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The influence of the dry needling method on the improvement of muscle function

Submission date
16/05/2023

Recruitment status
No longer recruiting

Registration date
24/05/2023

Overall study status
Completed

Last Edited
17/12/2024

Condition category
Musculoskeletal Diseases

[ ] Prospectively registered
[ ] Protocol
[ ] Statistical analysis plan
[X] Results
[ ] Individual participant data

Plain English summary of protocol

Background and study aims
The aim of this study is to assess the effect of dry needling on muscle parameters and the resulting regenerative effects on muscles.

Who can participate?
Mixed martial arts (MMA) fighters aged 18-40 years

What does the study involve?
Participants are randomly allocated to one of two groups. One group undergoes dry needling, which involves inserting an acupuncture needle into the pain point of the calf muscle in order to loosen it and have an analgesic effect. In the control group, it will be a quasi-needle that pricks the skin but does not actually pierce it.

What are the possible benefits and risks of participating?
The researchers want to prove that dry needling is effective not only in the treatment of muscle pain but also helps to relax muscles and can be used as a method of regeneration between exercises. There is a stereotype among MMA fighters and trainers that dry needling cannot be used between efforts because it worsens sports performance. In players undergoing dry needling, a clinically insignificant hematoma (bad bruise) may appear in the case of a puncture in a small blood vessel, and sometimes there may be an unpleasant sensation when local myofibril (muscle fibre) contraction is caused.

Where is the study run from?
Provita Medical Center (Poland)

When is the study starting and how long is it expected to run for?
December 2022 to July 2023

Who is funding the study?
Provita Medical Center (Poland)

Who is the main contact?
Dr Robert Trybulski, rtrybulski@o2.pl

Contact information

Type(s)
Scientific

Contact name
Dr Robert Trybulski

ORCID ID
http://orcid.org/0000-0002-4276-4813

Contact details
al.Zjednoczonej Europy 37
Żory
Poland
44240
+48 (0)502591428
provitazory@gmail.com

Additional identifiers

EudraCT/CTIS number
Nil known

IRAS number

ClinicalTrials.gov number
Nil known

Secondary identifying numbers
26/2022

Study information

Scientific Title
Immediate effect of dry needling therapy on the biomechanical properties and perfusion of the gastrocnemius muscle in mixed martial arts athletes

Study objectives
Current study hypothesis as of 04/07/2023:
This study aimed to evaluate the immediate effect of dry needling (DN) on selected muscle biomechanical properties and perfusion of the gastrocnemius and forearm muscles and muscles of the shoulder girdle (deltoid, trapezius, levator scapulae, and rhomboideus) in athletes. The immediate impact of DN in the period between efforts still raises some concerns among trainers, as it is suggested that it may increase muscle pain and worsen athletic performance.

The assessment of the microcirculation reaction after the use of DN is little recognized, and the correlation of changes in capillary blood supply and muscle stiffness and tone is innovative. The results obtained as part of these studies should contribute to a better understanding of the links between disturbed muscle tone and local ischemia in latent trigger points (TrP).

Previous study hypothesis:
The aim of this study was to evaluate the immediate effect of dry needling (DN) on selected muscle biomechanical properties and gastrocnemius muscle perfusion in mixed martial arts (MMA) fighters. Assessing the immediate impact of DN in the period between efforts still raises some concerns among trainers, as it is suggested that it may increase muscle pain and worsen athletic performance. The assessment of the microcirculation reaction after the use of DN is little recognized, and the correlation of changes in capillary blood supply and muscle stiffness and tone is innovative. The results obtained as part of these studies should contribute to a better understanding of the links between disturbed muscle tone and local ischemia in latent trigger points (TrP).

Ethics approval required
Old ethics approval format

Ethics approval(s)
Approved 12/01/2023, National Council of Physiotherapists (Al. Jerozolimskie 93, Warsaw, 02-001, Poland; +48 (0)22 230 23 80; komjaetykibadan@kif.info.pl), ref: 26/2022

Study design
Randomized crossover trial

Primary study design
Interventional

Secondary study design
Randomised cross over trial

Study setting(s)
Other

Study type(s)
Efficacy

Participant information sheet
Not available in web format, please use the contact details to request a consent form

Health condition(s) or problem(s) studied
Improvement of muscle regeneration function in athletes

Interventions
Current interventions as of 04/07/2023:
The experiment was conducted according to a randomized crossover design in which each subject participated in a DN familiarization intervention 14 days prior to the study. The DN procedure was carried out in accordance with the safety rules, previously disinfecting the puncture site. TrP was defined by signs of palpable tenderness and a taut band approximately four fingers below the popliteal fossa in the medial head of the gastrocnemius muscle of both

legs. DN was performed in a standardized prone position with feet hanging freely off the table. (Fernández-de-las-Peñas & Dommerholt, 2018). A simple method of drawing was used consisting of flipping a coin, where drawing the obverse side meant assigning subsequent participants to group A and the reverse to group B. Participants (n = 60) were randomly divided into two groups: the eDN group (experimental dry needing, n = 30) and the qDN group (quasi dry needing, n = 30). In the eDN group, sterile soma needles 0.30 x 50 mm were used. Each puncture was made with one needle for one TrP looking for a tremor response local twitch response (LTR). An experienced clinician (25 years of professional experience as a physiotherapist and 15 years of DN therapy experience, DN therapy instructor in Poland [exam in Simons Academy]) performed an average of three to five punctures, without leaving the skin border per one TrP. When LTR was not obtained after five punctures, the operator changed the puncture site by stepping out of the skin and changing the needle. The procedure was repeated a second time, near the puncture site, the same for both gastrocnemius muscles (Albin et al., 2020; Fernández-de-las-Peñas & Dommerholt, 2018). If there was no response, further insertions were not continued. The entire procedure lasted from 15 to 30 seconds for one TrP, with secondary ischemic compression for 5 seconds to reduce unpleasant sensations after a possible LTR. In the event of a burning sensation or other adverse reactions, the procedure was stopped, and the puncture site was changed. This situation occurred only in one case. The same procedure was used for subjects in the qDN group. Using a quasi-needle that did not pierce the skin. The quasi needle was manipulated to simulate DN therapy, and the same technique was performed (piston work movements). This mechanism produces a similar feeling to dry needling (Braithwaite et al., 2019). In addition, the participants did not see the techniques performed due to the position.

Previous interventions:
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Intervention Type
Other

Primary outcome measure
Current primary outcome measures as of 04/07/2023:
1. Muscle tone (T = Hz), stiffness (S = N/m), and elasticity (E= NaN), measured with a myotonometer (MyotonPRO AS, Myoton Ltd, Estonia 2021) at rest, 5 minutes, 24 hours after DN therapy
2. Muscle pain threshold (P PT= kG or N) measured with the FDIX algesimeter (Wagner Instruments, Greenwich, CT, USA 2013) at rest, 5 minutes, 24 hours after DN therapy
3. Perfusion unit (PU) index measured using laser Doppler flowmetry (LDF) (Perimed, Sweden 2004) at rest, 5 minutes and 24 hours after DN therapy
4. Muscle power (relative strength index [RSI]) measured using ForceDecks measuring platform (Vald Performance Australia 2012) at rest, 5 minutes and 24 hours after DN therapy
5. Maximum isometric force measured by electronic dynamometer 106 China 2022 at rest, 5 minutes and 24 hours after DN therapy
All measurements measured between 10-12 AM

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All measurements measured between 10-12 AM

Secondary outcome measures
There are no secondary outcome measures

Overall study start date
06/12/2022

Completion date
15/07/2023

Eligibility

Key inclusion criteria
1. Aged 18-40 years
2. Minimum of 3 years of training experience
3. Documented record (data of professional fights on tapology.com, amateur fights on mmapolska.org) of amateur or professional fights, at least three
4. Training at least four times a week
5. Participants in the study had to be abstinent from training for 48 hours and abstain from

training for 24 hours during the study
6. Due to PU measurements, they were asked to refrain from consuming ergogenic drinks for 4 hours before the test

Participant type(s)
Healthy volunteer

Age group
Adult

Lower age limit
18 Years

Upper age limit
40 Years

Sex
Male

Target number of participants
60

Total final enrolment
20

Key exclusion criteria
1. Elevated blood pressure before the test (blood pressure >140/90 mmHg)
2. People with musculoskeletal system injuries, damage or unspecified skin and myofascial lesions
3. Participants were also not allowed to have a tattoo at the measurement site because it interfered with tissue perfusion measurements
4. Needle phobia
5. Extreme fatigue
6. Fever
7. Infection
8. Allergy to nickel
9. Exclusion could occur at any time during the study at the participant's request

Date of first enrolment
15/03/2023

Date of final enrolment
15/07/2023

Locations

Countries of recruitment
Poland

Study participating centre
Provita Medical Center
al.Zjednoczonej Europy 37
Żory
Poland
44240

Sponsor information

Organisation
Provita Medical Center

Sponsor details
al.Zjednoczonej Europy 37
Żory
Poland
44240
+48 (0)502591428
provitazory@gmail.com

Sponsor type
Hospital/treatment centre

Website
https://www.rehabilitacja-provita.pl

Funder(s)

Funder type
Hospital/treatment centre

Funder Name
Provita Medical Center

Results and Publications

Publication and dissemination plan
Planned publication in an impact factor journal

Intention to publish date
30/08/2023

Individual participant data (IPD) sharing plan

The datasets generated during and/or analysed during the current study are/will be available upon request from Robert Trybulski (rtrybulski@o2.pl). Type of data that will be shared: a personal survey containing personal data. Data will be made available on request by email.

IPD sharing plan summary

Available on request

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
Results article	Acute Effects of the Dry Needling Session on Gastrocnemius Muscle Biomechanical Properties, and Perfusion with Latent Trigger Points - A Single-Blind Randomized Controlled Trial in Mixed Martial Arts Athletes	01/02/2024	14/02/2024	Yes	No
Results article	effects of compression contrast therapy (CT) and dry needling therapy	01/03/2024	07/08/2024	Yes	No
Results article	Adverse Reactions to Dry Needling Therapy: Insights from Polish Physiotherapy Practice	21/11/2024	17/12/2024	Yes	No
Results article	Biomechanical Profile after Dry Needling in Mixed Martial Arts	19/07/2024	17/12/2024	Yes	No