

Clinical Trial Protocol

Iranian Registry of Clinical Trials

04 Jul 2026

The effect of two type resistance exercise, concentric failure set and configuration cluster sets on bio markers of myocardium injury and left and right ventricles mechanical mechanism in athletic

Protocol summary

Study aim

The purpose of this study was to investigate the effect of resistance exercise with concentric failure sets and configuration cluster sets on response of cardiovascular, bio markers of cardiac injury, left and right ventricles mechanical mechanism of athletic myocardium and performance.

Design

Cross-sectional analysis of clinical trials was performed. SPSS Simple Random Sampling using to selected 24 cases and with limited random block allocations 6 cases in 4 blocks. The concealment was done in two blinding form. Clinical trials are classified into one phase.

Settings and conduct

training protocol performing in Gym of University of Tehran Dormitory and the tests taking in Shahid Rajaei Heart Center, On the day of the exercise protocol performing, None of the subjects or tester have aware of which of the two protocols performing.

Participants/Inclusion and exclusion criteria

Inclusion criteria: athletes with a history of weight training in advanced level with absence of any disease, not taking any kind of exercise supplement Exclusion criteria: Training history less than 3 years, No regular weight training in the past 18 months, absence of clinical symptoms associated with cardiovascular disease and musculoskeletal disorders and diseases, not taking ergogenic supplements for at least 8 weeks before the test.

Intervention groups

intervention 1 (INT1) : concentric failure sets with intensity zone 12-15 repetition maximum (RM) in 3 sets volume, INT2: same with INT1 but intensity (8-10 RM), INT3: configuration cluster sets with intensity (8-10 RM) in 9 sets volume with 2 to 3 reps, INT4: configuration cluster sets with intensity (12-15 RM) in 9 sets volume with 4 to 5 reps.

Main outcome variables

high sensitivity Cardiac Troponin I, N-terminal proBNP , right and left ventricular end systolic and diastolic volume and dimension. Right and left Ventricular Global Longitudinal Strain

General information

Reason for update

Acronym

IRCT registration information

IRCT registration number: **IRCT20190403043158N1**
Registration date: **2020-09-27, 1399/07/06**
Registration timing: **retrospective**

Last update: **2020-09-27, 1399/07/06**

Update count: **0**

Registration date

2020-09-27, 1399/07/06

Registrant information

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Name of organization / entity

The university of tabriz

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Recruitment status

Recruitment complete

Funding source

Expected recruitment start date

2018-11-11, 1397/08/20

Expected recruitment end date

2019-05-10, 1398/02/20
Actual recruitment start date
2018-11-22, 1397/09/01
Actual recruitment end date
2019-06-18, 1398/03/28
Trial completion date
2019-06-18, 1398/03/28

Scientific title

The effect of two type resistance exercise, concentric failure set and configuration cluster sets on bio markers of myocardium injury and left and right ventricles mechanical mechanism in athletic

Public title

The effect of high intensity resistance exercise on the biological and mechanical mechanism of the heart

Purpose

Health service research

Inclusion/Exclusion criteria

Inclusion criteria:

Everyone with a history of weight training in advanced level People who have regular weight training during the weekly exercise program. People with absence of any disease Not taking any kind of exercise supplement

Exclusion criteria:

Training history less than 3 years No regular weight training in the past 18 months Absence of clinical symptoms associated with cardiovascular disease Not taking ergogenic supplements for at least 8 weeks before the test Absence of musculoskeletal disorders and diseases

Age

From **20 years** old to **27 years** old

Gender

Male

Phase

N/A

Groups that have been masked

- Participant
- Outcome assessor
- Data analyser

Sample size

Target sample size: **24**

Actual sample size reached: **24**

Randomization (investigator's opinion)

Randomized

Randomization description

24 male strength athletes were selected by simple random sampling using SPSS software and from data select cases. Each subject was given a four-digit numeric code (for example: 1248) through which the code number was identified. In order to allocate sequences and able to control the number of subjects in each group, a limited randomized block allocation method was used. 24 subjects were placed in 4 blocks with setting a block size of 6, By applying the factorial formula, 6 possible combination were identified. , to determine the block number assigning 6 cases per block, used spss software with from the path Transform / Compute Variable / BLOCK_NUM / RND (\$ CASENUM / 4 + 0.49). \$ CASENUM

/ 4 indicates the case number divided by 4. Then random allocation group numbers were applied to all 6 possible combination. Which was done through: Transform / Rank cases / RANDOM / BLOCK_NUM. The concealment allocation was done through sealed the number of coded. Both the subject and the test taker until the moment of implementation do not be aware of the sequence generation step.

Blinding (investigator's opinion)

Double blinded

Blinding description

On the day that the exercise protocol was performed, None of the subjects or tester were aware of which of the two protocols were performed. Before the intervention subjects were not aware of the which intensity and type of resistance exercise will be performed. The persons responsible for measuring and analyzing the dependent variables of the research did not know which intervention method was implemented.

Placebo

Not used

Assignment

Parallel

Other design features

Secondary Ids

empty

Ethics committees

1

Ethics committee

Name of ethics committee

Ethics committee of Tabriz University of Medical Sciences

Street address

No. 111, Al-Ghadir Building, next to Faculty of Engineering, Amir Abad, North Kargar Ave, Tehran

City

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Province

Tehran

Postal code

1439951154

Approval date

2018-03-12, 1396/12/21

Ethics committee reference number

IR.TBZMED.REC.1396.1166

Health conditions studied

1

Description of health condition studied

The bio markers of cardiac injury response to two type resistance exercise, concentric failure set and configuration cluster sets

ICD-10 code

ICD-10 code description

2

Description of health condition studied

The response of left ventricles mechanical mechanism of athletic myocardium to two type resistance exercise, concentric failure set and configuration cluster sets

ICD-10 code

ICD-10 code description

3

Description of health condition studied

The response of right ventricles mechanical mechanism of athletic myocardium to two type resistance exercise, concentric failure set and configuration cluster sets

ICD-10 code

ICD-10 code description

4

Description of health condition studied

The response of blood pressure after the two type resistance exercise, concentric failure set and configuration cluster sets

ICD-10 code

ICD-10 code description

Primary outcomes

1

Description

Heart Ventricles dysfunction

Timepoint

Before and during the intervention, after 30 min, 4, 6, 12 and 24 hours after intervention

Method of measurement

Philips EPIQ7 Echocardiography, hscTnl and Nt-proBNP with PATHFAST system, REAGENT KITS FOR CRITICAL CARE DIAGNOSTICS (LSI Medience Corporation 13-4, Uchikanda 1-chome, Chiyoda-ku Tokyo 101-8517 JAPAN).

Secondary outcomes

1

Description

Rate of Perceived Exertion (RPE).

Timepoint

Before and during the intervention, after 30 min.

Method of measurement

Borg's 6-20 RPE (Rating of Perceived Exertion) scale

2

Description

Hand grip strength

Timepoint

Before and during the intervention, after 30 min.

Method of measurement

Yagami YG-200, Tokyo, Japan.

3

Description

Heart rate

Timepoint

Before and during the intervention, after 30 min, 4, 6, 12 and 24 hours after intervention

Method of measurement

Heart Rate monitor Polar v800, ECG connection to Philips EPIQ7 Echocardiography,

4

Description

Systolic blood pressure

Timepoint

Before the intervention, after 30 min, 4, 6, 12 and 24 hours after intervention.

Method of measurement

Finometer PRO (Finapres Medical Systems BV, Amsterdam, the Netherlands)

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Description

Diastolic blood pressure

Timepoint

Before the intervention, after 30 min, 4, 6, 12 and 24 hours after intervention.

Method of measurement

Finometer PRO (Finapres Medical Systems BV, Amsterdam, the Netherlands)

6

Description

Systemic vascular resistance

Timepoint

Before the intervention, after 30 min, 4, 6, 12 and 24 hours after intervention.

Method of measurement

Finometer PRO (Finapres Medical Systems BV, Amsterdam, the Netherlands)

7

Description

Mean blood pressure

Timepoint

Before the intervention, after 30 min, 4, 6, 12 and 24 hours after intervention.

Method of measurement

Finometer PRO (Finapres Medical Systems BV, Amsterdam, the Netherlands)

8

Description

Haematocrit

Timepoint

Before and during the intervention, after 30 min, 4, 6, 12 and 24 hours after intervention

Method of measurement

ELISA test

9

Description

Albumin

Timepoint

Before and during the intervention, after 30 min, 4, 6, 12 and 24 hours after intervention

Method of measurement

ELISA test

10

Description

Cortisol

Timepoint

Before and during the intervention, after 30 min, 4, 6, 12 and 24 hours after intervention

Method of measurement

ELISA test

11

Description

C-reactive protein

Timepoint

Before and during the intervention, after 30 min, 4, 6, 12 and 24 hours after intervention

Method of measurement

ELISA test

12

Description

Serum electrolyte concentrations (Calcium)

Timepoint

Before and during the intervention, after 30 min, 4, 6, 12 and 24 hours after intervention

Method of measurement

ELISA test

13

Description

Serum electrolyte concentrations(Magnesium)

Timepoint

Before and during the intervention, after 30 min, 4, 6, 12 and 24 hours after intervention

Method of measurement

ELISA test

14

Description

Serum electrolyte concentrations(Potassium)

Timepoint

Before and during the intervention, after 30 min, 4, 6, 12 and 24 hours after intervention

Method of measurement

ELISA test

15

Description

Serum electrolyte concentrations (Sodium)

Timepoint

Before and during the intervention, after 30 min, 4, 6, 12 and 24 hours after intervention

Method of measurement

ELISA test

16

Description

high sensitivity Cardiac Troponin I (hscTnI)

Timepoint

Before the intervention, after 30 min, 4, 6, 12 and 24 hours after intervention

Method of measurement

hscTnI with PATHFAST system, REAGENT KITS FOR CRITICAL CARE DIAGNOSTICS (LSI Medience Corporation 13-4, Uchikanda 1-chome, Chiyoda-ku Tokyo 101-8517 JAPAN).

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Description

N-terminal proBNP (NT-proBNP)

Timepoint

Before the intervention, after 30 min, 4, 6, 12 and 24 hours after intervention

Method of measurement

NT-proBNP with PATHFAST system, REAGENT KITS FOR CRITICAL CARE DIAGNOSTICS (LSI Medience Corporation 13-4, Uchikanda 1-chome, Chiyoda-ku Tokyo 101-8517 JAPAN).

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Description

Left ventricular end systolic volume and dimension

Timepoint

Before and during the intervention, after 30 min, 4, 6, 12 and 24 hours after intervention

Method of measurement

Two-dimensional (2D) heart echo, Philips EPIQ7 Echocardiography

19

Description

Left ventricular end diastolic volume and dimension

Timepoint

Before and during the intervention, after 30 min, 4, 6, 12 and 24 hours after intervention

Method of measurement

Two-dimensional (2D) heart echo, Philips EPIQ7 Echocardiography

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Description

Stroke volume

Timepoint

Before and during the intervention, after 30 min, 4, 6, 12 and 24 hours after intervention

Method of measurement

Two-dimensional (2D) heart echo, Philips EPIQ7

Echocardiography

21

Description

Cardiac output

Timepoint

Before and during the intervention, after 30 min, 4, 6, 12 and 24 hours after intervention

Method of measurement

Two-dimensional (2D) heart echo, Philips EPIQ7
Echocardiography

22

Description

Ejection Fraction

Timepoint

Before and during the intervention, after 30 min, 4, 6, 12 and 24 hours after intervention

Method of measurement

Two-dimensional (2D) heart echo, Philips EPIQ7
Echocardiography

23

Description

Left ventricle posterior wall thickness in diastole

Timepoint

Before and during the intervention, after 30 min, 4, 6, 12 and 24 hours after intervention

Method of measurement

Two-dimensional (2D) heart echo, Philips EPIQ7
Echocardiography

24

Description

Right ventricular end systolic dimension

Timepoint

Before and during the intervention, after 30 min, 4, 6, 12 and 24 hours after intervention

Method of measurement

Two-dimensional (2D) heart echo, Philips EPIQ7
Echocardiography

25

Description

Right ventricular end diastolic dimension

Timepoint

Before and during the intervention, after 30 min, 4, 6, 12 and 24 hours after intervention

Method of measurement

Two-dimensional (2D) heart echo, Philips EPIQ7
Echocardiography

26

Description

Right Ventricular Global Longitudinal Strain (RVGLS)

Timepoint

Before and during the intervention, after 30 min, 4, 6, 12

and 24 hours after intervention

Method of measurement

Two-dimensional (2D) heart echo, Philips EPIQ7
Echocardiography

27

Description

Posterior Wall Thickness (PWT), Relative Wall Thickness (RWT), Inter Ventricular Septum Thickness (IVST)

Timepoint

Before and during the intervention, after 30 min, 4, 6, 12 and 24 hours after intervention

Method of measurement

Two-dimensional (2D) heart echo, Philips EPIQ7
Echocardiography

28

Description

Left Ventricular Mass Indexed (LVMI)

Timepoint

Before and during the intervention, after 30 min, 4, 6, 12 and 24 hours after intervention

Method of measurement

Two-dimensional (2D) heart echo, Philips EPIQ7
Echocardiography

29

Description

Duration of Deceleration (DT) in blood flow from the atrium to the left ventricle in the early phase of diastole: E-wave DT

Timepoint

Before and during the intervention, after 30 min, 4, 6, 12 and 24 hours after intervention

Method of measurement

Two-dimensional (2D) heart echo, Philips EPIQ7
Echocardiography

30

Description

Right Ventricular Longitudinal Strain (RVLS)

Timepoint

Before and during the intervention, after 30 min, 4, 6, 12 and 24 hours after intervention

Method of measurement

Two-dimensional (2D) heart echo, Philips EPIQ7
Echocardiography

31

Description

Right ventricular free wall longitudinal strain

Timepoint

Before and during the intervention, after 30 min, 4, 6, 12 and 24 hours after intervention

Method of measurement

Two-dimensional (2D) heart echo, Philips EPIQ7
Echocardiography

32

Description

Right ventricular global circumferential strain

Timepoint

Before and during the intervention, after 30 min, 4, 6, 12 and 24 hours after intervention

Method of measurement

Two-dimensional (2D) heart echo, Philips EPIQ7
Echocardiography

33

Description

Right ventricular free wall circumferential strain

Timepoint

Before and during the intervention, after 30 min, 4, 6, 12 and 24 hours after intervention

Method of measurement

Two-dimensional (2D) heart echo, Philips EPIQ7
Echocardiography

34

Description

Right ventricular septal circumferential strain

Timepoint

Before and during the intervention, after 30 min, 4, 6, 12 and 24 hours after intervention

Method of measurement

Two-dimensional (2D) heart echo, Philips EPIQ7
Echocardiography

35

Description

Right ventricular septal longitudinal strain

Timepoint

Before and during the intervention, after 30 min, 4, 6, 12 and 24 hours after intervention

Method of measurement

Two-dimensional (2D) heart echo, Philips EPIQ7
Echocardiography

36

Description

Early diastolic myocardial relaxation (E')

Timepoint

Before and during the intervention, after 30 min, 4, 6, 12 and 24 hours after intervention

Method of measurement

Two-dimensional (2D) heart echo, Philips EPIQ7
Echocardiography

37

Description

Left ventricular filling pressure: ratio E/e'

Timepoint

Before and during the intervention, after 30 min, 4, 6, 12 and 24 hours after intervention

Method of measurement

Two-dimensional (2D) heart echo, Philips EPIQ7

Echocardiography

38

Description

Peak blood flow in the early phase of diastole (E)

Timepoint

Before and during the intervention, after 30 min, 4, 6, 12 and 24 hours after intervention

Method of measurement

Two-dimensional (2D) heart echo, Philips EPIQ7
Echocardiography

39

Description

Peak blood flow velocity in diastolic delay phase (A)

Timepoint

Before and during the intervention, after 30 min, 4, 6, 12 and 24 hours after intervention

Method of measurement

Two-dimensional (2D) heart echo, Philips EPIQ7
Echocardiography

40

Description

Flow to injection ratio; Ratio of blood flow from mitral valve to blood transfusion from atrium, ratio E/A

Timepoint

Before and during the intervention, after 30 min, 4, 6, 12 and 24 hours after intervention

Method of measurement

Two-dimensional (2D) heart echo, Philips EPIQ7
Echocardiography

41

Description

Peak systolic velocity of the Tricuspid annulus

Timepoint

Before and during the intervention, after 30 min, 4, 6, 12 and 24 hours after intervention

Method of measurement

Two-dimensional (2D) heart echo, Philips EPIQ7
Echocardiography

42

Description

Left ventricular relaxation in early diastolic

Timepoint

Before and during the intervention, after 30 min, 4, 6, 12 and 24 hours after intervention

Method of measurement

Two-dimensional (2D) heart echo, Philips EPIQ7
Echocardiography

43

Description

Right ventricular myocardial performance index

Timepoint

Before and during the intervention, after 30 min, 4, 6, 12 and 24 hours after intervention

Method of measurement

Two-dimensional (2D) heart echo, Philips EPIQ7
Echocardiography

44

Description

Fractional Area Change (FAC)

Timepoint

Before and during the intervention, after 30 min, 4, 6, 12 and 24 hours after intervention

Method of measurement

Two-dimensional (2D) heart echo, Philips EPIQ7
Echocardiography

45

Description

Tricuspid annular plane systolic excursion (TAPSE)

Timepoint

Before and during the intervention, after 30 min, 4, 6, 12 and 24 hours after intervention

Method of measurement

Two-dimensional (2D) heart echo, Philips EPIQ7
Echocardiography

46

Description

Systolic pulmonary artery pressure (SPAP)

Timepoint

Before and during the intervention, after 30 min, 4, 6, 12 and 24 hours after intervention

Method of measurement

Two-dimensional (2D) heart echo, Philips EPIQ7
Echocardiography

47

Description

Tricuspid Regurgitant Gradient (TRG)

Timepoint

Before and during the intervention, after 30 min, 4, 6, 12 and 24 hours after intervention

Method of measurement

Two-dimensional (2D) heart echo, Philips EPIQ7
Echocardiography

48

Description

Left ventricular global longitudinal strain (LVGLS)

Timepoint

Before and during the intervention, after 30 min, 4, 6, 12 and 24 hours after intervention

Method of measurement

Two-dimensional (2D) heart echo, Philips EPIQ7
Echocardiography

49

Description

Left ventricular circumferential strain

Timepoint

Before and during the intervention, after 30 min, 4, 6, 12 and 24 hours after intervention

Method of measurement

Two-dimensional (2D) heart echo, Philips EPIQ7
Echocardiography

50

Description

Left ventricular longitudinal strain

Timepoint

Before and during the intervention, after 30 min, 4, 6, 12 and 24 hours after intervention

Method of measurement

Two-dimensional (2D) heart echo, Philips EPIQ7
Echocardiography

51

Description

Left ventricular relaxation in early diastole (septal and lateral)

Timepoint

Before and during the intervention, after 30 min, 4, 6, 12 and 24 hours after intervention

Method of measurement

Two-dimensional (2D) heart echo, Philips EPIQ7
Echocardiography

52

Description

Ratio of Early to late filling velocity left ventricular (E/A ratio)

Timepoint

Before and during the intervention, after 30 min, 4, 6, 12 and 24 hours after intervention

Method of measurement

Two-dimensional (2D) heart echo, Philips EPIQ7
Echocardiography

53

Description

Early diastolic left ventricular tissue velocity

Timepoint

Before and during the intervention, after 30 min, 4, 6, 12 and 24 hours after intervention

Method of measurement

Two-dimensional (2D) heart echo, Philips EPIQ7
Echocardiography

54

Description

Left ventricular mass

Timepoint

Before and during the intervention, after 30 min, 4, 6, 12 and 24 hours after intervention

Method of measurement

Two-dimensional (2D) heart echo, Philips EPIQ7
Echocardiography

Intervention groups

1

Description

Intervention 1: concentric failure sets with circuit pattern consist of 9 movements: in front squat, bench press, dead lift, shoulder press, in front lunge, weight pull up, roman lift, weight dip parallel and bent over row with intensity zone (12-15 RM) in three sets of 12 to 15 repetitions with 120 seconds rest interval between each movement or set.

Category

Other

2

Description

Intervention 2: concentric failure sets with circuit pattern consist of 9 movements: in front squat, bench press, dead lift, shoulder press, in front lunge, weight pull up, roman lift, weight dip parallel and bent over row with intensity zone (8-10 RM) in three sets of 8 to 10 repetitions with 120 seconds rest interval between each movement or set

Category

Other

3

Description

Intervention 3: configuration cluster sets with circuit pattern consist of 9 movements: in front squat, bench press, dead lift, shoulder press, in front lunge, weight pull up, roman lift, weight dip parallel and bent over row with intensity zone (12-15 RM) in nine sets of 4 to 5 repetitions with 40 seconds rest interval between each movement or set

Category

Other

4

Description

Intervention 4: configuration cluster sets with circuit pattern consist of 9 movements: in front squat, bench press, dead lift, shoulder press, in front lunge, weight pull up, roman lift, weight dip parallel and bent over row with intensity zone (8-10 RM) in nine sets of 2 to 3 repetitions with 40 seconds rest interval between each movement or set

Category

Other

Recruitment centers

1

Recruitment center

Name of recruitment center

University of Tehran Faculty of Physical Education and Sport Sciences

Full name of responsible person

Rasoul Dokht Abdiyan

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Faculty of Physical Education and Sport Sciences, between 15th and 16th St., North Kargar st., Tehran, Islamic Republic

City

Tehran

Province

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Postal code

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Phone

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Email

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Web page address

<http://sport.ut.ac.ir/>

Sponsors / Funding sources

1

Sponsor

Name of organization / entity

Vice chancellor for research, Faculty of Tehran University, Physical Education and Sport Sciences

Full name of responsible person

Foad Seyedi

Street address

Faculty of Tehran University, Physical Education and Sport Sciences, between 15th and 16th St., North Kargar st., Tehran, Islamic Republic

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Phone

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Email

infosport@ut.ac.ir

Web page address

http://www.sport.ut.ac.ir

Grant name

Grant code / Reference number

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

Yes

Title of funding source

Vice chancellor for research, Faculty of Tehran University, Physical Education and Sport Sciences

Proportion provided by this source

100

Public or private sector

Public

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**

University of Tehran Faculty of Physical Education and Sport Sciences

Full name of responsible person

Rasoul Dokht Abdiyan

Position

PHD University student

Latest degree

Master

Other areas of specialty/work

Physiology

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

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Position

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Latest degree

Master

Other areas of specialty/work

Physiology

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

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Full name of responsible person

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Position

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Latest degree

Master

Other areas of specialty/work

Physiology

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

Yes - There is 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

Not applicable

Analytic Code

Not applicable

Data Dictionary

Not applicable

Title and more details about the data/document

Part of the main outcome data

When the data will become available and for how long

Two years after the article was published

To whom data/document is available

Graduate students from all universities in the country

Under which criteria data/document could be used

In order to use the data for doing research in this area

From where data/document is obtainable

rasoulabdiyan11@gmail.com

What processes are involved for a request to access

data/document

You will be working with the applicant as soon as possible by sending an email to

rasoulabdiyan11@gmail.com

Comments