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Comparing the Effect of continuous and Intermittent Physiotherapy on the Pain and Function in Moderate Knee Osteoarthritis; A Pilot Randomized Clinical Trial Study

Shahbaz Sheibani[1], Sayed Mohsen Mirbod[2], Zahra Sadat Rezaeian[3], Mohamad Abbasi[4], Hossein Akbari-Aghdam[5]

Original Article

Abstract

Introduction: Osteoarthritis is one of the common types of joint disorder. This study compared the effects of continuous and intermittent physiotherapy on the pain and function of the individuals with moderate knee osteoarthritis.

Materials and Methods: This randomized clinical trial study included 20 patients with moderate knee osteoarthritis randomly assigned into continuous and intermittent physiotherapy groups. The intervention was exactly the same for both groups including 10 sessions of conventional physical therapy. The treatment frequency was 6 and 3 sessions per week for continuous and intermittent groups, respectively. Using Knee injury and Osteoarthritis Outcome Score (KOOS) and Intermittent and Constant Osteoarthritis Pain (ICOAP) questioners, 6-minute-walking test, timed get up and go test, pain based on visual analogue scale (VAS), and function were assessed before, after 10 sessions, and after one month of follow up. The outcome was analyzed using independent t-test and, repeated measures ANOVA.

Results: Prior to the study, there was no significant difference between groups ($P > 0.05$). At the end of the 10th treatment session ($P = 0.048$), and after 1 month of follow up ($P = 0.030$), only the daily activity subscale of the KOOS questionnaire was significantly less in the continuous group. The records of 6-minute-walk test ($P = 0.046$), timed get up and go test ($P = 0.040$), continuous pain ($P = 0.006$), symptoms ($P = 0.020$), pain ($P = 0.003$), and quality of life ($P = 0.010$) subclasses of KOOS improved significantly in continuous group. After one month of follow up, daily activity subclass and pain based on VAS score were significantly better than baseline records ($P = 0.002$). In intermittent group, pain based on VAS score ($P = 0.002$) and continuous pain ($P = 0.030$) improved significantly after 10th session and follow up period).

Conclusion: It seems that the frequency of the treatment sessions has no significant effect on the treatment results in short term. Thus, the physiotherapist may take the subject's preference and their time limitations for scheduling the sessions. Continuous intervention may probably be the better choice to reach better results while intermittent protocol may result in more lasting effects.

Keywords: Osteoarthritis of knee, Pain, Functional performance, Physiotherapy (Techniques)

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Introduction

Osteoarthritis is one of the common joint disorders (1). The prevalence of this disease in the epidemiological studies in the world and Iran, the most comprehensive of which is the report called the Community Orientated Program for the Control of Rheumatic Diseases (COPCORD), is 2 to 3 times of its prevalence in Iran and 4 to 20 times of its

1- MSc Student, Musculoskeletal Research Center, Rehabilitation Research Institute AND Student Research Committee AND Department of Physical Therapy, School of Rehabilitation Sciences, Isfahan University of Medical Sciences, Isfahan, Iran
2- Instructor, Musculoskeletal Research Center, Rehabilitation Research Institute AND Department of Physical Therapy, School of Rehabilitation Sciences, Isfahan University of Medical Sciences, Isfahan, Iran
3- Assistant Professor, Musculoskeletal Research Center, Rehabilitation Research Institute AND Department of Physical Therapy, School of Rehabilitation Sciences, Isfahan University of Medical Sciences, Isfahan, Iran
4- Physical Therapy Unite, Alzahra Educational and Treatment Center, Isfahan University of Medical Sciences, Isfahan, Iran
5- Assistant Professor, Department of Orthopedic Surgery, School of Medicine, Isfahan University of Medical Sciences, Isfahan, Iran
Corresponding Author: Sayed Mohsen Mirbod, Email: mirbod@rehab.mui.ac.ir

prevalence in India, Pakistan, and Australia (2). This non-inflammatory joint disease affects not only the cartilage, but also all the joint components including the bone underneath the cartilage, ligaments, capsules, synovial membrane, and muscles surrounding the joint (3). Symptoms of this complication include pain, noisy joints, sensitivity to cold, dysfunction (joint stiffness and mobility impairment), muscle weakness, and inability to perform daily activities (4), ultimately leading to dysfunction and decreased quality of life (QOL). In addition to the physical disabilities caused by this disease, mental disorders that result from dependence on relatives and the inability to independently perform daily activities can have a profound effect on the individual's QOL (5). Therefore, preventive and therapeutic interventions at different levels are of great importance for knee osteoarthritis. Of the various joints that are most likely to develop osteoarthritis, the knee joint is not only one of the most commonly involved joints, but it is also regarded as the joint with the most disability for the patient (6).

Knee osteoarthritis is also the most common rheumatic disease in Iran, with a prevalence of 25.5% and 39.2% in urban and rural areas, respectively (7). Various therapeutic approaches, including non-invasive, pharmacological, and surgical therapies, have been identified for this disease, among which the role and importance of physiotherapy in the treatment of knee osteoarthritis (8) and in reducing pain and improving the function of the affected individuals have been emphasized (9). Several studies have shown the positive impact of various physiotherapy modalities including transcutaneous electrical nerve stimulation (TENS) (10,11), ultrasound (12,13), hot pack (14,15), and strengthening exercises for the muscles around the knee, especially quadriceps (16,17) on reducing pain and improving the function in patients with knee osteoarthritis. However, no investigation has been performed to date regarding the role and the effect of on frequency of physiotherapy sessions in these patients. In many cases, the frequency of treatment sessions is selected at the request of the patient, and on the basis of the investigations, the effect of the frequency of treatment change on the outcome of a particular treatment plan seems to have not been studied. Given the numerous questions raised by physicians, physiotherapists, and patients with knee osteoarthritis, the present community-based study was designed based on the needs of the Iranian therapy community and current physiotherapy regimens in Iran and to evaluate and compare the results of the conventional physiotherapy treatments as constant (daily, six sessions a week) and intermittent (every other day and three sessions a week) on reducing pain and improving the function of people with moderate knee osteoarthritis.

Materials and Methods

This study was a double-blind (subject and evaluator) randomized clinical trial carried out aiming with the aim of comparing the effect of 10 constant (daily and six sessions per week) and intermittent (every other day and three sessions per week) physiotherapy sessions on pain and performance of patients with moderate knee osteoarthritis in Physical Therapy Unit, Alzahra Educational and Treatment Center, Isfahan University of Medical Sciences, Isfahan, Iran. Prior to data collection, ethical approval with the code IR.MUI.REC.1396.3.436 was obtained from the ethics committee of Isfahan University of Medical Sciences. In addition, the study information was recorded at the Iranian Registry of Clinical Trials (IRCT) with the code IRCT20171017036837N1.

Due to lack of previous studies with intervention and related variables similar to those of the present study and based on the conventional sample size in the pilot studies (18), after the publication of a call in public and private health care centers in Isfahan, 20 people with knee osteoarthritis were selected and randomly divided into the two constant and intermittent physiotherapy groups of 10 by throwing a coin, taking into account the inclusion and exclusion criteria and after reviewing medical record and comprehensive musculoskeletal evaluation.

The study inclusion criteria were being over 40 years of age (19), suffering from tibiofemoral joint osteoarthritis based on American College of Rheumatology (ACR) criteria (20), moderate to severe osteoarthritis [grade 2 or grade 3 according to Kellgren-Lawrence (KL) scale] (21), involvement of at least one side, individuals with primary knee osteoarthritis (19), not being in acute phase of the disease (22), body mass index (BMI) of less than 35 kg/m^2 (19), and literacy (ability to read and write).

Likewise, the exclusion criteria included systemic rheumatic disease (23), secondary osteoarthritis, active synovitis and severe knee trauma, history of intra-articular injection of corticosteroid or hyaluronic acid for at least the past six months, history of knee surgery intervention, history of trauma or lower extremity surgery during the last year (19), taking oral (non-steroidal anti-inflammatory) medications since one week prior to entry into the study (24),

having musculoskeletal disorders, congenital or acquired lower extremity disorders (except for knee osteoarthritis) (25), disorders in the lumbar, hip, or leg joints (due to the possibility of spread of pain from the above mentioned areas to the knees) (20), and suffering of at least one of the knees from the grade 4 osteoarthritis on the K-L scale (26). Radiological images were taken from all subjects in the standing position with the semi-flex knee to diagnose moderate osteoarthritis and compare the two knees. The severity of osteoarthritis of each knee was determined separately according to the K-L criteria by two experts unaware of the study grouping. In case of disagreement between the two specialists, the third expert who was unaware of the grouping of individuals and the opinions of the other two experts determined the severity of the knee osteoarthritis.

Prior to starting the study, a formal written consent was received from all participants and the objective and method of the study were explained to them. Moreover, the demographic information of the participants was recorded in a questionnaire developed for this purpose. All study data were collected in three stages "before the onset of treatment, immediately after 10 sessions of physiotherapy, and one month after the last session of physiotherapy (follow-up phase)" by an evaluator unaware of grouping of the subjects. The Tegner Activity Scale (TAS), which is a variable and reliable tool for determining the level of activity of individuals with knee problems and has been localized in Persian (27), was employed to match the level of activity of the participants. Fisher's exact test showed no significant difference between the two groups in the Tegner activity level ($P < 0.05$). Furthermore, the pain was measured using the visual analogue scale (VAS), with the lower values of this score indicating a sign of improvement. Evaluation of the patients' functional status was performed using the six-minute walk test (6 MWT) (28) and the Get-Up-and-Go Test (GUGT) (29).

In 6 MWT, the person was asked to quickly walk at a flat surface for 6 minutes and the distance traveled at this time was measured and recorded (28). In the GUGT test, the person who was seated on a fully fixed armchair with a standard height, stood on the chair with the "go" command without pressing the chair, and traveled the flat and unobstructed length of a corridor and returned at maximum speed (15 m in total) and sat on the chair again. In this test, the time from the moment of issuing the "go" command until the person sat in the chair again was recorded (29).

Severity of pain and symptoms of knee osteoarthritis, difficulty in performing daily and exercise and recreational activities, and QOL related to knee osteoarthritis was measured and determined using Knee Injury and Osteoarthritis Outcome Score (KOOS) questionnaire which has been localized in Persian (30). In this questionnaire, there was no overall score and the scores of each subscale were calculated separately and the overall score of each subscale was divided by the maximum possible score of the subscale. The KOOS scale consisted of 42 patient-centered items that in each section, the total score of the individual after deducting from 100 was divided into 4 and then multiplied by 100, with 0 and 100 indicating the maximum and lack of knee pain problem, respectively (30). Besides, the increase in KOOS score indicated an improvement.

The type of the knee pain (constant or intermittent) caused by osteoarthritis was also measured using the Intermittent and Constant Osteoarthritis Pain (ICOAP) questionnaire. This valid and reliable scale is associated with changes in osteoarthritis pain following surgical and pharmacological interventions (27) and its self-administered version has been localized in Persian (31). In the ICOAP questionnaire, there were 5 parts related to constant pain and 6 parts related to intermittent pain. In each type of pain, there were items about the severity of pain, the effect of pain on sleep and QOL, and the degree of depression and concern or anxiety. The answers to the items were rated in a 4-point Likert scale from 0 to 4 (32) and the total pain score was the sum of scores of its subscales, with the overall range of pain ranging from 0 to 44.

In the present study, the treatment was the same in both constant and intermittent physiotherapy groups for 10 sessions of 45 to 60 minutes based on the conventional physiotherapy program on the knee with moderate osteoarthritis (5,19,33). In case of the symmetry on both sides, the symptoms and severity of involvement based on the K-L scale, intervention was performed on the dominant lower limb knee and the only difference between the two groups was in the frequency of the sessions. In the constant and intermittent groups, physiotherapy was performed daily as six sessions a week and every other day as three sessions a week, respectively.

The treatment program consisted of electrotherapy, ultrasound, exercise program, and educational booklet similar to previous studies (19,33). First, the Shapiro-Wilk test was performed. The independent t-test was exploited to determine the difference between the two groups and the repeated measures analysis of variance (ANOVA) was utilized to evaluate changes within each group in the three stages of evaluation.

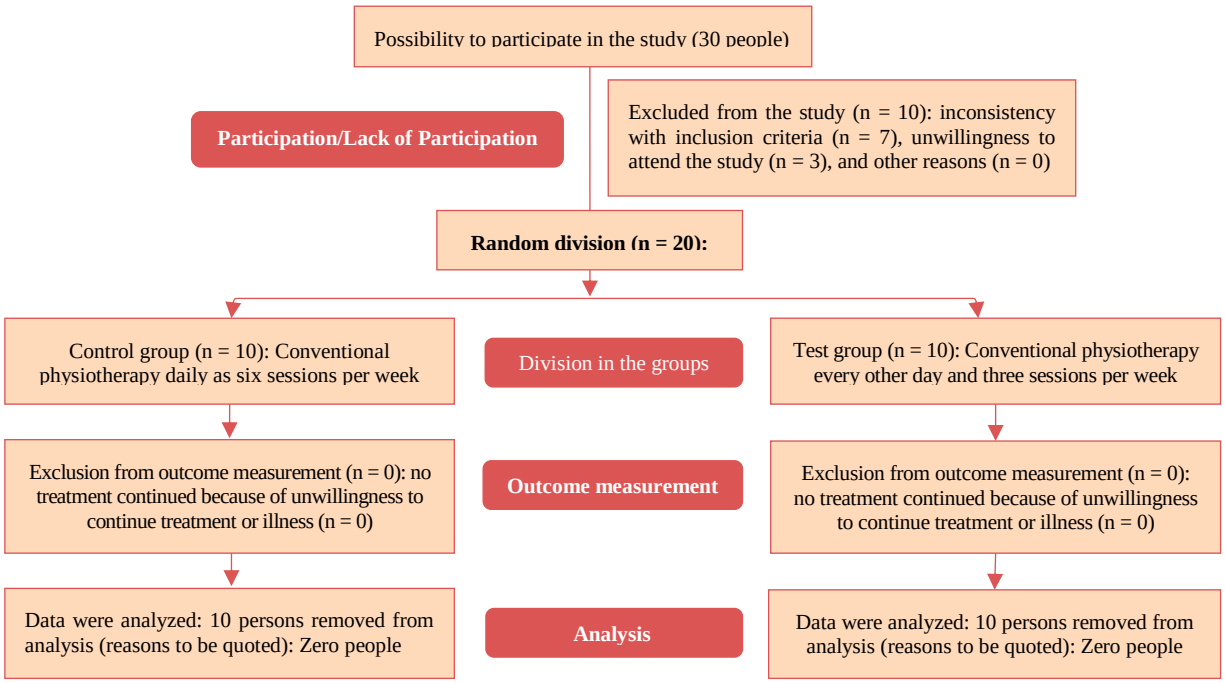

Figure 1. Study process and drop of subjects

Using Bonferroni test, the difference between the two evaluation stages in each group was determined. The difference between the two groups in terms of frequency distribution of different symptoms in the two groups was also tested by means of the Fisher's exact test. Finally, the data were analyzed by the SPSS software (version 20, IBM Corporation, Armonk, NY, USA) at the significant level of 0.05. The study power was obtained as 3 with the G * Power software version 3 considering $\alpha = 0.05$ and $\beta = 0.8$.

Results

The data obtained from 20 patients with moderate knee osteoarthritis aged 41 to 71 years were compared in the two groups of constant and intermittent physiotherapy. From the 30 participants, 7 and 3 ones were excluded because of the inconsistency with the inclusion criteria and because of unwillingness to participate in the study, respectively, (Figure 1). The percentage of drop of the participants was zero and all subjects completed all stages of the study.

There were 2 (20%) men and 8 (80%) women and 1 (10%) men and 9 (90%) women respectively in the constant physiotherapy group and in the intermittent physiotherapy group. There was no significant difference in the frequency distribution between men and women (P = 0.050). The demographic characteristics of the two groups are presented in table 1.

Accordingly, the two groups did not differ significantly in terms of the demographic characteristics. The frequency distribution of the knee symptoms reported by the affected individual in the study groups is shown table 2.

There was no significant difference in knee symptoms between the two groups (P > 0.050). The record of the participants in the 6 MWT and GUGT performance tests is presented in table 3.

Table 1. Demographic characteristics of participants

Variable / Group	Age (years)	Height (cm)	Weight (kg)	BMI (kg/m2)	Knee pain duration (months)
Constant physiotherapy	56.0 ± 10.1	160.8 ± 8.6	72.0 ± 12.4	27.9 ± 3.8	17.3 ± 17.2
Intermittent physiotherapy	54.4 ± 8.7	157.1 ± 3.9	72.1 ± 7.9	29.3 ± 3.8	16.5 ± 17.3
P*	0.710	0.220	0.940	0.420	0.920

BMI: Body mass index

Data were reported as mean ± standard deviation (SD). P < 0.05*

Table 2. Frequency distribution of symptoms and medical records by study groups

Group	Symptoms and medical records							
	Pain	Morning stiffness	Disability in movement	Impairment in daily activities	Disability in going up and down stairs	Noisy joints	Inflammation	Reduced ROM
Constant physiotherapy	10 (100)	9 (90)	4 (40)	9 (90)	9 (90)	4 (40)	4 (40)	3 (30)
Intermittent physiotherapy	10 (100)	10 (100)	4 (40)	10 (100)	10 (100)	5 (50)	2 (20)	4 (40)
P*	> 0.999	0.500	> 0.999	0.500	0.500	0.500	0.310	0.510

ROM: Range of motion
Data were reported by number (%). P < 0.05*

Based on the results of the performance tests, there was no significant difference in the record of the 6 MWT and GUGT tests in any of the three evaluation stages (P > 0.050). In the constant physiotherapy group, the mean distance traveled in the 6 MWT test after the 10th session (P = 0.046) was significantly higher than before the intervention. In the intermittent physiotherapy group, the mean distance traveled in the 6 MWT showed no significant difference with the pre-intervention record (P > 0.050).

The mean time of GUGT in the constant physiotherapy group after the 10th session was significantly lower than the pre-intervention record (P = 0.004), but it increased after one month of follow-up. In the intermittent physiotherapy group, the GUGT record did not change significantly (P > 0.050). The VAS-based pain intensity of the two groups is presented in table 4.

There was no significant difference between the two groups in the mean pain score based on VAS in any of the three evaluation stages (P > 0.050) and its mean score after the 10th session (P = 0.030 and P = 0.020 for constant and intermittent groups, respectively) and after one month of follow-up (P = 0.020 and P = 0.012 for respectively the constant and intermittent groups) was significantly less than the pre-intervention score for both groups, however there was no significant difference in pain severity on the VAS scale between the end of treatment and the end of one month follow up (P > 0.050).

Except for daily activity score from the KOOS questionnaire which was significantly lower in the constant physiotherapy group compared to the intermittent group immediately (P = 0.048) and one month after treatment (P = 0.030), the results of comparison of different sections of the questionnaire in the two groups showed that there was no significant difference between the two groups in the mean scores of the KOOS questionnaire (P > 0.050). Pain score was significantly higher in the constant physiotherapy group after the 10th session (P = 0.030), but there was no significant difference between the two groups in the other stages of evaluation (P > 0.050).

In both groups, the mean clinical symptom score (P = 0.020 and P = 0.038 for constant and intermittent groups, respectively) and daily activity score (P = 0.004 and P = 0.035 for constant and intermittent groups, respectively) after the 10th session were significantly higher than before the intervention. Additionally, there was no significant difference between the two groups in clinical symptom scores after the 10th session and after one month of follow-up (P > 0.050). The daily activities score after one month of follow-up (P = 0.002) was significantly higher in the constant physiotherapy group compared to the pre-intervention stage, but there was no significant difference between the two groups after the 10th session and after one month of follow-up (P > 0.050). The mean score of sport-recreational activities in both groups did not show a significant difference at any time of evaluation (P > 0.050).

Table 3. Results of functional tests of the studied groups

Variable	Group	Before intervention	After 10 sessions	After one month follow-up
6 MWT record (m)	Constant physiotherapy	313.5 ± 133.9	**353.5 ± 128.2	352.5 ± 12.9
	Intermittent physiotherapy	302.0 ± 191.9	372.0 ± 150.6	364.0 ± 140.7
	P (Independent t test)	0.880	0.770	0.850
GUGT record (s)	Constant physiotherapy	16.2 ± 4.8	**13.3 ± 4.3	14.3 ± 2.1
	Intermittent physiotherapy	17.7 ± 8.5	14.5 ± 4.0	14.9 ± 3.7
	P (Independent t test)	0.630	0.600	0.830

** P < 0.050 Comparison of records before intervention and after 10 sessions
Data were reported as mean ± SD. P < 0.05*
6 MWT: Six-minute walk test; GUGT: Get-Up-and-Go Test

Table 4. Mean pain score based on visual analogue scale (VAS) in the study groups

Variable	Group	Before intervention	After 10 sessions	After one month follow-up
Pain intensity based on VAS (cm)	Constant physiotherapy	6.6 ± 2.1	**1.7 ± 1.4	†4.0 ± 1.8
	Intermittent physiotherapy	6.8 ± 1.8	**4.7 ± 1.6	†4.6 ± 2.3
	P (Independent t test)	0.910	0.440	0.520

**P < 0.050 Comparison of records before intervention and after 10 sessions, †P < 0.050 Comparison of records before intervention and after one month follow up
Data were reported as mean ± SD. P < 0.05*
VAS: Visual analogue scale

The mean score of QOL in the constant physiotherapy group after the 10th session was significantly different than before the intervention (P = 0.011), while in the same stage of evaluation, in the intermittent physiotherapy group after one month of follow-up and after the 10th session in the two groups, there was no significant difference (P > 0.050) (Table 5).

The results of the ICOAP questionnaire in both groups indicated that there was no significant difference between the two groups in the mean intermittent and constant pain scores (P > 0.050). The mean score of the constant pain after the 10th session in the two groups (P = 0.006 and P = 0.009 for the constant and intermittent groups, respectively) and after one month of follow-up in the intermittent group (P = 0.037) were significantly lower than before the intervention; however, there was no significant difference in the two groups in the interval between the 10th session until the one-month follow-up (P > 0.050). The mean intermittent pain score in both groups was not significant at any of the evaluation stages (P > 0.050) (Table 6).

The power test showed that with the present data, for $\alpha = 0.05$ and $\beta = 0.8$ for different variables, a very high sample size (at least 3711 subjects) was needed in each group to observe the significance.

Discussion

The study findings revealed that despite the positive effect of conventional physiotherapy on pain relief and improvement of function in patients with moderate knee osteoarthritis, these two frequencies of treatment did not make a significant difference in the outcome of the short-term treatment after 10 sessions and in the one-month follow-up period. However, the daily activity score of the KOOS questionnaire with daily treatment was significantly lower in the constant physiotherapy group in comparison to the intermittent physiotherapy group, and this difference was maintained in the one-month follow-up period as well. On the basis of the investigations, no other similar study has been conducted nationwide and worldwide and therefore there was no ground available for making comparisons.

Although no similar study was found, the reference searches revealed that some studies with different objectives have used therapeutic indicators similar to those of the present study.

Table 5. Mean score of symptoms, pain, daily activities, sports and recreational activities, and quality of life (QOL) based on the Knee Injury and Osteoarthritis Outcome Score (KOOS) questionnaire in the study groups

Variable	Group	Before intervention	After 10 sessions	After one month follow-up
Symptoms	Constant physiotherapy	50.8 ± 14.9	**67.9 ± 23.5	59.3 ± 18.7
	Intermittent physiotherapy	50.6 ± 23.5	**63.5 ± 29.8	58.2 ± 22.5
	P (Independent t test)	0.970	0.830	0.910
Pain	Constant physiotherapy	61.2 ± 17.2	**84.0 ± 19.4	68.0 ± 29.7
	Intermittent physiotherapy	66.8 ± 27.3	77.5 ± 29.4	74.5 ± 24.5
	P (Independent t test)	0.590	0.570	0.600
Daily activities	Constant physiotherapy	72.6 ± 27.2	**26.5 ± 14.9	6.6 ± 29.6†
	Intermittent physiotherapy	71.3 ± 30.8	**36.9 ± 11.2	37.5 ± 10.6
	P (Independent t test)	0.900	0.048*	0.030*
Exercise and recreational activities	Constant physiotherapy	33.1 ± 12.9	42.9 ± 16.8	42.9 ± 11.3
	Intermittent physiotherapy	34.4 ± 94	46.1 ± 23.6	40.7 ± 21.5
	P (Independent t test)	0.810	0.730	0.780
QOL	Constant physiotherapy	42.3 ± 13.3	**60.8 ± 21.4	**53.0 ± 15.3
	Intermittent physiotherapy	43.9 ± 20.7	57.2 ± 23.0	50.6 ± 18.2
	P (Independent t test)	0.830	0.720	0.570

*P < 0.050 Comparison of the two groups, **P < 0.050 Comparison of records before intervention and after 10 sessions, †P < 0.050 Comparison of records before intervention and after one month follow up
Data were reported as mean ± SD. P < 0.05*

Table 6. Mean constant and intermittent knee osteoarthritis pain based on the Intermittent and Constant Osteoarthritis Pain (ICOAP) questionnaire in the study groups

Variable	Group	Before intervention	After 10 sessions	After one month follow-up
Constant pain	Constant physiotherapy	63.5 ± 23.7	**40.5 ± 9.6	47.5 ± 15.9
	Intermittent physiotherapy	64.5 ± 26.2	**44.0 ± 16.5	**46.5 ± 24.6
	P (Independent t test)	0.930	0.570	0.910
Intermittent pain	Constant physiotherapy	57.1 ± 26.8	37.5 ± 16.6	44.1 ± 17.0
	Intermittent physiotherapy	52.5 ± 30.6	44.2 ± 14.3	48.3 ± 25.4
	P (Independent t test)	0.730	0.350	0.640

**P < 0.050 Comparison of records before intervention and after 10 sessions, †P < 0.050 Comparison of records before intervention and after one month follow up
Data were reported as mean ± SD. P < 0.05*

These studies fall into two general categories, one category in which similar interventions were used intermittently (14,19,33) and the other category in which similar interventional therapies were used constantly (34,35). The findings of both groups were consistent with the results of the intra-group changes in the groups examined in the present study (intermittent physiotherapy and constant physiotherapy, respectively) and this finding indicates that the therapeutic interventions used in the present study physiologically had favorable effects on undesirable changes caused by knee osteoarthritis, hence improving pain and function in patients with this disease. In the meantime, as the only study available at present, comparison of the intergroup results was not possible because there was no study aimed at comparing the two constant and intermittent frequencies of this treatment program in patients with moderate knee osteoarthritis.

One of the causes of pain in patients with knee osteoarthritis is abnormal loading on the soft structures around the joint (36). In the present treatment program, using simple and regular exercises, proper function of the muscles around the joint was trained to the individual, simultaneously using the anti-inflammatory effect of ultrasound (12,13) and the effect of TENS on improving blood supply and reducing pain (10,11). The combination of these factors reduces the irritation of the tissues around the joint, and it may be the cause of pain reduction in both groups in the current study.

Furthermore, according to the studies available, pain improvement is one of the main factors of performance improvement (9) which was observed in the present study by improving the record of the GUGT and 6 MWT tests. Therefore, it seems that conventional physiotherapy as a non-invasive treatment may positively affect reduction of clinical symptoms (swelling and morning stiffness), pain, and improvement of daily and functional activities in people with moderate knee osteoarthritis and the sequence of sessions do not make any difference in therapeutic benefits and positive results. However, in constant planning, due to the accumulation of treatment effects, the individual reports a better daily functioning, and this improvement will continue until one month after stopping the treatment.

Since the trend of changes in all variables examined in the present study in the two groups was similar, and in all cases, the absolute magnitude of the changes was higher in the constant physiotherapy group than the intermittent group, it seems that the issue of accumulation of treatment effects in the constant planning has been well established. The short overall duration of treatment and follow-up may be one of the main reasons for the lack of significant differences between the other variables in the intergroup comparison. On the other hand, the trend of the intergroup changes implies the likelihood that the constant treatment program was more successful in achieving the desired treatment effect compared to the intermittent program, while the positive effects of the intermittent treatment were greater, and these effects lost importance less that the constant method after one month of follow-up. In this way, it can be claimed that the daily and constant treatment is a more appropriate strategy for rapid improvement of symptoms, but with the aim of achieving a more durable recovery, the use of intermittent treatment seems more appropriate. Additionally, considering the results of the power test in the two groups, it seems that the present sample size does not restrict the generalization of the study results and it is not reasonable to expect different results in the higher sample sizes.

Limitations

The follow-up in the present study was short-term and only limited to 30 days after stopping the treatment. Moreover, only the two daily and every other day frequencies were compared. 70% of the study participants were women and therefore the results

could not be compared between men and women.

Recommendations

Similar studies are recommended to be repeated with longer follow-up periods and lower therapeutic frequencies. In addition, given that the useful effects on patients were observed with only 10 sessions of physiotherapy, it seems that increasing the number of sessions will lead to the longer duration of the positive effects. Moreover, taking into account the psychological differences between men and women in response to chronic pain, it is suggested to investigate the differences in physical characteristics and prevalence of osteoarthritis in both genders. Furthermore, the present is suggested to be to replicated on larger sample sizes with the aim of comparing women and men.

Conclusion

The study findings indicated that constant and intermittent short-term physiotherapy did not significantly improve pain and function in patients with moderate knee osteoarthritis and the therapist can set the frequency of treatment on the basis of the individual's preference and his time constraints of attending the treatment sessions. The constant daily treatment may be more appropriate for reducing pain and intermittent treatment for more lasting effects.

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Authors' Contribution

Shahbaz Sheibani: Data Collection, analysis and interpretation of results, manuscript adjustment, expert evaluation of the manuscript in scientific terms, confirmation of the final manuscript for submission to the journal office, responsibility for preserving the integrity of the study process from beginning to publication, and responding to referees, Sayed Mohsen Mirbod: Design and ideation of the study, attracting funding for the study, supporting and performing the study services, analyzing and interpreting the results, manuscript adjustment, expert evaluation of the manuscript in scientific terms, final verification of the manuscript for submission to the journal office, responsibility for preserving the integrity of the study process from beginning to publication, and responding to referees, Zahra Sadat Rezaeian: study design and ideation, support, executive, and scientific services of the study, analysis and interpretation of results, specialized statistics services, manuscript adjustment, manuscript expert assessment for scientific concepts, final manuscript confirmation for submission to the journal office, responsibility for maintaining the integrity of the study process from beginning to publication, and responding to the opinions of the referees, Mohamad Abbasi: data collection, expert evaluation of the manuscript in scientific terms, approval of the final manuscript for submission to the journal office, responsibility for maintaining the integrity of the study process from beginning to publication and responding to the opinions of the referees, Hossein Akbari-Aghdam: study design and ideation, support, executive, and scientific services of the study, providing study equipment and samples, analyzing and interpreting results, manuscript adjustment, manuscript expert evaluation in terms of scientific concepts, final manuscript approval for submission to the journal office, responsibility for maintaining the integrity of the study process from beginning to publication and responding to referees' opinions.

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Conflict of Interests

The authors declare no conflict of interest. Sayed Mohsen Mirbod attracted funding for this study from Isfahan University of Medical Sciences and has been working as a faculty member of the department of physical therapy at this university since 1994. Shahbaz Sheibani has been a M.Sc. student of physiotherapy at the school of rehabilitation sciences of Isfahan University of Medical Sciences since 2015.

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