold compression, avoidance of activities that intensify the pain, mental health, and meditation, seeking counselling from a health care professional.
Medication review	Listing medication regimens, assessing participants if they know the indication, developed any adverse effects, adherence issues, and self-medication practice. Assessment of risk for the development of adverse effects with NSAIDs. Counselling for the effective use of drugs, duration of therapy, probable side effects, and precautions to be applied. Patients were referred to the physician if any issues identified.
Video (Education)	The video was a role-play (simulated patient and pharmacist) at a community pharmacy. It was developed in the Nepalese language for better understanding. The contents were the same as in the leaflet. However, the pharmacist clarifies every piece of content by explaining and providing an opportunity for the patient to cross-questioning. It was 9 min long, starting with a brief introduction.

Appendix Table 2
An outcome measure

Variables	Domain	Measure
Descriptive/demographic	Participant characteristics	Structured questionnaire
Primary outcome	Pain score	Numeric pain rating scale
	Participants' knowledge	Participants' knowledge Questionnaire on osteoarthritis and pain management
Secondary outcome	Physical function	Western Ontario and McMaster Universities Arthritis Index (WOMAC)
	Depression	PROMIS Short form Depression Scale
	Quality of life	Euro Qol-five-dimension 3 levels (EQ-5D-3L)

Appendix Table 3
Data collection time points

Variables	Baseline (Both groups)	Intervention (treatment group)					Three months (Both groups)	Six months (Both groups)
		At enrollment Week 1	Week 2	Week 3	Week 4	Week 6		
Demographic detail	x	Medication review, educated counselling (leaflet)						
Pain score	x		Follow up phone calls				x	x
WOMAC score	x			Follow up phone calls			x	x
EQ-5D-3L	x				Follow up phone calls			x
PROMIS depression	x					Video Demonstration		x
Knowledge Assessment	x						x	x

Patient Reported Outcome Measures Information System (PROMIS); Western Ontario and McMaster Universities Arthritis Index (WOMAC); EuroQol-five-dimension 3 levels (EQ-5D-3L).

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