

Official Title

Effects of Mulligan Mobilization with movement
versus Kinesiotaping and Placebo on knee function
and injury -related Outcomes in Basketball
Players: A parallel-group Randomized Controlled
Trial

NCT Number:

Date 10 December 2024

4. Study Protocol with SAP and ICF

1. Subtitles Study Protocol

Title of the Study: Effects of Mulligan Mobilization with movement versus Kinesiotaping and Placebo on knee function and injury -Related Outcomes in Basketball Players: A parallel-group randomized controlled trial.

Protocol Version & Date: (Version 1.0, Date 10/12/2024).

Principal Investigator: Selda Sokoli, University of Sports, Tirana.

Introduction

Basketball is a contact sport that requires rapid and high-intensity movements such as jumping, changing direction, turning, landing, running (Sokoli, S. V., et al., 2024), Rubin, E. B., et al., 2021; Hannington, M. et al., 2022; Chang, L. L. Y., 2020). These maneuvers result in musculoskeletal injuries (Tummala, S. V., et al., 2022) and the highest frequency of knee injuries (Tummala, S. V., et al., 2022). Previous studies have shown the tendency to injure athletes in contact sports such as basketball (Qëndro et al., 2024). Young basketball players are influenced by the effects of continuous mechanical stress, rapid biological growth, sports overload, and neuromuscular development, which increases the risk of overuse injury (Zoellner, A., & Whatman, C., 2025) while limiting sports activities and functional limitations. In order to determine the impact of sports overuse injury, the sports population uses a measuring tool called the OSTRC Overuse Injury Questionnaire (Owoeye, O.B.A. et al., 2018). This is a standard questionnaire from the Oslo Sports Trauma Research Centre (Weiss, K. J., et al., 2017) to help identify injuries, especially in young athletes with symptoms. In many cases, in young athletes, not only are symptom monitoring, neuromuscular control, and dynamic stability evaluated, but also functional capacity. KOS-ADLS sports activity scale assesses the functional capacity of young basketball players in relation to the specific requirements of basketball (Nyland, J. et al. 2025). There are many conservative physiotherapeutic interventions to improve the functioning of young basketball players. Mulligan's technique is based on joint mobilization combined with active physiological movements and acts to interact with the physiological kinematics of joint movements and neurophysiological mechanisms of pain (ElMeligie, M. M., et al., 2025; Veizaj, S. S., et al., 2024). Randomized studies to assess the effect of Mulligan's MWM technique, versus Kinesiotaping and placebo, are limited, especially studies that are applied to young basketball players. The lack of evidence from randomized studies also has to do with the assessment of the injury rate in young athletes, on the one hand, and the assessment of the level of activity and sports functionality, on the other. Although a good part of the research is focused on rehabilitation through conservative management of sports injury in young basketball players (Sos-Tirado, M. et al., 2024). This randomized study aimed to evaluate the effect of the Mulligan MWM technique, the Kinesiotaping technique, and a placebo intervention in young U16-U20 basketball players on reducing symptoms of knee injuries and improving functionality and sports levels. This study hypothesized that the Mulligan group would have a more significant improvement in the KOS-SAS and OSRTC scores.

Objectives

The primary objective is to compare the effect of Mulligan, Kinesiotaping and Placebo in improving the functionality and scale of sports activity in U16-U20 basketball players.

The secondary objective is to evaluate the effect of the Mulligan, Kinesiotaping, and Placebo intervention in decreasing the level of overuse injuries in U16-U20 basketball players.

The third objective is whether each of the techniques, Mulligan, Kinesiotaping, and Placebo, has an impact on the relationship between decreasing the rate of OSTRC overuse injury and increasing the ADLS functional scale and SAS sports activity scale in U16-U20 basketball players.

Study Design

This study was designed as a parallel group randomized controlled clinical trial with three intervention arms: Mulligan Mobilization with movement MWM, Kinesiotaping, and Placebo with repeated measurements at baseline, 1 hour, and 2 weeks after treatment.

Participants

Inclusion Criteria:

- ✓ Male and female genders
- ✓ Have a minimum of 2 years of sports experience
- ✓ Presence of knee injury
- ✓ Active participation in sport.

Exclusion Criteria:

- ✓ Knee surgery
- ✓ Knee instability
- ✓ Neurological disorders
- ✓ Not approve of the application of the Mulligan method

Recruitment Method

The basketball players were recruited from local sports clubs through referrals and collaborations from the club coaches.

Interventions / Procedures

Mulligan Group Experimental

For all participants who applied, regardless of the type of knee injury, Mulligan Mobilization with movement MWM in the squat position was used manually to maintain the homogeneity of the treatment. The intervention included tibial glide by the therapist while the basketball players actively performed the mobilization without pain. The athletes underwent the technique 2 sessions per week for 2 weeks. Each session lasted 5 min, and the technique was applied by a Physiotherapist who had the Mulligan technique certificate.

Kinesiotaping Active Comparator Group

Kinesiotaping was also used in a model regardless of the injury of athletes. Initially, the measurement was made from the medial and lateral condyles of the knee by placing a y-taping from the tibial tuberosity towards the femoral condyles, and another taping was placed horizontally over the patella. It was applied 2 times a week for 2 weeks for 5 minutes

Placebo Comparator Group

In this group, participants received a sham intervention to mimic the treatment without therapeutic effect twice a week for 2 weeks, for 5 minutes.

Outcome Measures

Primary Outcomes: KOS-ADLS: The Activities of Daily Living Scale (ADLS) subscale of the Knee Outcome Survey evaluates symptoms and functional limitations during daily activities. Scores range from 0 to 100, with higher scores indicating better function.

The Sports Activity Scale (SAS) subscale of the Knee Outcome Survey evaluates knee function during sports and higher-level activities. Scores range from 0 to 100, with higher scores indicating better sports-related function.

Secondary outcomes The OSTRC Overuse Injury Questionnaire is a validated self-report tool used to monitor the severity and impact of overuse-related musculoskeletal problems. It assesses the consequences of knee-related problems on sports participation, training volume, performance, and symptom severity. Each question is scored on a graded response scale, and a severity score is calculated, with higher scores indicating greater symptom burden and functional impairment.

Timeline / Schedule of Assessments

Outcome /Assessment	Baseline treatment	pre	1 hour post treatment	2 weeks post treatment
KOS-ADLS ; ADLS	*		*	*
SAS	*		*	*
OSTRC	*		*	*

Sample Size & Justification

The sample size (N=60) was determined based on the available number of eligible participants during the period of study. A post-hoc power analysis was conducted for the ADLS outcome using mixed ANOVA. The time × group interaction yielded $\eta^2p = 0.816$ (Cohen's $f = 2.11$), indicating a very high statistical power (1.0) for detecting the observed effect.

Ethics and Regulatory Approvals

Ethics Committee Approval. This study has been reviewed and approved by the University of Sports of Tirana. Ethics Committee for scientific research.

Approval Reference Number: Prot. Nr. 3736/2

Approval Date: 10/12/2024.

Confidentiality Measures

All participant data will be treated with strict confidentiality. Personal identifiers have been replaced with coded identification numbers. Data are stored and are only accessible by the

study researchers. Any publication or presentation of study results will report only aggregated data, ensuring that individual participants cannot be identified.

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2. Subtitles Informed Consent Form Adults ≥ 18 years old



**REPUBLIC OF ALBANIA
UNIVERSITY OF SPORTS OF TIRANA
FACULTY OF PHYSICAL ACTIVITY AND RECREATION
DEPARTMENT OF MOVEMENT AND HEALTH**

Letter of acceptance to participate in the study: 'The impact of the Mulligan Technique on knee problems in basketball in Albania.'

For participants over the age of 18

I declare that the testing and physiotherapeutic intervention of this Scientific Study have been explained to me in detail by the study leaders in the information meeting held by them. Also, for every question I have asked, I have received a quick and clear answer from them.

During the meeting, I was informed about the conditions set for being part of the study, about my right not to participate in the study, and about the right to withdraw from it at any time.

The positive and negative (side) effects of all examinations that will be performed during the study have been explained to me in detail. In this way, I have managed to understand the benefits of my participation in this Scientific Study not only for me personally but also for other sports. I know that I can ask at any time about any uncertainties that I may have in the future, during the different stages of its development.

I have been assured that:

1. I will be cared for at every stage of the study by specialized medical and physiotherapy personnel.
2. My confidentiality will be maintained.
3. No information that will be distributed or published will reveal my personal identity.
4. No information will be distributed or published without my consent and only if it is permitted by legal provisions.

In this way, I agree to participate in this study

First Name Last Name

Signature (if you are 18 years old or older)

Note: The person who can be contacted for this study is Msc. Selda Sokoli, at this phone number: 355692199179 and with this electronic address (e-mail): seldaveizaj@gmail.com

3. Subtitles Parental Consent Form Adults ≥ 18 years old



**REPUBLIC OF ALBANIA
UNIVERSITY OF SPORTS OF TIRANA
FACULTY OF PHYSICAL ACTIVITY AND RECREATION
DEPARTMENT OF MOVEMENT AND HEALTH**

Parental consent form

(To be used for parents of participating children under 18 years of age, excluding students)

Study Title: 'The Impact of the Mulligan Technique on Knee Problems in Basketball in Albania',

For questions regarding the research project, please contact:

Scientific Researcher: Selda SOKOLI seldaveizaj@gmail.com

Scientific Leader: Prof.Asc.Dr.Klotilda VRENJO

Description

This project will include all basketball athletes starting from the age of 14 to 22 years old. The athletes will undergo orthopedic assessment tests for hidden or active knee problems. Circuit tests will be conducted, and athletes with problems will be grouped, and a non-invasive physiotherapeutic treatment technique (Mulligan technique, Kinesiotaping, and placebo intervention) will be developed for them. The time it will take athletes to answer the questionnaire will not exceed 5 minutes, testing 5 minutes, and intervention 5 minutes. The confidentiality of basketball athletes will be maintained regarding individual data.

Risks

During the implementation of this study, participants will not have any physical injury, pain, or disability. The duration from testing, questionnaire, to physiotherapy intervention will not be a limitation in terms of training time.

Confidentiality

I pledge that all individual data of each participant will be kept confidential. All data that will be collected will be stored only by me, Selda Sokoli, the Scientific Researcher of this study. In studies where only measurement and non-identifying data will be used. This data will be stored by me, Selda Sokoli, until 2028, and then will be deleted.

Right to withdraw

Participation in this study is voluntary, and each participant may choose to withdraw from the study at any time. Each participant has the right to withdraw consent and discontinue participation in the study without prejudice.

Voluntary Consent

(The following consent statement must be included)

1. I have read the above information and agree that my child may participate in this study.
2. I understand that all aspects of this project will be conducted in strict confidence and in a manner in which my child's rights as a human participant are protected.
3. I have been informed in advance of what the task(s) will be and what procedures will be followed.
4. I have been allowed to ask questions, and my questions have been answered satisfactorily.
5. I am aware that I have the right to withdraw consent and discontinue my child's participation at any time, without prejudice.
6. My child may also withdraw his/her consent at any time.
7. My signature below may be taken as confirmation of all of the above, prior to participation.

Child's name: _____

Parent's name: _____

Parent's signature: _____

Date _____