

Comparison the Effect of Rehabilitation at Home and Outpatient Physiotherapy after Total Knee Arthroplasty Surgery on Quality of Life and Knee Function: A Clinical Trial Study

Babak Haghpanah¹, Fatemeh Tavakoli², Mohammadhadi Mollaabbasi², Mohammad J. Azadchehr³, Ali Afsharirad⁴, Amirhossein Sadeghian⁵, Amirmohammad Taravati⁶, Seyedeh Ghazal Shahrokh⁶, Abdollah Shakiba Dastgerdi¹

¹Department of Orthopedic Surgery, School of Medicine, Kashan University of Medical Sciences, Kashan, Iran, ²Department of Health Psychology, University of Tehran, Tehran, Iran, ³Department of Infectious Diseases, Kashan University of Medical School, Kashan, Iran, ⁴Department of General Surgery, Imam Khomeini Hospital, Tehran University of Medical Sciences, Tehran, Iran, ⁵Department of Orthopedic Surgery, School of Medicine, Zabol University of Medical Sciences Sistan and Baluchestan Province, Iran, ⁶Department of Orthopedic Surgery, School of Medicine, Isfahan University of Medical Science, Isfahan, Iran

Abstract

Background: Primary total knee arthroplasty (TKA) is an effective procedure to better function and relief the pain in advanced osteoarthritis patients. This study aimed to evaluate the effectiveness and safety of outpatient clinic-based setting of physiotherapy versus home-based rehabilitation (HBR) for functional recovery immediately after primary TKA procedure.

Materials and Methods: This randomized clinical trial study was conducted on patients underwent TKA in 2021–2022. Participants were randomly allocated to either “usual care” or a “home-based rehabilitation” in a 1:1 ratio. The primary outcome measurement of this study was the Knee Society Score (KSS). The secondary outcome was patient quality of life using the 36-item Short Form Survey Instrument (SF-36). Data were entered into the SPSS software 25 and analyzed.

Results: In this study, 80 patients who underwent TKA in equal proportion in two outpatient physiotherapy (36 women; average age 64.37 ± 5.12 years) and home rehabilitation (33 women; average age 62.4 ± 4.87 years) groups were examined. The findings our study showed that after the intervention (3 and 5 months after the operation), there was no significant difference between the two groups in terms of the quality of life (total score) ($P > 0.05$). KSS had no significant difference between the two groups ($P > 0.05$).

Conclusion: This randomized controlled trial found no significant differences in the outcomes of rehabilitation using either a HBR or a traditional outpatient physiotherapy model.

Keywords: Physiotherapy, rehabilitation, total knee arthroplasty

Address for correspondence: Dr. Abdollah Shakiba Dastgerdi, Department of Orthopedic Surgery, School of Medicine, Kashan University of Medical Sciences, Kashan, Iran.

E-mail: abdollahshakiba@yahoo.com

Submitted: 24-May-2023; **Revised:** 11-Sep-2023; **Accepted:** 02-Oct-2023; **Published:** 29-Jul-2024

INTRODUCTION

Primary total knee arthroplasty (TKA) is an effective procedure to improve function and relieve the pain in advanced osteoarthritis patients.^[1,2] Arthritis is predicted to affect the lives of 78.4 million adults by 2040, and the lifetime prevalence of symptomatic knee arthritis is reported to be 44.7%. Until 2030, the United States

expects an increasing demand of TKA, as it is predicted that 75 million “baby boomers” be affected by arthritis at a rate of 50%.^[3]

As healthcare costs continue to rise and more patients are paying their own health care bills, physiotherapy has been heavily

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: WKHLRPMedknow_reprints@wolterskluwer.com

How to cite this article: Haghpanah B, Tavakoli F, Mollaabbasi M, Azadchehr MJ, Afsharirad A, Sadeghian A, *et al.* Comparison the effect of rehabilitation at home and outpatient physiotherapy after total knee arthroplasty surgery on quality of life and knee function: A clinical trial study. *Adv Biomed Res* 2024;13:51.

Access this article online

Quick Response Code:



Website:
www.advbiores.net

DOI:
10.4103/abr.abr_177_23

considered to justify its effectiveness.^[4,5] Some research focusing on home exercise programs has indicated that these programs may be as effective as supervised physiotherapy and may be a more cost-effective option.^[6] It has been shown that rehabilitation programs can be effective in restoring functional status, thus increasing the clinical and social benefits of TKA. The methods of rehabilitation after discharge from the hospital are different in various countries. Some of the early rehabilitation at 0–6 weeks of discharge from hospital appears to be normal in some areas.^[7] After surgery, an initial inpatient rehabilitation program will be helpful to restore function and range of motion (ROM)^[8] and it should continue after discharge from the hospital. However, these post-hospitalization programs are highly different and some of them are very expensive.^[9–11] They may include anything from supervised physiotherapy with multiple techniques to home exercises taught to patients by physiotherapists. There is still controversy regarding the need for physiotherapy or exercise supervision.^[12]

If a well-structured exercise regimen were to be established, it may not be necessary to have expensive supervised outpatient physiotherapy. However, strong evidence is needed to provide such an indication because most supervised physiotherapy programs are already concentrated in centers with TKA.^[13] This study aimed to evaluate the effectiveness and safety of outpatient clinic-based setting physiotherapy delivered by physiotherapists versus home-based rehabilitation (HBR) for functional recovery immediately after discharge from a primary TKA procedure as well as compare the effect of outpatient physiotherapy with HBR on the quality of life.

MATERIALS AND METHODS

This was a randomized clinical trial study conducted on patients who underwent TKA in Milad Hospital in Kashan city in 2021–2022. The study protocol was approved by the ethics committee of the Isfahan University of Medical Sciences (IR.MUI.MED.REC.1400.609) and the research committee also approved the study (IRCT20210614051574N16).

The inclusion criteria for patients included in the study were age 55 years and above, end-stage OA patients (Kellgren–Lawrence [KL] grade 4) who underwent primary unilateral TKA (it should be noted that all TKA were performed by one surgeon), body mass index (BMI) less than 35 kg/m², patients with controlled blood pressure (BP) and diabetes (DM), willing for treatment, and giving informed and written consent.

Patients with any absolute contraindication to exercise, severe cardiovascular or pulmonary disease (New York Heart Association III–IV), severe dementia (assessed using the Hospital Dementia Screening Tool), rheumatoid arthritis (RA), major extremity surgery planned within 12 months, and serious postoperative complications of the patient were excluded from the study.

The sample size of our study was measured using the sample size software (<https://app.sampsize.org.uk/>). Based

on the following inputs, the sample size of each group was 40 cases. Our inputs were: power, 0.9; significance level, 0.05; significance, 2; mean difference, 7.5; population standard deviation, 10; and allocation ratio, 1.

Using the census method, all patients with the inclusion criteria entered the study and were randomly allocated by a computer-generated system (<https://www.sealedenvelope.com>) to either “usual care” or a “HBR” in a 1:1 ratio. Randomization used permuted blocks of various sizes (two, four, and six) in a 1:2:1 ratio and was stratified by the recruitment site to account for any site effects [Figure 1]. Regarding the nature of the intervention, participants and those providing the rehabilitation were aware of the treatment allocation but those who carried out the follow-up outcome measurements remained blinded to treatment allocation. Then, demographic data on patients, including age, and gender, were obtained. The primary outcome measurement of this study was the Knee Society Score (KSS). The secondary outcome was patient’s quality of life using the 36-item Short Form Survey Instrument (SF-36).

Expert orthopedics evaluated the following items for each patient before surgery:

The KSS consists of two parts: a function score (KSS-F) and a knee score, each of which can range anywhere from 0 to 100 points. During the function evaluation, the patient is given a walking distance and stair-climbing ability rating, and any time they require a walking aid, they receive a negative score. The knee score can be broken down into two subcomponents: the first is a question that evaluates the frequency and severity of pain (KSS-P) and is worth 50 points (50 points indicates that there is no pain), and the second is a clinical judgment of the range of motion (ROM) and stability of the joint, which is 50 points (50 points indicates that there is 125 degrees of motion with no active lag, no instability, and normal alignment).^[14]

In addition, an SF-36 was completed for each patient. This questionnaire is an extensively utilized, well-researched, and self-reported assessment of health covering eight different categories of health. The SF-36 questionnaire is one of the most valid quality of life surveys that is used to assess a person’s quality of life. It is a standard generic or general questionnaire that does not place any cultural limits on its respondents. The questionnaire contains of 36 questions and is divided into eight dimensions. The eight dimensions are as follows: physical function, role limitation due to physical health, role limitation due to emotional problems, sense of life, mental health, social function, physical pain, and general health. These eight dimensions are summed up into two parts: physical and mental.^[15]

The community-based rehabilitation intervention after knee arthroplasty (CORKA) was initiated up to 4 weeks after surgery, and most participants were observed within 2 weeks. In the interval between the surgery and the first examination,

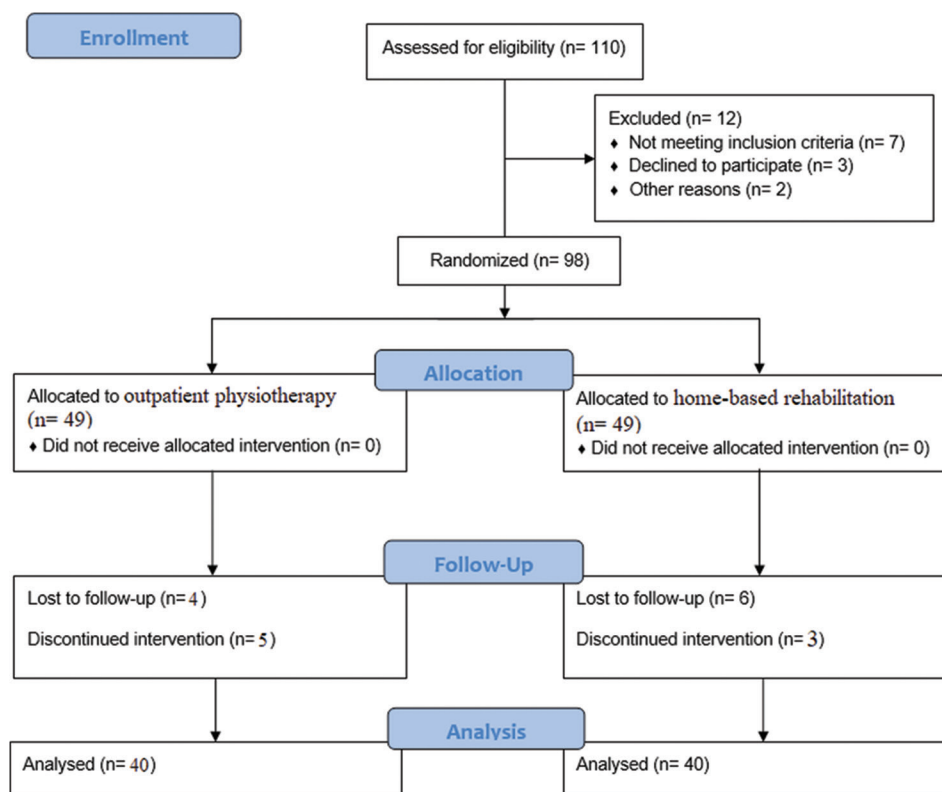


Figure 1: Consort diagram of patients that outpatient physiotherapy and home-based intervention

the physiotherapists of the department gave the participants a home exercise program according to their current common practice. The CORKA home intervention is a multi-component rehabilitation program developed with physicians and patients' collaboration.

The physiotherapist focused on the identified problematic tasks during the initial assessment of patients. Then, the exercise program was adjusted according to the needs and goals of people. Therapists could remove and replace the exercise felt to be unsafe for a participant with another exercise from the pack, or use a more stable position to start. Additional components included functional training, adherence approaches such as using techniques including goal setting, and exercise logs. If needed, aids and appropriate equipment were provided to them.

The physiotherapist performed the initial assessment and prescribed the exercise program, which was observed by the rehabilitation assistant who continued the program in future sessions and, if necessary, modified it using treatment algorithms and decision aids. Another session conducted by the physiotherapist in the middle of the program to check the progress of participants and their exercise program.

All therapists delivering the CORKA intervention attended a 2–3-h training session including instructions on how to evaluate and treat CORKA participants, prescribing and progressing the different categories in the exercise program.

Those assigned to the usual care group received standard postoperative physiotherapy. Routine care after surgery can vary significantly. However, usual care is more likely to include some of the following: between one and six sessions of outpatient setting physiotherapy, a classroom-based setting, or hydrotherapy; written advice on home exercises upon discharge from the hospital; and assessment of any potential home needs or barriers to discharge by the occupational therapist. To standardize usual care as much as possible, patients were expected to participate a minimum of one and a maximum of six physiotherapy usual care sessions. Quality assurance reviews were conducted at all CORKA research sites, which included a fidelity review, during which assessment and treatment delivery were observed. Using a predefined fidelity checklist according to the study protocol, all intervention aspects were checked.

Statistical analysis

After study data were collected, they were entered into the SPSS software (version 25, IBM Corporation, Armonk, NY) and analyzed. After descriptive analysis of the variables (mean and standard deviation), baseline comparisons of the two treatment groups were performed to determine whether they were equivalent in the measured variables. In the next step, the intra-group comparison of scores before and after the intervention was performed using the Wilcoxon rank-sum test, and the inter-group comparison of the change scores in all outcome measures was performed using the ANOVA test with a 95% confidence interval ($P = 0.05$).

RESULTS

In this study, 80 patients who underwent TKA in equal proportion in two outpatient physiotherapy groups (36 women; average age: 64.37 ± 5.12 years) and home rehabilitation (33 women; average age: 62.4 ± 4.87 years) were examined, and there was no significant difference between the two groups in gender and age (gender: $P = 0.330$, age: $P = 0.085$).

The findings of Table 1 show that after the intervention (3 and 5 months after the operation), there was no significant difference between the two groups in terms of quality of life (total score) ($P > 0.05$) [Figure 2].

The findings of Table 2 show no significant difference between the two groups in terms of KSS ($P > 0.05$) after the intervention (3 and 5 months after the operation) [Figure 3].

DISCUSSION

The current study was conducted on 80 patients who underwent TKA to compare HBR with outpatient physiotherapy. The primary and secondary outcome measurements of this study were the KSS and SF-36, respectively. However, our study demonstrated no significant differences between the two groups in terms of KSS and SF-36 after 3 and 5 months of TKA.

In 2021, Barker *et al.*^[16] conducted a study to compared the HBR program with traditional physiotherapy for patients at risk of poor outcome after TKA. Among 621 patients, 309 were assigned to CORKA HBR, receiving a median five treatment sessions (IQR 4–7). In this study, 312 ones were assigned to usual care, receiving a median four sessions (IQR 2–6). The primary outcome was the Late-Life Function and Disability Instrument (LLFDI) at 12 months. However, there was no clinical or statistical significant difference between the groups. Also, no significant differences were found between the two groups according to the Oxford Knee Score (OKS) and 5 level version of EuroQol (EQ-5D-5L). Overall, this study conclude that the CORKA intervention was not superior to usual care. Also, this research revealed that no significant clinical or statistical differences between the two groups in primary or secondary outcomes. In this group of patients, CORKA provides evaluation of intervention by a different service delivery model.

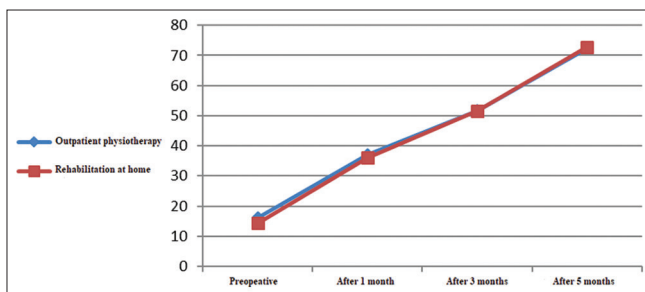


Figure 2: The mean quality of life (total score) between two groups at different times

In 2020, Hamilton *et al.*^[17] conducted a study on 334 participants with knee osteoarthritis at risk of a post TKA poor outcome, based on the OKS, at 6 weeks after surgery. In their study, 163 individuals were assigned to therapist-led outpatient rehabilitation and 171 to a home-based exercise protocol. This study found that outpatient rehabilitation by therapist was not better than a HBR regimen in patients at risk of post-TKA poor outcomes. No clinically related differences were observed among primary or secondary outcome measures. In a similar study by Artz *et al.*,^[18] they found no significant difference in outcomes between the two groups, suggesting that HBR may be a viable alternative to traditional outpatient physiotherapy. In 2019, Buhagiar *et al.*^[19] conducted a meta-analysis to determine the association of inpatient or clinic-based rehabilitation with better post TKA function and pain outcomes compared to any other home-based program. In this review, five studies involving 752 participants compared clinic- and HBR, and one study with 165 participants compared inpatient and HBR. Based on low- to moderate-quality evidence, no superiority was found in the early subacute period of post-TKA for clinic-based or inpatient programs in comparison with home-based programs. Therefore, this study suggested that after uncomplicated TKA, home rehabilitation for patients with adequate social support is an appropriate first line of treatment. In a previous meta-analysis conducted by Florez-Garcia *et al.*,^[6] 11 randomized clinical trials of moderate quality with small sample sizes were evaluated. This study demonstrated that in patients after primary TKA, short-term improvements in physical function and knee ROM between outpatient physical therapy and home exercise regimens did not have a clear difference; however, this conclusion was based on a meta-analysis that was conducted with high heterogeneity. This study was in line with our research. However, in 2023, Alsayani *et al.*^[20] conducted a study on only female patients who underwent TKA. Thirty-two patients were assigned to clinic-based progressive resistance training (PRT) and home-based PRT groups. An 8-week training program was conducted in the clinic or at home, with exercise adherence of 100% in the clinic-based PRT and 90.6% in the home-based PRT group. The first group showed better results in activity pain, knee flexion and extension range of motion (ROM), chair sit-to-stand test, joint awareness and quality of life than in home-based PRT. This study was in contrast with our research.

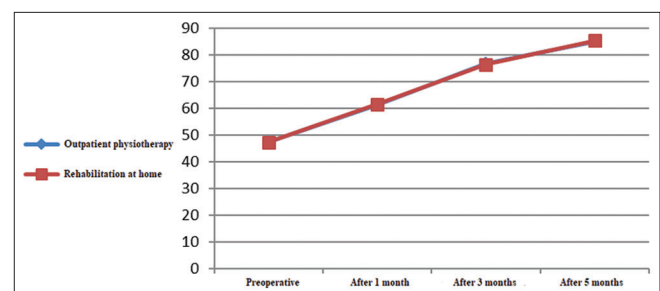


Figure 3: The mean Knee Society Score between two groups at different times. Considering the lack of significant difference in terms of KSS between the two groups, the chart obtained from the analysis of the changes in KSS of the two groups coincided and overlapped

Table 1: Comparison of the mean quality of life (and its components) between two groups

Quality of life	Groups		Effects test*	Postoperative difference between the two groups
	Outpatient physiotherapy	Rehabilitation at home		
Physical function				
Preoperative	22.8±12.31	20.9±12.64	Inter-group: $P=0.040$, $F=4.351$	1-months, $P=0.065$
After 1 month	44.4±12.22	43.5±87.93	Intra-group: $P=0.102$, $F=2.732$	3-months, $P=0.005$
After 3 months	56.3±0.79	53.3±50.95	Reciprocal: $P=0.071$, $F=3.345$	5-months, $P=0.911$
After 5 months	69.5±0.09	69.5±0.09		
Role limitations (physical)				
Preoperative	11.12±87.64	13.12±75.59	Inter-group: $P=0.071$, $F=3.345$	1-months, $P=0.346$
After 1 month	38.12±75.59	35.12±62.51	Intra-group: $P=0.701$, $F=0.149$	3-months, $P=0.641$
After 3 months	65.12±62.26	64.12±37.51	Reciprocal: $P=0.676$, $F=0.176$	5-months, $P=0.898$
After 5 months	71.8±87.37	71.8±87.37		
Role limitations (emotional)				
Preoperative	19.16±17.69	11.16±67.10	Inter-group: $P<0.001$, $F=67.509$	1-months, $P=0.075$
After 1 month	51.16±67.79	52.16±50.69	Intra-group: $P=0.236$, $F=1.430$	3-months, $P=0.008$
After 3 months	53.16±33.54	60.12±83.83	Reciprocal: $P=0.028$, $F=5.045$	5-months, $P=0.517$
After 5 months	90.15±83.07	90.15±0.47		
Energy of vitality				
Preoperative	7.5±0.52	7.5±0.64	Inter-group: $P=0.001$, $F=11.749$	1-months, $P=0.095$
After 1 month	24.3±50.72	23.3±75.71	Intra-group: $P=0.522$, $F=0.413$	3-months, $P=0.194$
After 3 months	50.7±37.54	48.8±12.29	Reciprocal: $P=0.093$, $F=2.899$	5-months, $P=0.296$
After 5 months	71.4±0.11	72.4±12.37		
Mental health				
Preoperative	21.5±60.64	21.6±40.81	Inter-group: $P=0.330$, $F=0.961$	1-months, $P=0.068$
After 1 month	36.3±50.03	35.3±60.24	Intra-group: $P=0.379$, $F=0.784$	3-months, $P=0.194$
After 3 months	48.5±40.71	50.5±20.35	Reciprocal: $P=0.318$, $F=1.012$	5-months, $P=0.902$
After 5 months	72.5±60.55	72.5±20.28		
Social function				
Preoperative	13.10±75.13	11.9±56.55	Inter-group: $P=0.007$, $F=7.636$	3-months, $P=0.477$
After 1 month	31.6±25.33	30.6±31.26	Intra-group: $P=0.859$, $F=0.032$	5-months, $P=0.463$
After 3 months	42.6±81.26	41.6±87.04	Reciprocal: $P=0.319$, $F=1.008$	
After 5 months	62.8±19.25	63.8±44.67		
Pain				
Preoperative	18.8±94.49	9.8±44.5	Inter-group: $P<0.001$, $F=17.195$	1-months, $P=0.155$
After 1 month	34.8±72.41	30.8±83.53	Intra-group: $P=0.914$, $F=0.012$	3-months, $P=0.269$
After 3 months	52.6±50.65	50.7±55.94	Reciprocal: $P=0.089$, $F=2.973$	5-months, $P=0.256$
After 5 months	76.8±39.41	77.8±78.34		
General health perceptions				
Preoperative	21.6±62.03	19.5±62.47	Inter-group: $P=0.114$, $F=2.563$	1-months, $P=0.066$
After 1 month	35.3±12.67	35.4±25.52	Intra-group: $P=0.550$, $F=0.360$	3-months, $P=0.030$
After 3 months	44.3±50.36	42.2±87.97	Reciprocal: $P=0.107$, $F=2.657$	5-months, $P=0.589$
After 5 months	65.5±25.54	65.5±50.97		
Total score				
Preoperative	16.3±13.83	14.3±32.69	Inter-group: $P=0.001$, $F=10.858$	1-months, $P=0.0611$
After 1 month	37.3±8.06	35.2±97.86	Intra-group: $P=0.221$, $F=1.521$	3-months, $P=0.667$
After 3 months	51.2±69.82	51.3±54.05	Reciprocal: $P=0.528$, $F=0.402$	5-months, $P=0.185$
After 5 months	72.2±39.81	72.3±74.04		

The data in the table are reported as mean±standard deviation. The values before and 1 month after the operation are considered as before the intervention (physiotherapy/rehabilitation) and the values 3 and 5 months after the operation are considered as after the intervention. *Mixed (within-between) ANOVA (values before and 1 month after the operation as covariates)

Although in our study, like most published studies, no significant difference was observed between outpatient physiotherapy and HBR, our study has some limitations. First, in our study, common to all trials of postoperative TKA physiotherapy,

there was no control group. Second, the statistical population of our study is small. Therefore, considering the limitations that existed in our study, it is suggested that more studies be conducted with a higher statistical population.

Table 2: Comparison of the mean Knee Society Score (KSS) between two groups

Variable	Groups		Effects test*	Postoperative difference between the two groups
	Outpatient physiotherapy	Rehabilitation at home		
Knee Society Score (KSS)				
Preoperative	47.4±4.96	47.5±5.62	Inter-group: $P=0.010$, $F=7.010$	1-months, $P=0.241$
After 1 month	61.3±5.12	61.55±5.37	Intra-group: $P=0.903$, $F=0.015$	3-months, $P=0.627$
After 3 months	76.87±4.55	76.4±4.59	Reciprocal: $P=0.401$, $F=0.714$	5-months, $P=0.791$
After 5 months	85.15±4.49	85.45±4.69		

The data in the table are reported as mean±standard deviation. *Mixed (within-between) ANOVA (values before and 1 month, 3 months and 5 months after the operation as covariates)

CONCLUSION

This randomized controlled trial concluded no important differences in outcomes of HBR and traditional outpatient physiotherapy model. HBR was feasible but had no advantages over standard outpatient physiotherapy.

Ethics approval and consent to participate

The patient provided written informed consent for publication of this case report and accompanying images.

Availability of data and materials

The authors declare that data supporting the findings of this study are available within the article.

Authors' contributions

B.H: data acquisition, literature search, and manuscript preparation. F.T: data acquisition and literature search. M.M, A.S, A.A and M.A: manuscript preparation. A.S: medical management. A.T and S.S: prepared figures, editing the manuscript. All authors read and approved the final manuscript.

Acknowledgments

The authors consider it necessary to thank and appreciate the clinical research development unit of Shahid Beheshti Hospital of Kashan City, Iran.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

- Li JW, Ma YS, Xiao Lk. Postoperative pain management in total knee arthroplasty. *Orthop Surg* 2019;11:755-61.
- Moradi A, Abedini N. Hemodynamic changes and related factors in bone cement implantation syndrome in knee arthroplasty candidates. *J Parathyroid Dis* 2022;10:e9146.
- Nham FH, Patel I, Zalikha AK, El-Othmani MM. Epidemiology of primary and revision total knee arthroplasty: Analysis of demographics, comorbidities and outcomes from the national inpatient sample. *Arthroplasty* 2023;5:1-8.
- Price AJ, Alvand A, Troelsen A, Katz JN, Hooper G, Gray A, *et al.* Knee replacement. *Lancet* 2018;392:1672-82.
- Moradi A, Abedini N. Effect of spinal anesthesia with and without addition of fentanyl on the occurrence of urinary retention after knee replacement in patients with class III obesity: A randomized clinical trial. *J Parathyroid Dis* 2021;9:e9147.
- Florez-García M, Garcia-Perez F, Curbelo R, Perez-Porta I, Nishishinya B, Rosario Lozano MP, *et al.* Efficacy and safety of home-based exercises versus individualized supervised outpatient physical therapy programs after total knee arthroplasty: A systematic review and meta-analysis. *Knee Surg Sports Traumatol Arthrosc* 2017;25:3340-53.
- Feng JE, Novikov D, Anoushiravani AA, Schwarzkopf R. Total knee arthroplasty: Improving outcomes with a multidisciplinary approach. *J Multidiscip Healthc* 2018:63-73.
- Kornuijt A, De Kort G, Das D, Lenssen A, Van Der Weegen W. Recovery of knee range of motion after total knee arthroplasty in the first postoperative weeks: Poor recovery can be detected early. *Musculoskelet Surg* 2019;103:289-97.
- Alrawashdeh W, Eschweiler J, Migliorini F, El Mansy Y, Tingart M, Björn R. Effectiveness of total knee arthroplasty rehabilitation programmes: A systematic review and meta-analysis. *J Rehabil Med* 2021;53:jrm00200.
- Artz N, Elvers KT, Lowe CM, Sackley C, Jepson P, Beswick AD. Effectiveness of physiotherapy exercise following total knee replacement: Systematic review and meta-analysis. *BMC Musculoskelet Disorders* 2015;16:1-21.
- Moradi A, Abedini N. Does adding ketamine to morphine in a patient-controlled intravenous analgesia pump after orthopedic surgeries help better management of postoperative pain in obese patients. A double-blinded clinical trial. *J Ren Endocrinol* 2022;8:e17076.
- Castrodad IMD, Recai TM, Abraham MM, Etcheson JI, Mohamed NS, Edalatpour A, *et al.* Rehabilitation protocols following total knee arthroplasty: A review of study designs and outcome measures. *Ann Transl Med* 2019;7(Suppl 7):S255.
- Fatoye F, Yeowell G, Wright J, Gebrye T. Clinical and cost-effectiveness of physiotherapy interventions following total knee replacement: A systematic review and meta-analysis. *Arch Orthop Trauma Surg* 2021;41:1761-78.
- Culliton SE, Bryant DM, MacDonald SJ, Hibbert KM, Chesworth BM. Validity and internal consistency of the new knee society knee scoring system. *Clin Orthopaed Relat Re* 2018;476:77.
- Ware JE Jr. SF-36 health survey update. *Spine* 2000;25:3130-9.
- Barker KL, Room J, Knight R, Dutton S, Toye F, Leal J, *et al.* Home-based rehabilitation programme compared with traditional physiotherapy for patients at risk of poor outcome after knee arthroplasty: The CORKA randomised controlled trial. *BMJ Open* 2021;11:e052598.
- Hamilton DF, Beard DJ, Barker KL, Macfarlane GJ, Tuck CE, Stoddart A, *et al.* Targeting rehabilitation to improve outcomes after total knee arthroplasty in patients at risk of poor outcomes: Randomised controlled trial. *BMJ* 2020;371:m3576.
- Artz N, Dixon S, Wylde V, Marques E, Beswick AD, Lenguerrand E, *et al.* Comparison of group-based outpatient physiotherapy with usual care after total knee replacement: A feasibility study for a randomized controlled trial. *Clin Rehabil* 2017;31:487-99.
- Buhagiar MA, Naylor JM, Harris IA, Xuan W, Adie S, Lewin A. Assessment of outcomes of inpatient or clinic-based vs home-based rehabilitation after total knee arthroplasty: A systematic review and meta-analysis. *JAMA Network Open* 2019;2:e192810.
- Alsayani KYA, Baş Aslan U, Bayrak G, Şavkın R, Bükler N, Güngör HR. Comparison of the effectiveness of late-phase clinic-based and home-based progressive resistance training in female patients with total knee arthroplasty. *Physiother Theory Pract* 2023:1-12.