

Clinical Trial Protocol

Iranian Registry of Clinical Trials

10 Jun 2026

Effects of High-Intensity Versus Low-Intensity Resistance Training Along With Blood Flow Restriction in Patients with Total Knee Arthroplasty

Protocol summary

Study aim

This study aims to evaluate the effects of high-intensity versus low-intensity resistance training along with blood flow restriction on pain, range of motion, strength, muscle thickness, and functional performance in patients with total knee arthroplasty.

Design

parallel-group, single-blind, randomized clinical trial

Settings and conduct

Setting: Allied Hospital, Faisalabad single-blinded study, assessor will be blind.

Participants/Inclusion and exclusion criteria

INCLUSION CRITERIA • Both male and female patients • 50 to 65 years of age • Post-total knee arthroplasty for osteoarthritis • Unilateral joint replacement surgery
EXCLUSION CRITERIA • Impaired cognitive function and mental disease (e.g., diagnosis of Alzheimer's disease) • Paraplegia/extremity amputation • End-stage renal disease requiring dialysis • Uncontrolled cardiovascular disease or Severe pulmonary disease • Active neoplasm • Body mass index greater than 40 kg/m² • Peripheral vascular disease or deep vein thrombosis • Opioid use and Chronic oral steroid use and anticoagulation use • Ipsilateral joint disease involving hip, ankle, or spine • Neurologic or other etiology of quadriceps wasting

Intervention groups

Both groups will receive the same baseline treatment.
Group A: BFR with Low-Intensity Resistance training 5 min light cycling • Start with 10 repetitions of unilateral leg press at light weights • Calf raises • Knee flexion • Knee extension Progress to 20-30% of predicted 1RM
Group B: BFR with High-Intensity Resistance training 5 min light cycling • Start with 10 repetitions of unilateral leg press at light weights • Calf raises • Knee flexion • Knee extension Progress to 65-70% of predicted 1RM

Main outcome variables

NPRS → Pain Universal goniometer → ROM Hand-held dynamometer → Strength Muscle mass → Ultrasound imaging Functional Performance • Lower extremity

function scale • 6-Minute walk test

General information

Reason for update

Acronym

IRCT registration information

IRCT registration number: **IRCT20190717044238N13**

Registration date: **2024-05-12, 1403/02/23**

Registration timing: **registered_while_recruiting**

Last update: **2024-05-12, 1403/02/23**

Update count: **0**

Registration date

2024-05-12, 1403/02/23

Registrant information

Name

Fareeha Amjad

Name of organization / entity

The University of Lahore

Country

Pakistan

Phone

+92 42 99200600

Email address

fari_fairy22@yahoo.com

Recruitment status

Recruitment complete

Funding source

Expected recruitment start date

2024-05-06, 1403/02/17

Expected recruitment end date

2024-07-30, 1403/05/09

Actual recruitment start date

2024-05-12, 1403/02/23

Actual recruitment end date

2024-08-02, 1403/05/12

Trial completion date

2024-08-10, 1403/05/20

Scientific title

Effects of High-Intensity Versus Low-Intensity Resistance Training Along With Blood Flow Restriction in Patients with Total Knee Arthroplasty

Public title

Effects of resistance training in patients after total knee replacement surgery

Purpose

Treatment

Inclusion/Exclusion criteria

Inclusion criteria:

Both male and female patients 50 to 65 years of age (27)
Post-total knee arthroplasty for osteoarthritis Unilateral joint replacement surgery

Exclusion criteria:

Impaired cognitive function and mental disease (e.g., diagnosis of Alzheimer's disease) Paraplegia/extremity amputation End-stage renal disease requiring dialysis Uncontrolled cardiovascular disease or Severe pulmonary disease Active neoplasm Body mass index greater than 40 kg/m² Peripheral vascular disease or deep vein thrombosis Opioid use and Chronic oral steroid use and anticoagulation use Ipsilateral joint disease involving hip, ankle, or spine Neurologic or other etiology of quadriceps wasting

Age

From **50 years** old to **65 years** old

Gender

Both

Phase

N/A

Groups that have been masked

- Outcome assessor

Sample size

Target sample size: **34**

Actual sample size reached: **34**

Randomization (investigator's opinion)

Randomized

Randomization description

The randomization will be done by using computer generated randomizer. Allocation will be concealed by sealed envelope method.

Blinding (investigator's opinion)

Single blinded

Blinding description

This study will be a single blinded study. Assessor will be kept blind about the group allocation and previous readings.

Placebo

Not used

Assignment

Parallel

Other design features

Secondary Ids

empty

Ethics committees

1

Ethics committee

Name of ethics committee

Research and ethics Committee Riphah College of Rehabilitation and Allied Health Sciences

Street address

Riphah International University Gulberg campus lahore

City

Lahore

Postal code

54000

Approval date

2024-04-03, 1403/01/15

Ethics committee reference number

REC/RCR & AHS/23/0189

Health conditions studied

1

Description of health condition studied

Total knee arthroplasty

ICD-10 code

Z96.65

ICD-10 code description

Presence of artificial knee joint

Primary outcomes

1

Description

Pain

Timepoint

baseline , at 4th week and post training at 8th week

Method of measurement

Numeric Pain Rating Scale (NPRS)

2

Description

knee range of motion ROM

Timepoint

baseline , at 4th week and post training at 8th week

Method of measurement

Universal Goniometer

3

Description

Strength

Timepoint

baseline , at 4th week and post training at 8th week

Method of measurement

Hand-Held Dynamometer

4

Description

Quadriceps muscle thickness

Timepoint

baseline & at the end of 8th week

Method of measurement

Ultrasound Imaging

5

Description

Functional Performance

Timepoint

baseline , at 4th week and post training at 8th week

Method of measurement

a) Lower Extremity Function Scale b) 6-Minute Walk Test

Secondary outcomes

empty

Intervention groups

1

Description

Intervention group:1BFR with Low Intensity Resistance training (For the first two weeks participants will follow home plan of standard physical therapy. Resistance training will be started if patient weight bears on unilateral leg for 5 s without support, have knee ROM of 0-90° able to perform repeated straight leg raise without knee extensor muscle lag. Patients 10 Repetition maximum (RM) will be used to predict 1 RM value according to formula $10 \text{ RM} / 0.75$. BFR will be achieved using a tourniquet, and limb occlusion pressure (LOP) will be calculated, defined as the minimum pressure required for full arterial occlusion. Its will be calculated as baseline Systolic blood pressure (SBP) and formula for safety margins will be applied: add 40-50 mm Hg for SBP<130, Add 60-75 mm Hg for SBP 131-190, Add 80 mm Hg for SBP > 190. 60% of the calculated pressure will be used. Prior to exercise the cuff will be placed on the most proximal portion of the limb. -Standard Physical Therapy:1) Ankle Pumps2) AAROM/ AROM3) Quadriceps, Hamstrings and adductor setting Exercises 4) Patellar Mobilization (grade I, II) 5) Hamstrings, Calf & IT Band Stretching -Resistance Training:5 min light cycling• Start with 10 repetitions of unilateral leg press at light weights• Calf raises • Knee flexion• Knee extension. Progress to 20-30% of predicted 1RM

Category

Rehabilitation

2

Description

Intervention group: 2 BFR with High Intensity Resistance training (Resistance training will be started if patient weight bears on unilateral leg for 5 s without support, have knee ROM of 0-90° able to perform repeated straight leg raise without knee extensor muscle lag.

Patients 10 Repetition maximum (RM) will be used to predict 1 RM value according to formula $10 \text{ RM} / 0.75$. BFR will be achieved using a tourniquet, and limb occlusion pressure (LOP) will be calculated, defined as the minimum pressure required for full arterial occlusion. Its will be calculated as baseline Systolic blood pressure (SBP) and formula for safety margins will be applied: add 40-50 mm Hg for SBP<130, Add 60-75 mm Hg for SBP 131-190, Add 80 mm Hg for SBP > 190. 60% of the calculated pressure will be used. Prior to exercise the cuff will be placed on the most proximal portion of the limb. -Standard Physical Therapy:1) Ankle Pumps2) AAROM/ AROM3) Quadriceps, Hamstrings and adductor setting Exercises4) Patellar Mobilization (grade I, II)5) Hamstrings, Calf & IT Band Stretching -Resistance Training:5 min light cycling• Start with 10 repetitions of unilateral leg press at light weights• Calf raises • Knee flexion• Knee extension. Progress to 65-70% of predicted 1RM

Category

Rehabilitation

Recruitment centers

1

Recruitment center

Name of recruitment center

Allied Hospital, Faisalabad

Full name of responsible person

Maira Shahzad

Street address

Dr. Tusi road

City

Faisalabad

Postal code

38000

Phone

+92 41 9210095

Email

help@ahfsd.pk

Web page address

<https://ahfsd.pk/>

Sponsors / Funding sources

1

Sponsor

Name of organization / entity

Riphah International University Lahore

Full name of responsible person

Fareeha Amjad

Street address

Riphah International University Gulberg campus
lahore

City

Lahore

Postal code

54000

Phone

+92 334 3372779

Email

fari_fairy22@yahoo.com

Grant name**Grant code / Reference number****Is the source of funding the same sponsor organization/entity?**

Yes

Title of funding source

Riphah International University Lahore

Proportion provided by this source

100

Public or private sector

Private

Domestic or foreign origin

Domestic

Category of foreign source of funding

empty

Country of origin**Type of organization providing the funding**

Academic

Person responsible for general inquiries**Contact****Name of organization / entity**

Riphah International University Lahore

Full name of responsible person

Maira Shahzad

Position

Student

Latest degree

Master

Other areas of specialty/work

Physiotherapy

Street address

Riphah International University Gulberg campus
lahore

City

Lahore

Province

Punjab

Postal code

54000

Phone

+92 312 6635635

Email

maairashahzad@gmail.com

Person responsible for scientific inquiries**Contact****Name of organization / entity**

Riphah International University Lahore

Full name of responsible person

Fareeha Amjad

Position

Associate professor

Latest degree

Ph.D.

Other areas of specialty/work

Physiotherapy

Street address

Riphah International University Gulberg campus
lahore

City

Lahore

Province

Punjab

Postal code

54000

Phone

+92 334 3372779

Email

fari_fairy22@yahoo.com

Person responsible for updating data**Contact****Name of organization / entity**

Riphah International University Lahore

Full name of responsible person

Maira Shahzad

Position

Student

Latest degree

Master

Other areas of specialty/work

Physiotherapy

Street address

Riphah International University Gulberg campus
lahore

City

Lahore

Province

Punjab

Postal code

54000

Phone

+92 312 6635635

Email

maairashahzad@gmail.com

Sharing plan**Deidentified Individual Participant Data Set (IPD)**

No - There is not a plan to make this available

Justification/reason for indecision/not sharing IPD

confidentiality of participants

Study Protocol

Yes - There is a plan to make this available

Statistical Analysis Plan

No - There is not a plan to make this available

Informed Consent Form

Yes - There is a plan to make this available

Clinical Study Report

Yes - There is a plan to make this available

Analytic Code

No - There is not a plan to make this available

Data Dictionary

No - There is not a plan to make this available

Title and more details about the data/document

Consent form in its original format with no information about any participant study protocol -how the

intervention was given to both groups

When the data will become available and for how long

Data would be available after the completion of the research

To whom data/document is available

People working in an academic and clinical setting can have access to the above mentioned information/documents

Under which criteria data/document could be used

Data can be used for research paper

From where data/document is obtainable

Data can be asked at following email
maairashahzad@gmail.com

What processes are involved for a request to access data/document

One can ask for data at the given email address and it would be provided after knowing the general implications of sharing that particular data

Comments