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ADHERENCE TO TELEHEALTH-DELIVERED EXERCISE INTERVENTIONS IN KNEE AND HIP OSTEOARTHRITIS: A SYSTEMATIC REVIEW

Systematic Review

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ABSTRACT

Background: Osteoarthritis (OA) of the knee and hip is a leading cause of disability worldwide, commonly associated with pain, reduced physical function, and decreased quality of life. Exercise therapy is a cornerstone of OA management; however, adherence to exercise programs remains a major challenge. Telehealth-delivered interventions have emerged as a potential solution to improve accessibility and engagement, yet their effectiveness in promoting adherence is not well established.

Objective: To evaluate adherence to telehealth-delivered exercise interventions compared to conventional physiotherapy in individuals with knee and/or hip osteoarthritis.

Methods: A systematic review was conducted in accordance with PRISMA guidelines. PubMed was searched for randomized controlled trials (RCTs) published between January 2015 and February 2026. Studies including adults with knee and/or hip OA, comparing telehealth-based exercise interventions with conventional physiotherapy or usual care, and reporting adherence outcomes were included. Methodological quality was assessed using the PEDro scale. Data were extracted and synthesized narratively, with a primary focus on adherence rates, session completion, and retention.

Results: Nine RCTs involving sample sizes ranging from 29 to 208 participants were included. Overall, telehealth interventions demonstrated moderate to high adherence levels. High adherence (>80–95%) was reported in several studies, particularly those incorporating supervision, feedback, or behavioral support. Some studies showed comparable adherence between telehealth and conventional physiotherapy, while others reported either slightly higher or lower adherence in telehealth groups. Self-directed or minimally supervised interventions were associated with lower adherence. Factors such as real-time supervision, personalized feedback, and patient engagement strategies positively influenced adherence outcomes.

Conclusion: Telehealth-delivered exercise interventions can achieve adherence levels comparable to conventional physiotherapy in individuals with knee and hip osteoarthritis. However, adherence is influenced more by intervention design than delivery mode alone. Incorporating supervision, behavioral support, and interactive components appears essential for optimizing adherence. Further research is needed to standardize adherence measures and evaluate long-term outcomes in telehealth-based rehabilitation.

Key words: Adherence, Exercise Therapy, Digital Health, Osteoarthritis, Patient Compliance, Telerehabilitation, Telemedicine, Rehabilitation

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INTRODUCTION

Osteoarthritis (OA) is a debilitating disease involving gradual joint destruction and deterioration accompanied by joint pain, stiffness, and impairment of physical function, with knee and hip joints being the most frequently affected sites (1, 2). This musculoskeletal disorder is considered one of the major causes of disability globally, especially prevalent among elderly people and associated with aging population and high rates of obesity (3, 4). Exercise therapy is one of the major components of non-pharmacological treatment of knee and hip OA (5). Physiotherapy that is traditionally provided via face-to-face consultations has been proven effective in terms of alleviating patients' pain and improving physical functioning (6). Nevertheless, numerous barriers including affordability and lack of accessibility make it hard for people to attend traditional physiotherapy sessions (7). Adherence to exercise protocols is still a major issue despite clear benefits in patients with knee and hip OA, even though the advantages of rehabilitation interventions have been proven (8). Ineffectiveness is due to poor adherence, which results in unsatisfactory outcomes of treatment (9). Adherence enhancement methods have thus become a topic of interest for researchers in the field of rehabilitation medicine (10). According to a recent meta-analysis by Pérez-Maletzki et al. (2023), interventions aimed at improving adherence through the use of telecommunication devices and behavioral methods increase patient adherence to physical therapy in patients with OA, though they do not guarantee improved outcomes (11).

In recent years, telehealth has become increasingly popular due to its potential as an innovative treatment modality (12, 13). As the name suggests, telehealth involves using information and communication technology to provide remote care and support (14). Specifically, telerehabilitation and other types of telehealth interventions use diverse tools, including mobile apps, video conferencing software, websites, and wearable sensors to help patients perform exercises and receive necessary care remotely (14-16). There have been an increasing number of studies evaluating the efficacy of exercise interventions delivered via telehealth in OA patients. For example, Mousavi Baigi et al. (2023) concluded that the use of telerehabilitation interventions had positive impacts on the physical function, self-efficacy, and quality of life in OA patients, especially in the short term (17). Likewise, Zhu et al. (2025) showed that telemedicine-based exercise interventions were capable of improving the symptoms of pain, physical functions, and quality of life in older people with OA (18). Moreover, Wang et al. (2024) showed that telehealth programs based on the Internet resulted in positive impacts on pain and function in patients with hip and knee OA (19). According to a study by Baigi et al. (2023), in the short run, telerehabilitation may help increase physical activity, functionality, and improve quality of life, even though its long-run effect does not differ from conventional physiotherapy treatment (20). Moreover, Naeemabadi et al. (2022) revealed various ways of delivering telerehabilitation treatments using video-based, sensor-based, or phone-based technology, which reflects the development of this technology (21).

Moreover, the effectiveness of telehealth programs in treating OA is supported by additional evidence from systematic literature. Specifically, Wang et al. (2024) performed a meta-analysis that showed the superiority of internet-based telehealth programs in terms of pain reduction, improvements in physical function, and self-efficacy compared to the traditional treatment (22). At the same time, Ouendi et al. (2023) indicated the value of digital health technologies in improving patient surveillance and rehabilitation outcomes (23). Similar results were obtained by Zhang et al., 2023, among surgical patients where telerehabilitation provided similar outcomes to those of traditional hospital rehabilitation (24). Nevertheless, adherence is crucial for achieving successful results from these interventions. Aily et al. (2020) found that adherence to telerehabilitation may depend on the mode of delivery of the program as well as on the preferences of patients and the degree of facilitation required (25). In addition, according to the literature, interventions that include certain strategies, feedback, and supervision usually lead to better adherence levels than those that imply self-regulation only (26, 27).

Although several systematic reviews have evaluated the effectiveness of telehealth interventions in improving clinical outcomes such as pain and function, there is limited synthesis specifically focused on adherence as a primary outcome. Most previous reviews have either reported adherence as a secondary outcome or have focused broadly on effectiveness rather than engagement with the intervention. Furthermore, heterogeneity in intervention design, delivery methods, and adherence measurement tools makes it difficult to draw clear conclusions regarding the comparative effectiveness of telehealth versus conventional physiotherapy in promoting adherence. Therefore, a clear gap exists in the literature regarding how telehealth-delivered exercise interventions influence adherence compared to traditional face-to-face physiotherapy in individuals with knee and hip OA. Addressing this gap is essential for informing clinical practice and optimizing rehabilitation strategies, particularly in the context of increasing reliance on digital health solutions. The aim of this review is to evaluate adherence to telehealth-delivered exercise interventions in individuals with knee and hip osteoarthritis.

METHODS

This review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, which provide a structured approach to identifying, screening, and reporting relevant studies (28). The use of PRISMA enhances transparency, reproducibility, and methodological rigor in evidence synthesis (29). To guide the review process, a PICO framework (Population, Intervention, Comparison, Outcome) was developed: “In individuals with knee and/or hip osteoarthritis, how does telehealth-delivered exercise intervention compare to conventional physiotherapy in influencing adherence to exercise programs?” (Table 1), which is widely recommended for structuring clinical research questions and search strategies (30).

Table 1: PICO Framework

1.	Component	2.	Description
3.	Population (P)	4.	Adults diagnosed with knee and/or hip osteoarthritis
5.	Intervention (I)	6.	Telehealth-delivered exercise interventions
7.	Comparison (C)	8.	Conventional physiotherapy
9.	Outcome (O)	10.	Adherence to exercise programs

Systematic Search Strategy

The literature search was conducted primarily using PubMed, which is known to be an extensive database on biomedical and clinical research, including randomized controlled trials in the field of rehabilitation and musculoskeletal disorders (31). PubMed offers broad indexing of MEDLINE journals and also has advanced features such as MeSH terms that aid in conducting precise searches (32). Previous methodological studies have demonstrated that PubMed captures a substantial proportion of relevant clinical trials, particularly in physiotherapy and telehealth-related research (33-35). Because of time and resource limitations, searching of other databases was not conducted systematically; however, steps were taken to ensure comprehensiveness through the application of a systematic search strategy, together with manual searching of references from included articles. This approach has been considered acceptable in focused reviews where a well-defined research question and rigorous screening process are applied (36, 37).

The search process incorporated both MeSH terms and key words developed using the PICO framework. This was done through the use of Boolean operators (AND, OR) in order to maintain the required level of sensitivity and specificity in accordance with the accepted systematic review process (38). The search terms included combinations of keywords related to osteoarthritis (e.g., "knee osteoarthritis," "hip osteoarthritis"), telehealth modalities (e.g., "telehealth," "telemedicine," "remote rehabilitation," "digital health"), exercise interventions (e.g., "exercise," "physical activity," "rehabilitation"), and adherence-related outcomes (e.g., "adherence," "compliance"), along with study design filters such as "randomized controlled trial" or "RCT." These terms were systematically combined using Boolean operators to retrieve relevant studies across the selected database (Table 2).

Table 2: Search Strategy based on PICO Framework

Population		**Intervention**		**Exercise**		**Outcome**		**Study Type**
"Osteoarthritis" **OR** "Knee osteoarthritis" **OR** "Hip osteoarthritis"	**AND**	"Telehealth" **OR** "Telemedicine" **OR** "Remote rehabilitation" **OR** "Digital health"	**AND**	"Exercise" **OR** "Physical activity" **OR** "Rehabilitation"	**AND**	"Adherence" **OR** "Compliance"	**AND**	"Randomized controlled trial" **OR** "RCT"

While first searching for exact phrases, advanced search was performed via Boolean Phrases, using "OR" to denote synonyms and "AND" to denote keywords from different categories. First, the search was done without any filter, then with all the four categories combined with "AND", finally, filters for the language and the time-frame were applied on the results found, across the database.

Eligibility Criteria

The inclusion criteria were predefined using the PICO approach and were strictly adhered to during the title/abstract screening process as well as the full text screening stage, in accordance with PRISMA guidelines (39).

1. ***Population:*** Those studies were included that used subjects who were adults and diagnosed with osteoarthritis of the knees and/or hips. Studies involving younger populations or non-degenerative joint conditions were excluded to maintain clinical relevance and population homogeneity.

2. ***Studies:*** Only randomized controlled trials (RCTs) were considered eligible, as this study design is regarded as the gold standard for evaluating the effectiveness of clinical interventions and minimizing bias in rehabilitation research (40-42). Studies employing observational, quasi-experimental, or non-randomized designs were excluded due to their lower methodological rigor (43).

3. ***Experimental Group:*** Must include telehealth-delivered exercise programs, defined as exercise interventions delivered remotely using digital or communication technologies such as video conferencing, mobile applications, web-based platforms, or telephone-based supervision (44). This definition aligns with contemporary applications of telehealth in musculoskeletal rehabilitation, where remote delivery facilitates accessibility and continuity of care. Studies that did not clearly incorporate a telehealth component or relied solely on in-person interventions were excluded.

4. ***Comparison Group:*** Eligible studies were required to include a comparison group receiving conventional physiotherapy, standard care, or no intervention, allowing for meaningful comparison of adherence outcomes.

5. ***Outcome:*** The primary outcome of interest was adherence to exercise interventions, operationalized through measures such as attendance rates, session completion, or self-reported compliance. Studies that did not report adherence or related measures were excluded.

6. ***Publications:*** Only peer-reviewed articles published in English between January 1, 2015 and February 28, 2026 were included. Conference abstracts, grey literature, and non-peer-reviewed sources were excluded to ensure the inclusion of high-quality and reliable evidence.

Quality Assessment

For this review, the methodological quality of the selected studies was evaluated by utilizing the Physiotherapy Evidence Database (PEDro) scale, which is a validated and widely used tool for evaluating randomized controlled trials in physiotherapy and rehabilitation research (45, 46). The PEDro scale has demonstrated acceptable reliability and validity for assessing methodological rigor and risk of bias in clinical trials (46). The PEDro scale comprises eleven items, of which ten contribute to the final score. The items include such aspects as random allocation, allocation concealment, comparability of the groups at baseline, blinding, completeness of follow-ups, intention-to-treat analysis, and statistical methods applied. Though the first item focuses on the external validity of trials, its score is not counted while forming the final score. The remaining items primarily evaluate internal validity and statistical interpretability, which are critical for determining the credibility of trial findings (47). Every study was then rated on a scale from one to ten, depending on the quality of the methodology. This helped to ensure that the comparative rating was easy to understand in terms of assessing the quality of each individual study.

Data Extraction

The data extraction procedure was performed using a systematic, standardized process for data extraction to ensure consistency in the included studies. Data that were relevant for inclusion were then extracted and compiled into tables. These included parameters such as authors and year of publication, sample size, and patient demographic characteristics, such as age and gender distribution. Moreover, other variables that were considered when assessing the literature include detailed information about the intervention being performed, such as how the intervention was done (e.g., via video, via phone support, or via an app), how long the intervention lasted, the frequency of the intervention, and how supervised the intervention was. Regarding outcomes, the focus of the data extraction in particular was in terms of adherence measures such as adherence rate, compliance, and dropout rate. Other data that may be included as key findings related to adherence were also included for qualitative synthesis.

RESULTS

Study Selection Criteria

The database search yielded a total of 61 records. After applying the language filter and limiting by year of publication (2015-2026), 60 records were eligible for screening. Four duplicates were removed at the end, leaving 56 records. In title screening, twelve records were found to be not related to the research topic and thus excluded from the review. Abstracts of the remaining forty-four records were screened, resulting in sixteen being excluded due to lack of alignment to the predefined inclusion criteria, including inappropriate interventions and outcomes. Remaining twenty-eight records underwent full-text evaluation for eligibility. Out of these, one article could not be accessed, seventeen records were excluded because there was no control group (n =1), involved non-osteoarthritis patients (n =2), and they were published as protocols of studies with no results presented (n = 15). As a result of the full-text evaluation, nine randomized controlled trials were identified and selected for the review. The steps of record identification and selection are visualized in Figure 1 according to PRISMA guidelines.

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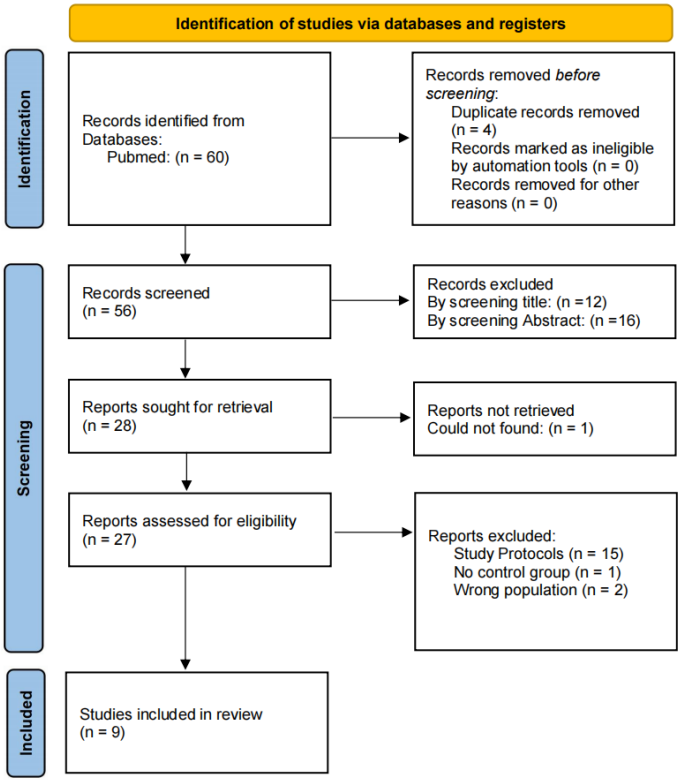

Figure 1: PRISMA Flow Diagram

Quality Assessment

The methodological quality of the included studies was assessed using the PEDro scale. Overall, the majority of the included randomized controlled trials demonstrated good methodological quality, with scores ranging from 7 to 8 out of 10. Specifically, most studies satisfied key criteria related to random allocation, baseline comparability, adequate follow-up, and appropriate statistical reporting. However, consistent limitations were observed in blinding procedures, particularly with respect to participants and therapists, which is a common challenge in rehabilitation-based interventions. One study was rated as fair quality with a score of 5, reflecting limitations in allocation concealment, blinding, and intention-to-treat analysis (48).

Table 3: Quality Assessment of included studies based on PEDro Scale

Articles	2	3	4	5	6	7	8	9	10	11	Total Score	Quality of Study
Aily et al (49)	1	1	1	0	0	1	1	1	1	1	8/10	Good
Akgül et al (50)	1	1	1	1	0	0	1	1	1	1	8/10	Good
Baker et al (51)	1	1	1	0	0	1	1	1	1	1	8/10	Good
Dieter et al (52)	1	1	1	0	0	1	1	1	1	1	8/10	Good
Im et al (53)	1	1	1	0	0	1	1	1	1	1	8/10	Good
Kloek et al (54)	1	1	1	0	0	1	1	0	1	1	7/10	Good
Martinsen et al (8)	1	1	1	0	0	1	1	0	1	1	7/10	Good
Rini et al (55)	1	1	1	0	0	1	1	0	1	1	7/10	Good
Tore et al (48)	1	0	1	0	0	0	1	0	1	1	5/10	Fair

Participants were assigned to groups using a randomization process.
The allocation procedure was concealed from those enrolling participants.
The study groups were comparable at baseline in terms of key clinical characteristics.
Participants were unaware of the group to which they were assigned.
Therapists delivering the intervention were blinded to group allocation.
Outcome assessors were blinded when measuring at least one primary outcome.
Outcome data were obtained from at least 85% of the initially allocated participants.
Data analysis followed the intention-to-treat principle or equivalent handling of dropouts.
Statistical comparisons between groups were reported for at least one key outcome.
Results included both point estimates and measures of variability (e.g., standard deviation or confidence intervals).

Study Characteristics

A total of nine studies were included in this systematic review to evaluate adherence to telehealth-delivered exercise interventions in individuals with knee and/or hip osteoarthritis (Table 4). All included studies were randomized controlled trials published between 2015 and 2025 (8, 48-55). The studies were conducted across diverse geographical settings, including Brazil (49), Turkey (48, 50), the United States (51, 55), Germany (52), the Netherlands (54), Norway (8), and South Korea (53). Sample sizes varied considerably, ranging from 29 to 208 participants. Most studies focused on individuals with knee osteoarthritis (48-53), while three studies included participants with both hip and knee osteoarthritis (8, 54, 55). The mean age of participants across studies ranged approximately from the early 50s to early 70s. Intervention durations varied from 6 weeks to 24 months, with most studies assessing short-term outcomes (≤3 months), although one study included long-term follow-up (51).

Characteristics of Telehealth Interventions

The telehealth interventions demonstrated substantial variability in delivery mode and content (Table 4). Several studies implemented app-based or mobile health (mHealth) exercise programs, often incorporating monitoring, feedback, or sensor-guided training (8, 52, 53). Other interventions included telerehabilitation delivered via real-time video supervision by physiotherapists (48, 49), as well as blended approaches combining digital platforms with limited face-to-face sessions (54). Additionally, some studies focused on behavioral or educational telehealth interventions, such as telephone-based counseling incorporating motivational interviewing and self-monitoring (51), or internet-based pain coping skills training programs (55). Digital physical activity interventions incorporating wearable devices and remote communication were also reported (50). Control conditions typically involved conventional face-to-face physiotherapy, home-based exercise programs, or usual care, with varying levels of supervision.

Outcome Measures

Primary Outcome

Adherence to Telehealth Interventions

Adherence to telehealth-delivered exercise interventions varied across the included studies (Table 4). Several studies reported high adherence levels within telehealth groups. For instance, adherence exceeded 95% in both intervention and control groups in one study, with slightly higher session frequency observed in the telehealth group (49). Similarly, high adherence and engagement were reported for an internet-based pain coping program, with 91% of participants completing all modules (55). High adherence was also observed in mobile app-based personalized exercise interventions, where a majority of participants exercised frequently throughout the intervention period (53). Moderate adherence levels were reported in some studies. A digitally supported physical activity intervention demonstrated adherence rates of 80% in the intervention group compared to 73.3% in the control group, with no statistically significant difference between groups (50). Likewise, an mHealth exercise program reported approximately 77% adherence, although participant attrition increased over time (52). In contrast, some studies reported low or suboptimal adherence, particularly in interventions lacking supervision or engagement. A long-term telehealth counseling intervention demonstrated low adherence in both intervention and control groups, with no significant between-group difference (51).

Comparison with Conventional Physiotherapy

When compared to conventional physiotherapy or supervised exercise, findings were mixed. In some studies, telehealth interventions achieved comparable adherence to face-to-face physiotherapy, with no significant differences between groups (50, 51, 54). However, other studies suggested that supervised or structured telehealth approaches may enhance adherence. For example, telerehabilitation delivered via real-time video supervision demonstrated higher adherence and patient satisfaction compared to unsupervised home exercise (48). Conversely, one study reported significantly lower adherence in the telehealth group compared to in-person physiotherapy, indicating that direct supervision may still play a critical role in maintaining adherence (8).

Factors Influencing Adherence

Several factors influencing adherence were identified across the included studies. Interventions incorporating supervision, feedback, or behavioral support appeared to promote higher adherence (48, 49, 53). In contrast, self-directed or minimally supervised interventions were associated with lower adherence in some cases (8, 51). Patient-related factors also influenced adherence. Higher adherence was associated with greater self-efficacy and education levels, while lower adherence was linked to factors such as fatigue (8). Additionally, engagement features, including monitoring tools, reminders, and interactive content, were associated with improved adherence in digital interventions (50, 53).

Table 4: Summary of Study Characteristics of Included Studies (n = 9)

Author (Year), Country	OA Location & Sample Size	Age (years); female/male patients	Intervention (Experimental)	Comparison (Control)	Duration / Assessment	Key Outcomes	Adherence (Primary Outcome)
Aily et al. (2023) (49); Brazil	Knee OA; n = 100 (EG = 50, CG = 50)	Mean age: EG 53 ± 9; 30/20 CG 55 ± 8; 30/20	Telerehabilitation-based circuit training (video-based) + motivational calls	Supervised face-to-face circuit training	14 weeks; baseline, 14, 26 weeks	Pain (VAS), Function (WOMAC), Physical performance	High adherence in both groups (>95%); EG: 3.6 sessions/week, CG: 2.9 sessions/week; slightly higher in EG
Akgül et al. (2025) (50); Turkey	Knee OA; n = 30 (EG = 15, CG = 15)	Mean age: EG 58.7 ± 5.2; 15/0 CG 62.1 ± 8.6; 15/0	Digital physical activity program (walking + app support + education)	Education + home exercise	8 weeks; baseline, 8 weeks	Pain (NPRS), Function (WOMAC), QoL	Moderate adherence; EG: 80% (12/15) adhered (≥3 days/week); CG: 73.3% (11/15) adhered; no significant difference
Baker et al. (2020) (51); USA	Knee OA; n = 104 (EG = 52, CG = 52)	Mean age: EG 65.8 ± 6.6; 43/9 CG 64.5 ± 8.3; 42/10	Telehealth counseling program (behavioral support + monitoring)	Automated reminders only	24 months; multiple follow-ups	Pain, Function (WOMAC), Physical performance	Low adherence in both groups; (Mean: 3.63 vs 4.01; p = 0.57); no significant difference
Dieter et al. (2025) (52); Germany	Knee OA; n = 195 (EG = 98, CG = 97)	Mean age: EG 61.6 ± 8.0; 70/28 CG 62.1 ± 7.5; 62/34	mHealth exercise program (app-based + sensor-guided training)	Usual care	12 weeks; baseline, 3 months	Pain (KOOS), Function, QoL, Physical performance	Moderate adherence (77%); increased attrition over time
Im et al. (2025) (53); South Korea	Knee OA; n = 29 (EG = 19, CG = 10)	Mean age: EG 69.9 ± 6.8; 16/3 CG 71.4 ± 6.4; 8/2	Mobile app-based personalized exercise with feedback	Brochure-based home exercise	6 weeks; baseline, 6 weeks	Pain (NRS), Function (WOMAC), QoL, Physical performance	High adherence in EG; 69% exercised ≥5 days/week, 38% daily; high satisfaction (88%); retention: EG 84%, CG 100%
Kloek et al. (2018) (54); Netherlands	Hip/Knee OA; n = 208 (EG = 109, CG = 99)	Mean age: EG 63.8 ± 8.5; 74/35 CG 62.3 ± 8.9; 67/32	Blended physiotherapy (online + limited face-to-face)	Usual face-to-face physiotherapy	12 weeks; up to 12 months follow-up	Function, Physical activity, Pain, QoL	High adherence (81% completed modules); no between-group difference
Martinsen et al. (2025) (8); Norway	Hip/Knee OA; n = 68 (EG = 34, CG = 34)	Mean age: 63 ± 11; 44/24	App-based exercise program	Supervised face-to-face physiotherapy	6 weeks; baseline, 6 weeks	Adherence, Function (HOOS/KOOS), QoL	Lower adherence in EG; higher in face-to-face group (significant)
Rini et al. (2015) (55); USA	Hip/Knee OA; n = 113 (EG = 58, CG = 55)	Mean age: EG 68.5 ± 7.7; 46/12 CG 66.7 ± 11.0; 45/10	Internet based pain coping skills training (self-directed)	Usual care (no intervention)	8 weeks; baseline, mid, post	Pain, Self-efficacy, Function	High adherence (91% completion); high retention
Tore et al. (2023) (48); Turkey	Knee OA; n = 48 (EG = 24, CG = 24)	Mean age: EG 55.9 ± 7.2; 21/3 CG 55.8 ± 6.8; 22/2	Telerehabilitation (real-time supervised exercise via video)	Home-based unsupervised exercise	8 weeks; baseline, post	Pain (NRS), Function (KOOS), Physical activity, Psychological outcomes	Higher adherence in EG (EARS); greater satisfaction; no difference in subscale B

Abbreviation: EG = Experimental group, CG = Control group, OA = Osteoarthritis, QoL = Quality of life, VAS = Visual Analog Scale, NPRS/NRS = Numeric Pain Rating Scale, WOMAC = Western Ontario and McMaster Universities Osteoarthritis Index, KOOS = Knee Injury and Osteoarthritis Outcome Score, HOOS = Hip Disability and Osteoarthritis Outcome Score, IPAQ-SF = International Physical Activity Questionnaire - Short Form, HADS = Hospital Anxiety and Depression Scale, TKS = Tampa Scale of Kinesiophobia, FSS = Fatigue Severity Scale, EARS = Exercise Adherence Rating Scale

DISCUSSION

This systematic review synthesized evidence from nine randomized controlled trials to evaluate adherence to telehealth-delivered exercise interventions in individuals with knee and/or hip osteoarthritis. Overall, the findings demonstrate that telehealth interventions can achieve moderate to high levels of adherence; however, the results are inconsistent when compared with conventional physiotherapy. While several studies reported comparable or slightly higher adherence in telehealth groups (49, 50, 54), others indicated no significant

differences (50, 51), and one study reported significantly lower adherence compared to face-to-face physiotherapy (8). It should be noted that the type of intervention is more critical than the mode of delivery when considering adherence to the treatment program. Studies that utilized an intervention program with a component of supervision, feedback, or behavior modification, such as live telerehabilitation or customized apps, exhibited greater adherence rates (48, 49, 53). On the other hand, interventions that were based on self-management or low supervision showed poor adherence results (8, 51).

The results obtained during the course of this review are in accordance with the existing body of literature, which indicates that telehealth is indeed a feasible approach for delivering rehabilitation therapy as compared to regular physiotherapy but cannot guarantee superior patient compliance. For example, Pérez-Maletzki et al. (2023) found that using telecommunication technology, behavioral interventions, and digital health could moderately increase compliance in patients suffering from osteoarthritis without necessarily improving clinical outcomes (11). Additionally, Mousavi Baigi et al. (2023) established that the use of tele-rehabilitation intervention programs could help increase compliance and physical activity in the short term but did not guarantee superior levels of long-term adherence (17). Other studies have reached the same conclusion as well. According to Wang et al. (2024), online telehealth interventions increased patient pain, function, and self-efficacy but did not report compliance as an outcome of interest (22). At the same time, Naeemabadi et al. (2022) pointed out to the variety of telehealth delivery systems and indicated that their success largely depended on proper implementation of monitoring, communication, and feedback (21). Additionally, other studies such as Aily et al. (2020) have established the significance of other factors such as the intervention characteristics and preferences of patients in determining the adherence rate (25). This is evident in this review study as adherence has been observed to be better for interventions that were more organized and interactive.

Some factors, however, emerged as part of the review process and seemed to influence adherence to the exercise intervention performed via telehealth technology. One of them was supervision where higher adherence rates and levels of satisfaction were recorded in cases where there was real-time contact with the physiotherapists (48). Feedback also contributed to adherence (50, 53). Motivational encouragement and counseling were also part of behavioral factors that made a contribution to improving adherence. Nevertheless, where those interventions failed to reach adequate intensity and personalized nature, the level of adherence still stayed low as evidenced in cases of tele-health counseling intervention programs (51). Other factors related to patient behavior also had an impact on adherence. Such factors included high self-efficacy, engagement, and knowledge about digital technologies, on one hand, and fatigue, lack of motivation, and poor supervision, on the other (8). One of the major strengths of the current review is the use of adherence as the main indicator under study, as it is an area that lacks attention in existing literature and often remains underreported or only serves as a secondary measure. Moreover, the use of RCTs adds additional reliability and quality to the findings. Nevertheless, several limitations can be mentioned here. First, due to the low number of studies and variations in intervention characteristics and measures used to track adherence, results were not always comparable across studies. Second, all the studies analyzed the immediate outcomes related to the level of adherence, while no conclusions could be drawn about long-term effects. Finally, differences in telehealth formats used can account for the variation found in adherence levels.

The results obtained from this review show that telehealth-based exercise programs can serve as an effective substitute for traditional physical therapy in improving compliance, especially when supervision and feedback are included in such programs. Nevertheless, it cannot be said that telehealth itself guarantees better compliance, but rather, intervention design matters significantly. Future studies should concentrate on developing uniform methods of measuring compliance and studying its long-term effects, as well as experimenting with different combinations of technology and human elements within telehealth-based programs.

CONCLUSION

This systematic review indicates that telehealth-delivered exercise interventions can achieve comparable adherence to conventional physiotherapy in individuals with knee and hip osteoarthritis, although results remain variable. Interventions that incorporate supervision, personalization, and behavioral support tend to demonstrate higher adherence, whereas self-directed approaches may be less effective. Overall, telehealth represents a promising and accessible approach to delivering exercise therapy; however, its success in promoting adherence depends largely on intervention design rather than delivery mode alone. Further research is required to establish standardized approaches and optimize long-term adherence in telehealth-based rehabilitation.

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