Clinical Trial Protocol
Iranian Registry of Clinical Trials

22 Nov 2026

Effects of retrowalking training protocol on Gait Kinematics and kinetics parameters of patients with medial knee osteoarthritis

Protocol summary

Study aim

The aim of this study was to compare the Gait Kinematics and kinetics parameters in male patients according to severity of knee osteoarthritis during gait

Design

This study was performed with a pretest-posttest design including 21 healthy men and 42 male patients with knee osteoarthritis who were divided into experimental and control groups .

Settings and conduct

Backward gait training protocol including 6 weeks study, 3 sessions per weeks . Each exercise session began with warm up exercises , followed by backward gait exercises and ended up by cool-down exercises. Backward gait training protocol including Interval training (3 set, 2-4-6 reps), continuous training (2sets,2 and 3 minutes), Stretching exercises(3 minute),Strength training , Exercise intensity increased in the second week. Patients were stopped immediately once they report pain or discomfort during retro gait.

Participants/Inclusion and exclusion criteria

The patients were knee osteoarthritis according to the Kelgerand and Lawrence index with grade 2 and 3 osteoarthritis. All patients were able to perform activities of daily living including walking, running, up and down stairs, Radiological symptoms of osteoarthritis in the knee, pain and tenderness on the medial side of the knee. All patients with knee OA were not in the acute phase of the disease. Not having history of trauma, injury or surgery, lower limb fracture , and joint threatening diseases, The lack of a long history of drug use and non-drug addiction.

Intervention groups

The experimental group performed backward gait training for six weeks.

Main outcome variables

A) kinematics parameters (the Spatial, Temporal, Distance variables and ROMs), B) kinetics parameters (vertical ground reaction forces, Peak adduction moment and adduction moment impulse). A Vicon motion analysis system with six T-series cameras and a Kistler force plate used to record.

General information

Reason for update

Acronym

IRCT registration information

IRCT registration number: **IRCT20170712035052N1**
Registration date: **2019-03-08, 1397/12/17**
Registration timing: **retrospective**

Last update: **2019-03-08, 1397/12/17**
Update count: **0**

Registration date

2019-03-08, 1397/12/17

Registrant information

Name

Ali Jalalvand

Name of organization / entity

Country

Iran (Islamic Republic of)

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Recruitment status

Recruitment complete

Funding source

Expected recruitment start date

2015-05-31, 1394/03/10

Expected recruitment end date

2015-08-06, 1394/05/15

Actual recruitment start date

2015-06-05, 1394/03/15

Actual recruitment end date

2015-08-06, 1394/05/15

Trial completion date

2016-01-27, 1394/11/07

Scientific title

Effects of retrowalking training protocol on Gait Kinematics and kinetics parameters of patients with medial knee osteoarthritis

Public title

Effect of Backward Gait on Biomechanical Walking Parameters in Patients with Knee Osteoarthritis

Purpose

Supportive

Inclusion/Exclusion criteria

Inclusion criteria:

All patients were able to perform activities of daily living including walking, running, up and down stairs The patients were knee osteoarthritis according to the Kelgerand and Lawrence index with grade 2 and 3 osteoarthritis

Exclusion criteria:

No patient had problems in standing and walking Radiological symptoms of osteoarthritis in the knee, pain and tenderness on the medial side of the knee. All patients with knee OA were not in the acute phase of the disease The lack of consumption (non-steroid anti-inflammatory) from a week before entering the study. Not having history of trauma, injury or surgery, and lower limb fracture Not having history of joint threatening diseases (Osteonecrosis, diabetes, osteoporosis, rheumatoid arthritis, musculoskeletal neurological disease) The lack of a long history of drug use and non-drug addiction

Age

From **45 years** old to **60 years** old

Gender

Male

Phase

3

Groups that have been masked

No information

Sample size

Target sample size: **66**

Actual sample size reached: **63**

Randomization (investigator's opinion)

Not randomized

Randomization description

Blinding (investigator's opinion)

Not blinded

Blinding description

Placebo

Not used

Assignment

Parallel

Other design features

Secondary Ids

empty

Ethics committees

1

Ethics committee

Name of ethics committee

Ethics committee of Hamedan University of Medical Sciences

Street address

Hamadan University of Medical Sciences, Shahid Fahmideh Ave. Hamadan, Islamic Republic of Iran

City

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Province

Hamadan

Postal code

6517838695

Approval date

2015-05-23, 1394/03/02

Ethics committee reference number

IR.UMSHA.REC.1394.110

Health conditions studied

1

Description of health condition studied

medial knee Osteoarthritis

ICD-10 code

M17

ICD-10 code description

Osteoarthritis of knee

Primary outcomes

1

Description

kinematics parameters (the Spatial, Temporal, Distance variables and ROMs)

Timepoint

This study was performed with a pretest-posttest design in two groups (healthy and patient) and an experimental group (subjects with medial knee osteoarthritis).

Method of measurement

A Vicon motion analysis system with T-Series cameras were used to measure the Kinematics parameters. The Kinematics parameters of gait including were calculated by Vicon Nexus 1.8.5 software in pretest-posttest trials. All data were then extracted by Polygon 3.5.1.

2

Description

kinetics parameters (vertical ground reaction forces, Peak adduction moment and adduction moment impulse)

Timepoint

This study was performed with a pretest-posttest design in two groups (healthy and patient) and an experimental group (subjects with medial knee osteoarthritis).

Method of measurement

A Vicon motion analysis system with four T-Series

cameras and two Kistler force plates were used to measure parameters by Vicon Nexus 1.8.5 , Polygon 4.1.2 software .

Secondary outcomes

empty

Intervention groups

1

Description

Intervention group: The subjects were 21 healthy men and 42 male patients with knee osteoarthritis who were divided into experimental and control groups according to the Kellgren and Lawrence radiologic scale and the visual analogue scale.The effects of retro-gait training protocol on Kinematics and kinetics parameters knee osteoarthritis gait hasn't been considered in the literature. Effects of retro walking: reducing shear force, increasing extensor moment and to gain flexibility around knee, decrease in eccentric quadriceps activity , patellofemoral joint stresses that are often associated with anterior knee pain. Therefore, these advantages make retro-gait a safe and effective component of rehabilitation programs. The experimental group performed backward gait training for six weeks, 3 sessions per weeks. Subjects accomplish a five minute warm-up on followed by backward gait exercises. Backward gait training protocol including Interval training (3 set, 2-4-6 reps), continuous training (2sets,2 and 3 minutes), Stretching exercises(3 minute), Strength training , Exercise intensity increased in the second week. Patients were stopped immediately once they report pain or discomfort during retro gait. Each exercise session began with warm up exercises , followed by backward gait exercises and ended up by cool-down exercises.

Category

Rehabilitation

2

Description

Control group: The 42 patients with knee OA were divided into experimental and control groups according to the Kellgren and Lawrence radiologic scale and the visual analogue scale. Participants in the control group did not receive any training.

Category

Other

3

Description

Control group: Furthermore, among the staff of the university 21 healthy male peers were selected as normal controls. The participants in the normal control group did not receive any training during the study period.

Category

Other

Recruitment centers

1

Recruitment center

Name of recruitment center
Sheykh Al-Raees Clinic

Full name of responsible person
Alireza Yavari Kia

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Sponsors / Funding sources

1

Sponsor

Name of organization / entity
Islamic Azad University

Full name of responsible person
Ali Reza Pirhayati

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Grant name

Grant code / Reference number

Is the source of funding the same sponsor organization/entity?
Yes

Title of funding source
Islamic Azad University

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
Islamic Azad University
Full name of responsible person
Ali Jalalvand
Position
Associate professor
Latest degree
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Sharing plan

Deidentified Individual Participant Data Set (IPD)
Undecided - It is not yet known if there will be a plan to make this available
Study Protocol
Yes - There is a plan to make this available
Statistical Analysis Plan
Yes - There is 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
Yes - There is a plan to make this available
Data Dictionary
Not applicable
Title and more details about the data/document
The data are available for research use
When the data will become available and for how long
1398
To whom data/document is available
clinical researchers working in academia
Under which criteria data/document could be used
For other people who work at universities

From where data/document is obtainable

jalalvand_ali@yahoo.com

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

A week

Comments