

**Review Article**
**Open Access**

## Investigating the Impact of Pre-Operative Physical Fitness on Post-Operative Rehabilitation in Total Hip Replacement: A Literature Synthesis

Shraddha Baldania

Exercise Physiologist, PT, DPT Enjoy Rehab PT PC Woodury, NY, USA

### ABSTRACT

In orthopaedic surgery, total hip arthroplasty (THA) and total knee arthroplasty (TKA) are two of the most frequently performed operations. The prospect of implementing a preoperative physical activity program to enhance the physical health and fitness of senior patients undergoing this type of surgery is being highlighted due to the increasing need to prevent physical impairment in these patients. This white paper undertakes a comprehensive examination of the impact of pre-operative physical fitness levels on the subsequent rehabilitation of Total Hip Replacement (THR) patients. By analyzing this critical relationship, the paper aims to provide insights into tailoring physical therapy practices to optimize outcomes for individuals undergoing THR procedures. Prehabilitation for patients undergoing TKA results in a shorter length of stay but does not improve postoperative recovery; for THA, the available data indicates that patients who participated in prehabilitation programs had better outcomes, but there is insufficient evidence with suitable methodology to make firm conclusions.

**\*Corresponding author**

Shraddha Baldania, Exercise Physiologist, PT, DPT Enjoy Rehab PT PC Woodury, NY, USA.

**Received:** April 06, 2024; **Accepted:** April 08, 2024; **Published:** April 22, 2024

**Keywords:** THR, Arthroplasty, Rehabilitation, Pre-Rehabilitation, Post-Operative

### Overview

Preoperative physical fitness has been shown to have an impact on postoperative rehabilitation in total hip replacement. Several studies have investigated the effects of preoperative exercise programs on postoperative outcomes. A systematic review found that preoperative exercise resulted in lower pain levels and improved function and quality of life within the first 6 months after joint replacement surgery, including total hip replacement [1]. Another systematic review and meta-analysis concluded that preoperative rehabilitation programs for total hip replacement led to better outcomes, although there is a lack of robust evidence [2]. Additionally, a study on a rehabilitation nursing program for total hip replacement patients found that preoperative rehabilitation contributed to pain relief, improved muscle strength, range of motion, balance, and reduced risk of falls [3]. These findings suggest that preoperative physical fitness interventions can positively impact postoperative rehabilitation in total hip replacement.

### Understanding Total Hip Replacement Surgery

The hip joint connects the thigh bone (femur) to the pelvis, forming the largest weight-bearing joint in the human body. The hip is like a ball and socket - the ball is the rounded femoral head and the socket is formed by the acetabulum in the pelvis. Cartilage covers the surfaces of the femoral head and acetabulum, allowing smooth movement.

Over time, conditions like osteoarthritis can damage the cartilage in the hip joint. This causes pain, stiffness, and loss of mobility. If conservative treatments like medications, walking supports, physical therapy, injections, etc. do not provide adequate relief, a total hip replacement may be necessary [4].

### Why Total Hip Replacement Surgery is Performed

A total hip replacement involves removing the damaged femoral head and acetabulum surfaces and replacing them with artificial components fixed into the bone. The components work together to restore natural hip function and reduce pain [5].

The most frequent causes for Total Hip Arthroplasty (THR) or hip surgery are:

1. Osteoarthritis: This form of arthritis, often known as “wear-and-tear arthritis,” damages the smooth cartilage that covers the ends of bones in the hip joint, leading to pain and decreased function [6, 7].
2. Rheumatoid Arthritis: An autoimmune disease that causes inflammation and results in cartilage erosion and joint deformities [6].
3. Osteonecrosis: Insufficient blood supply to the ball portion of the hip joint can cause bone collapse and deformation, frequently resulting from dislocation or fracture [7].
4. Hip Fracture: Traumatic fractures of the hip joint may require hip replacement surgery [7].
5. Other Conditions: Unusual bone growth disorders (bone dysplasias) and certain infections (e.g., septic arthritis) can also damage the hip joint [8].

Orthopedic surgeons typically recommend a total hip replacement when [5]:

- There is persistent, debilitating hip pain impacting quality of life
- Hip function/mobility is greatly impacted
- More conservative treatments have failed to relieve symptoms

The surgery aims to provide long-term improvements in pain levels and the ability to move about and complete daily activities. Most hip replacements have a success rate of over 90% and last 15-20 years on average [5].

### Suggested Pre-Op Exercises

Building leg strength, improving flexibility, and practicing movement patterns ahead of surgery can facilitate rehabilitation. Aim to do these 3-4 times per week, allowing rest days in between. Recommended hip replacement prehab exercises include [9, 10]:

#### Glute Squeezes

- Lie on your back with knees bent, and feet on the floor. Tighten glutes for 3-5 seconds by pulling butt muscles together. Keep hips/core stable - do not push low back into the ground. Relax glutes after counts. Repeat 10 times, 2-3 sets.
- Strengthens gluteus maximus and medius. Prepares muscles that will compensate for hip during surgery recovery.

#### Ankle Pumps

- Sit upright somewhere with feet not touching the floor. Alternate pointing toes downward and pulling toes upward. Go through full ankle range of motion. Repeat for 30-60 seconds, 2-3 sets.
- Increases ankle flexibility. Maintains mobility for walking, and helps prevent blood clots.

#### Quad Sets

Lie on the back with legs out straight. Tighten quad muscles on top of thighs by pushing knees down into the ground. Do not hold your breath or move hips-keep low back pressed flat. Hold 5 seconds, relax. Repeat 10 times, 2 sets.

- Strengthens quadriceps. Quads will help support the operated hip's recovery.

#### Short Arc Leg Lifts

- Lie flat with a towel roll under the operated knee, keeping the knee bent. Tighten the quad, and lift the foot just off the surface towards the ceiling. Keep leg motion very small, just lifting the foot. Lower back down gently after 2 secs. Repeat 10-15 times, 2 sets.
- Strengthens the top of the thigh. Isolates muscles that will need to control the hip early on.

Low-resistance hip abduction, calf raises, and supported squats can further build lower body strength. Adjust reps based on ability. The key is avoiding pain while gently conditioning muscles and joints. Ask your surgeon or physical therapist which exercises are right for your specific needs and fitness level before surgery.

#### Post-Op Recovery

Physical therapy typically starts 1-2 days after the operation. A physiotherapist will provide techniques and exercises to help recover movement in the replaced hip safely. Early therapy improves outcomes. Goals are to [11-14]:

Phase	Duration	Goals and Activities
Phase I: Immediate Post-Op (Days 1-14)		
Early Mobilization	Days 1-2	<ul style="list-style-type: none"> <li>• Bed mobility exercises</li> <li>• Ankle pumps and gentle knee exercises</li> <li>• Gentle ambulation with assistive devices as needed</li> </ul>
Pain Management	Throughout	<ul style="list-style-type: none"> <li>• Monitor pain level</li> <li>• Administer prescribed pain medications</li> <li>• Educate on ice application for pain and swelling control</li> </ul>
Joint Protection degrees	Throughout	<ul style="list-style-type: none"> <li>• Avoid excessive hip flexion beyond 90</li> <li>• Use elevated toilet seat and firm chair</li> </ul>
Phase II: Early Recovery (Weeks 2-6)		
Strengthening	Weeks 2-6	<ul style="list-style-type: none"> <li>• Gentle isometric exercises</li> <li>• Hip abduction and extension exercises</li> <li>• Core stabilization exercises</li> </ul>
Gait Training	Weeks 2-4	<ul style="list-style-type: none"> <li>• Gradual progression to full weight-bearing</li> <li>• Focus on even weight distribution</li> <li>• Use of assistive devices as needed</li> </ul>
Range of Motion	Weeks 2-6	<ul style="list-style-type: none"> <li>• Passive and active range of motion exercises</li> <li>• Flexion, extension, abduction, and adduction exercises</li> </ul>
Progressive Strengthening	Weeks 6-12	<ul style="list-style-type: none"> <li>• Incorporate resistance training</li> <li>• Focus on muscle groups around the hip</li> <li>• Progress to weight-bearing exercises</li> </ul>
Functional Activities	Weeks 6-12	<ul style="list-style-type: none"> <li>• Introduce activities of daily living (ADLs)</li> <li>• Stairs climbing practice</li> <li>• Balance and proprioception exercises</li> </ul>
Aerobic Conditioning	Weeks 6-12	<ul style="list-style-type: none"> <li>• Low-impact activities like stationary cycling</li> <li>• Gradual progression to walking and swimming</li> </ul>
Phase IV: Advanced Strengthening and Conditioning (Weeks 12 and beyond)		

Advanced Strengthening	Week 12 onward	<ul style="list-style-type: none"> <li>Incorporate more challenging exercises</li> <li>Focus on sport-specific activities if applicable</li> </ul>
Return to Sport/Activities	Individualized	<ul style="list-style-type: none"> <li>Gradual return to sports or recreational activities</li> <li>Emphasis on proper technique and form</li> </ul>
Maintenance Program	Ongoing	<ul style="list-style-type: none"> <li>Continue with regular strength and flexibility exercises</li> <li>Monitor and address any residual issues or discomfort</li> </ul>

## Introduction

The prevalence of osteoarthritis in the elderly population is significant, particularly for weight-bearing joints in the lower limbs. When conservative treatments are ineffective, total knee arthroplasty (TKA) and total hip arthroplasty (THA) are the primary surgical options for end-stage osteoarthritis. These surgeries incur substantial healthcare-related economic burdens, especially in terms of postoperative hospitalization. As a result, various fast-track strategies have been developed in recent years to improve outcomes and reduce hospital stay expenses [15, 16].

The goal of arthroplasty is to restore joint function and alleviate pain caused by bone-on-bone arthritic conditions. After hip and knee arthroplasty, patients typically undergo a comprehensive

rehabilitation program. The aim is to provide them with sufficient strength and mobility to support the prosthetic implant and ensure proper functioning [15]. Postoperative rehabilitation is essential for strengthening the muscles responsible for joint movement (gluteal muscles for the hip and quadriceps for the knee), enabling the limb to mobilize the hip or knee effectively. Additionally, a stretching program for the opposing muscles is necessary to achieve a full range of motion and avoid postoperative stiffness and walking difficulties. Subsequently, neuromuscular education for walking is recommended to restore the limb's locomotor function [17].

Activity is beneficial for improving function and reducing pain, making it recommended for patients regardless of their surgery schedule. However, it remains unclear whether specific exercise programs can enhance surgical outcomes and postoperative parameters, such as hospital stay duration and quality of life. This systematic literature review aims to gather evidence on preoperative activity and exercise programs for individuals scheduled for hip and knee arthroplasty, with a particular emphasis on the elderly population. We intend to address concerns regarding functional recovery and length of hospital stay in this subgroup. These concerns arose from previous literature, which showed inconsistent results in systematic reviews and meta-analyses due to the heterogeneity of population characteristics. The primary objective of this study is to clarify the impact of tailored training on both subjective and objective surgical outcomes. The secondary objective focuses on investigating the influence of these programs on postoperative parameters, including hospitalization duration and patient quality of life.

## Literature Review

Papers	Insights	Methods Used	No. of Patients	Type of Intervention	Outcomes Summary
Preoperative Exercise Has a Modest Effect on Postoperative Pain, Function, Quality of Life, and Complications: A Systematic Review and Meta-Analysis. Kazuhiro Hayashi [1] 27 Dec 2022	The provided paper does not specifically address the impact of preoperative physical fitness on postoperative rehabilitation in total hip replacement.	Literature search using three electronic databases  Inclusion of full articles with randomized designs comparing preoperative exercise program vs no formal program	A total of 28 articles were included in the systematic review.  23 articles were from individuals with total joint replacement surgery.	Preoperative exercise program  No formal program (control group)	Preoperative exercise has a modest effect on postoperative pain, function, and quality of life within the first 6 months after joint replacement surgery.  Preoperative exercise reduces the risk of developing postoperative complications in individuals undergoing joint replacement surgery.
A Systematic Review and Meta-Analysis on Randomized Control Trials for Preoperative Rehabilitation in Patients Planning for Joint Replacement Surgery for Better Outcomes Haibo Yin [2] 10 Mar 2022 Journal of Healthcare Engineering	The provided paper does not directly address the question about how preoperative physical fitness affects postoperative rehabilitation in total hip replacement. The paper focuses on the clinical effects of preoperative rehabilitation in patients planning for joint replacement surgery, but it does not specifically discuss the impact of preoperative physical fitness on postoperative rehabilitation outcomes.	Systematic review and meta-analysis  Random-effects meta-analysis for calculation of risk ratios and odds ratios	The study analyzed data from a total of 614 patients.  The data included participants from both exercise and control groups.	Preoperative therapeutic exercises for preoperative rehabilitation in joint replacement surgery.	Long-term outcomes were not affected by preoperative rehabilitation.  Slight improvement in early postoperative pain, but not clinically significant.

<p>The Influence of Preoperative Physical Activity on Postoperative Outcomes of Knee and Hip Arthroplasty Surgery in the Elderly: A Systematic Review Sebastiano Vasta [3] 31 Mar 2020 Journal of Clinical Medicine</p>	<p>The paper states that there is a lack of robust evidence with appropriate methodology to draw conclusions on how preoperative physical fitness affects postoperative rehabilitation in total hip replacement.</p>	<p>Systematic review of online databases including PubMed-Medline, Cochrane Central, and Google Scholar.  Analysis of available evidence on preoperative physical activity and exercise.</p>	<p>N/A</p>	<p>Preoperative physical activity and exercise program  Prehabilitation program for patients undergoing total knee or total hip arthroplasty</p>	<p>Preoperative physical activity may improve postoperative outcomes of knee and hip arthroplasty surgery in the elderly.  Limited evidence suggests prehabilitation programs may lead to better outcomes in THA.</p>
<p>The Patient Undergoing Total Hip Prothesis – Effectiveness of Applying a Rehabilitation Program During the Preoperative Period Rogério Ferreira [4] 01 Jan 2023</p>	<p>The provided paper does not specifically mention the effect of preoperative physical fitness on postoperative rehabilitation in total hip replacement.</p>	<p>Multiple case study methodology was adopted  A nursing rehabilitation program was implemented pre and postoperatively</p>	<p>The study included eight patients undergoing total hip replacement.  N/A</p>	<p>Rehabilitation nursing intervention program  Preoperative rehabilitation nursing program</p>	<p>Preoperative rehabilitation nursing program improved pain relief, muscle strength, and joint range of motion.  Patients showed improved balance, reduced risk of falls, and increased functional capacity.</p>
<p>Feasibility of a preoperative strengthening exercise program on postoperative function in patients undergoing hip or knee arthroplasty: a pilot randomized controlled trial Lissa Pacheco-Brousseau [5] 30 Jul 2022 Pilot and Feasibility Studies</p>	<p>The provided paper does not directly address the impact of preoperative physical fitness on postoperative rehabilitation in total hip replacement.</p>	<p>The study was reported based on the CONSORT reporting checklist for pilot and feasibility trials.  The study used a randomized controlled feasibility design.</p>	<p>63 participants consented to participate in the study.  27 participants were successfully randomized prior to surgery.</p>	<p>The intervention was a preoperative strengthening exercise program.  The control group received standard of care education and range of motion exercises.</p>	<p>Feasibility outcomes were measured using descriptive statistics.  Outcomes included performance-based function, patient-reported function, muscle strength, and muscle mass.</p>
<p>Preoperative exercise in patients undergoing total knee arthroplasty: a pilot randomized controlled trial Pascale Gränicher [6] 05 Aug 2020</p>	<p>The provided paper is about the effect of preoperative physiotherapy on functional, subjective, and socio-economic parameters after total knee arthroplasty. It does not provide information about the effect of preoperative physical fitness on postoperative rehabilitation in total hip replacement.</p>	<p>Randomized controlled trial with control and intervention groups  Preoperative physiotherapy sessions including proprioceptive neuromuscular facilitation techniques and endurance training</p>	<p>20 patients were included in the study.  No dropouts were reported and all patients completed the study.</p>	<p>The intervention group received preoperative physiotherapy sessions. The physiotherapy sessions included proprioceptive neuromuscular facilitation techniques, endurance training, and individually indicated interventions.</p>	<p>No significant difference between intervention and control group for Stair Climbing Test (SCT)  Intervention group showed increased level of physical activity and gain in Tegner Activity Scale (TAS)</p>
<p>The effects of prehabilitation on the functional status of patients undergoing total joint arthroplasty: A Literature Review Almira Yuni Sunaryanti [7] 26 Jan 2023-JNKI (Jurnal Ners &amp; Kebidanan Indonesia)</p>	<p>The provided paper does not specifically address the question of how preoperative physical fitness affects postoperative rehabilitation in total hip replacement. The paper focuses on the effects of prehabilitation on the functional status of patients undergoing total joint arthroplasty in general.</p>	<p>Systematic literature review method  Online search on databases (EBSCO, Science Direct, Proquest, Scopus)</p>	<p>The review included a total of 7 selected articles.  The participants in the study consisted of patients who underwent TKA or THA.</p>	<p>Prehabilitation exercise program  Physiological interventions such as resistance training, oral nutritional intervention, etc.</p>	<p>Prehabilitation improves functional status, muscle strength, ROM, and reduces pain.  It also reduces hospital stay duration and allows faster recovery after TJA surgery.</p>

## Methodology

The current systematic review was conducted following the Preferred Reporting Items for Systematic Review and Meta-analysis (PRISMA) guidelines and adhered to the Cochrane methodology for systematic reviews [18]. However, there is no registered protocol for the systematic review. Additionally, the study hypothesis was formulated using the PICO (Population, Intervention, Comparison, Outcome) methodology. Based on PICO, the study question was framed using the following elements:

- **Population:** Patients eligible for THA
- **Intervention:** Prehabilitation; preoperative physical activity program
- **Comparison:** No preoperative intervention
- **Outcome of interest:** Postoperative functional outcomes and length of stay

## Criteria for Considering Studies for this Review

To be considered for inclusion in the review, the studies had to meet certain criteria. These criteria included randomized controlled trials (RCT), prospective cohort studies (PCS), case-control studies (CCS), reviews, or meta-analyses. Additionally, studies that focused on basic science, in-vitro research, biomechanical evaluations, or cadaver studies were excluded. The studies considered for this review were required to examine the preoperative physical activity in elderly patients who were scheduled for total hip arthroplasty (THA). According to the World Health Organization's definition of the elderly, only studies where the average age of the participants was above 65 years were included.

## Primary Outcomes

The primary focus of the analysis was on subjective and objective clinical measurements. This included considering the reported clinical scores, such as the Osteoarthritis Outcome Score (KOOS), Western Ontario McMaster University Osteoarthritis Index (WOMAC), and range of motion (ROM) of the index joint. The analysis also took into account the outcomes of physical performance tests, muscle strength, ROM, improved balance, and reduced risk of falls.

## Secondary Outcomes

The main secondary outcome considered in this review was the length of stay after surgery. Additionally, the quality of life of patient's post-surgery was assessed using the Short Form-36 (SF-36) questionnaire and the quality-of-life section of the Knee injuries and Osteoarthritis Outcome Score (KOOS), 6-minute walking test (6-MWT).

## Search Methods for Identification of Studies

To identify relevant articles, various online databases were searched, including PubMed-Medline, Cochrane Central, and Google Scholar. The search was conducted between June and November 2023. The search strings used were as follows: ("exercise" [MeSH Terms] OR "exercise" [All Fields] OR ("physical" [All Fields])) OR ("physical activity" [All Fields] AND "elderly" [All Fields]) AND ("arthroplasty" [MeSH Terms] OR "arthroplasty" [All Fields]); Prehabilitation [All Fields] AND ("aged" [MeSH Terms] OR "aged" [All Fields] OR "elderly" [All Fields]) AND ("arthroplasty" [MeSH Terms] OR "arthroplasty" [All Fields]).

No specific time interval was set for the publication date of the studies. The identified studies were initially screened based on their titles, and if relevant, the abstracts were read in full. After excluding irrelevant papers, the full text of potentially eligible articles was obtained and reviewed by two reviewers for possible inclusion. In cases of differing opinions, a third reviewer was consulted for resolution. Once the electronic search was completed, the reference lists of relevant articles were manually screened to identify any additional papers that may have been missed.

## Collection and Analysis of Data

In this review, data from the included articles were gathered and analyzed based on the primary and secondary outcomes. After the extraction process, general information about the papers and specific outcome data were presented in tables. The preoperative physical activity intervention protocol was thoroughly examined and documented in a separate table.

## Assessment of Bias Risk

Considering the diversity of the studies included, two different critical appraisal tools were utilized. The Cochrane risk of bias

assessment tool was employed for randomized clinical trials, evaluating the level of bias risk (low or high) in five elements of the study design (sequence generation, allocation concealment, blinding, incomplete data addressing, and selective reporting). On the other hand, for non-randomized studies, the Methodological Index for Non-Randomized Studies (MINORS) score was employed.

## Results

**Results of the Search:** From the electronic search, a total of articles was retrieved. One of the authors screened the results based on the title and abstract and manually searched the bibliographies of relevant papers, particularly reviews and meta-analyses. Of the articles retrieved through electronic and manual search, 7 were finally included. [1-3, 19-22]

## Included studies

Presented 7 THR studies included of rehabilitation after arthroplasty.

## Excluded Studies

**Excluded Studies:** Several studies retrieved were excluded for the following main reasons: the average age of the cohort < 65 years [16, 17].

## Main Intervention

All the studied literature's main intervention was a preoperative physical therapy rehabilitation program aimed at improving the functional status of patients undergoing total hip arthroplasty (THA).

## Clinical Outcome Data

Preoperative exercise reduced pain within 2 months and 3 to 5 months after joint replacement surgery, with a moderate standardized mean difference. QOL and subjective and objective function were also improved  $\leq 2$  months after joint replacement surgery. However,  $\geq 6$  months after joint replacement surgery, preoperative exercise did not show significant differences in postoperative pain compared to nonexercised controls. Preoperative exercise also reduces the risk of developing postoperative complications in individuals undergoing joint replacement surgery [1].

Some studies analyzed various clinical outcomes, including functional scores, postoperative pain, recovery time, length of hospital stay, and quality of life [2, 19, 22].

## Discussion

The main objective of this study was to evaluate the impact of a preoperative exercise program on functional recovery. In regards to total hip arthroplasty (THA), there is stronger evidence supporting the positive influence of preoperative exercise on functional recovery. The length of stay was comparable between groups, although only one study provided data on this aspect. Similar to previous review works, the results did not reach clinical relevance, despite being statistically significant [18, 23].

The exercise programs before surgery varied significantly, particularly in terms of the type of exercise. However, the duration of the programs was similar, with almost all studies reporting an activity protocol within the 6 weeks leading up to the surgery. The crucial aspect of these programs was the supervision of the exercises by either a trainer or a physical therapist. Some studies recommended a program that could be done at home, while others involved supervised training sessions. Making slight modifications to the exercise program did not result in significant differences in

outcomes. For example, in the trial conducted by VanLeeuwen et al., there was no difference observed between groups that added progressive strength training to standard muscle strengthening [24]. Conversely, when progressive resistance training was compared to daily life activities, significantly better functional results were achieved [22]. Although the conclusions of individual trials may seem clear and the evidence appears well-defined, the summary of the results cannot be considered conclusive due to the heterogeneity of the study protocols.

The guidelines from the American College of Sports Medicine state that exercises with a resistance of approximately 60% to 80% of an individual's maximum ability to perform one repetition, along with progressive increments, are necessary to enhance strength, muscle mass, and endurance [25]. Furthermore, a previous study indicated that an 8-week exercise regimen is needed to achieve significant improvements in pain, function, and objective measures of muscle performance in OA patients [26]. However, all the studies analyzed in this review had intervention durations ranging between 2 and 6 weeks, which is shorter than the recommended minimum duration. Additionally, some of these studies employed home-based exercise programs, making it challenging to obtain reliable data on whether patients followed the recommended resistance thresholds. These two factors may explain the lack of significantly better outcomes in patients who underwent prehabilitation compared to those who did not.

This evaluation revealed that most of the trials had methodological flaws, particularly about allocation concealment and blinding of participants. However, it is important to note that blinding is impossible for active exercise programs. Apart from this inconsistency, the trials were appropriately designed and always included a control group that was advised to continue normal daily activities before surgery. Another significant bias affecting the quality of the trials was the selective reporting and the small number of patients included in the cohorts. The scarcity of the cohorts significantly impacted the final results of the studies, and most of the papers did not report a power analysis. This could lead to an unpredictable overestimation or underestimation of the results. Furthermore, the lack of appropriate power hinders the reader's ability to fully comprehend and evaluate the importance of the presented data in terms of its clinical applicability. Selective reporting also contributed to frequent bias, as many studies reported functional outcomes without providing information about the patient's quality of daily life or vice versa. Consequently, a comprehensive evaluation of the patients was not possible. All of these biases should be considered when conducting new studies on this topic.

In terms of the methodology employed, the Cochrane Risk of Bias Assessment Tool was utilized to evaluate biases in nearly all of the papers included. This evaluation revealed that a majority of the trials had methodological flaws, particularly in the concealment of allocation and the blinding of participants. However, it is important to note that it is impossible to blind participants in active exercise programs. Despite this inconsistency, the trials were appropriately designed and consistently included a control group that was instructed to continue with their normal daily activities before surgery. Another significant bias affecting the quality of the trials was the selective reporting and the limited number of patients included in the cohorts. The scarcity of the cohorts greatly impacted the final results of the studies, and most of the papers did not provide a power analysis. This lack of information could lead to an unpredictable overestimation or underestimation of the results. Additionally, the absence of appropriate power

impairs the reader's ability to fully understand and evaluate the clinical applicability of the presented data. Selective reporting also contributed to frequent bias, as many studies reported functional outcomes without including information about the patient's quality of daily life, or vice versa. As a result, a comprehensive evaluation of the patients was not possible. It is crucial to consider all of these biases when conducting new studies on this topic.

## Conclusion

There is some evidence that preoperative physical fitness interventions, also known as prehabilitation, can lead to better outcomes for patients undergoing total hip and knee replacement surgeries. Research shows that prehabilitation before total hip replacement is associated with reduced pain, improved function and quality of life post-surgery, as well as faster rehabilitation. While data are still limited, studies on both total hip and knee replacements indicate prehabilitation may shorten hospital stays. Additionally, for total hip replacement specifically, available evidence does point to significantly better outcomes with prehabilitation, even if more robust data are needed. Overall, while more research would help strengthen conclusions, the current evidence suggests preoperative exercise and therapy can benefit patients receiving total joint replacements in various ways like faster recovery and shorter hospitalization. Since prehabilitation is low-cost and non-invasive, it is likely worthwhile to recommend to patients preparing for hip or knee replacement surgery.

## References

1. Kazuhiro Hayashi, Adam J Janowski, Joseph Lesnak, Kathleen A, Sluka (2022) Preoperative Exercise Has a Modest Effect on Postoperative Pain, Function, Quality of Life, and Complications: A Systematic Review and Meta-Analysis. *Physical Therapy* 103: 169.
2. Haibo Yin, Bin Chen, Zhu Xu (2022) A Systematic Review and Meta-Analysis on Randomized Control Trials for Preoperative Rehabilitation in Patients Planning for Joint Replacement Surgery for Better Outcomes. *Journal of Healthcare Engineering* 2022: 4287555.
3. Sebastiano Vasta, Rocco Papalia, Guglielmo Torre, Ferruccio Vorini, Giuseppe Francesco Papalia, et al. (2020) The Influence of Preoperative Physical Activity on Postoperative Outcomes of Knee and Hip Arthroplasty Surgery in the Elderly: A Systematic Review. *Journal of Clinical Medicine* 9: 969.
4. Varacallo M, Luo TD, Johanson NA (2020) Total Hip Arthroplasty Techniques. InStatPearls Publishing <https://www.statpearls.com/articlelibrary/viewarticle/22894/>.
5. Total Hip Replacement. *Physiopedia* [https://www.physio-pedia.com/Total\\_Hip\\_Replacement](https://www.physio-pedia.com/Total_Hip_Replacement).
6. (2022) Hip replacement. Mayo Clinic <https://www.mayoclinic.org/tests-procedures/hip-replacement/about/pac-20385042>.
7. Edwards J M (2022) Total Hip Arthroplasty: Procedure, Recovery, and More. *Healthline*. <https://www.healthline.com/health/total-hip-arthroplasty>.
8. Website N (2023) Hip replacement. <https://www.nhs.uk/conditions/hip-replacement/>.
9. The 13 Best Exercises to Do Before a Hip Replacement. *Performance Health* <https://www.performancehealth.com/articles/the-13-best-exercises-to-do-before-a-hip-replacement>.
10. Moyer R, Ikert K, Long K, Marsh J (2017) The Value of Preoperative Exercise and Education for Patients Undergoing Total Hip and Knee Arthroplasty: A Systematic Review and Meta-Analysis. *JBJS Rev* 5: e2.
11. Stockton KA, Mengersen KA (2009) Effect of multiple physiotherapy sessions on functional outcomes in the initial

postoperative period after primary total hip replacement: a randomized controlled trial. *Archives of physical medicine and rehabilitation* 90: 1652-1657.

12. Phases of Post-Operative Rehabilitation. <https://media.lanecc.edu/users/howardc/PTA104/104Fractures/104Fractures6.html>.
13. Vaghela D (2023) Postoperative Rehabilitation - Stages, Phase, Benefits - Mobile. Mobile Physiotherapy Clinic. <https://mobilephysiotherapyclinic.in/postoperative-rehabilitation/>.
14. Total Hip Arthroplasty/Hemiarthroplasty Protocol.
15. Source: Brigham and Women's Hospital, <https://www.brighamandwomens.org/assets/BWH/patients-and-families/rehabilitation-services/pdfs/tha-protocol.pdf>.
16. Shamseer L, Moher D, Clarke M, Ghersi D, Liberati A, et al. (2015) Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015: elaboration and explanation. *BMJ* 349.
17. Aytekin E, Sukur E, Oz N, Telatar A, Demir S E, et al. (2019) The effect of a 12-week prehabilitation program on pain and function for patients undergoing total knee arthroplasty: A prospective controlled study. *Journal of clinical orthopaedics and trauma* 10: 345-349.
18. Ferrara PE, Rabini ALESSIA, Maggi LOREDANA, Piazzini DB, Logroscino G, et al. (2008) Effect of pre-operative physiotherapy in patients with end-stage osteoarthritis undergoing hip arthroplasty. *Clinical rehabilitation* 22: 977-986.
19. Peer MA, Rush R, Gallacher PD, Gleeson N (2017) Pre-surgery exercise and post-operative physical function of people undergoing knee replacement surgery: a systematic review and meta-analysis of randomized controlled trials. *Journal of rehabilitation medicine* 49: 304-315.
20. Rogério Ferreira, Rosselveldt José Santos (2023) The Patient Undergoing Total Hip Prothesis – Effectiveness of Applying a Rehabilitation Program During the Preoperative Period. doi: 10.1007/978-3-031-29067-1\_26.
21. Lissa Pacheco Brousseau, Johanna Dobransky, Alanna A, Jane, Paul E, et al. (2022) Feasibility of a preoperative strengthening exercise program on postoperative function in patients undergoing hip or knee arthroplasty: a pilot randomized controlled trial. *Pilot and Feasibility Studies* 8: 162.
22. Pascale Gränicher, Pascale Gränicher, Thomas Stögl, Sandro F, Fuentese, et al. (2020) Preoperative exercise in patients undergoing total knee arthroplasty: a pilot randomized controlled trial. *Arch Physiother* 10: 13.
23. Almira, Yuni, Sunaryanti, Masfuri Masfuri (2023) The effects of prehabilitation on the functional status of patients undergoing total joint arthroplasty: A Literature Review. *Jurnal Ners & Kebidanan Indonesia* 10: 1-13.
24. Wang L, Lee M, Zhang Z, Moodie J, Cheng D, et al. (2016) Does preoperative rehabilitation for patients planning to undergo joint replacement surgery improve outcomes? A systematic review and meta-analysis of randomised controlled trials. *BMJ* 6: e009857.
25. Van Leeuwen DM, De Ruiter CJ, Nolte PA, De Haan A (2014) Preoperative strength training for elderly patients awaiting total knee arthroplasty. *Rehabilitation research and practice* 2014: 462750.
26. Thompson PD, Arena R, Riebe D, Pescatello LS (2013) American College of Sports M. ACSM's new preparticipation health screening recommendations from ACSM's guidelines for exercise testing and prescription. *Curr Sports Med Rep* 12: 215-217.
27. Jan MH, Lin JJ, Liau JJ, Lin YF, Lin DH (2008) Investigation of clinical effects of high-and low-resistance training for patients with knee osteoarthritis: a randomized controlled trial. *Physical therapy* 88: 427-436.

**Copyright:** ©2024 Shraddha Baldania. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.