Clinical Trial Protocol
Iranian Registry of Clinical Trials

07 Nov 2026

Investigation of metformin effect on sirtuin gene expression in peripheral blood mononuclear cells with obesity and metabolic syndrome in children and adolescents of 8-18 years old

Protocol summary

Summary

Introduction: obesity is currently one of the main clinical complains. Metabolic syndrome is a complication of obesity and is a combination of central obesity, dyslipidemia, glucose metabolism alteration, hypertension, and insulin resistance, that may begin in childhood and progress through adulthood and increases the risk of diabetes and cardiovascular diseases. Risk of obesity and its complications is higher in obese children than normal weight children. Preventing obesity and metabolic syndrome in children prevents early occurrence of diabetes and cardiovascular disease. Sirtuins are deacetylase enzymes which act using NAD and effect gene expression by deacetylation of histones. SIRT1 is one of the sirtuins that has been shown to be associated with metabolic syndrome, insulin resistance and diabetes. This enzyme has been shown to be reduced in obesity and insulin resistance and is suggested as a marker and target for metabolic disorders. Because of the protective effect of SIRT1, its reduction in obesity may be responsible for the complications of diabetes and therefore induction of its expression may be effective in prevention of obesity complications. Metformin has been shown to be able to induce SIRT1 activity but this effect has not been previously studied in children and adolescents. The aim of this study is to assess the effectiveness of metformin, which is an approved and widely used medication, on SIRT1 expression. 1) objectives: Main objective: determination of the effect of metformin on sirtuin gene expression in peripheral blood mononuclear cells in 8-18 year old children and adolescents who are referred to H. Aliasghar hospital. Minor objectives: a- determination of sirtuin gene expression in obese children before administration of metformin; b- determination of sirtuin gene expression in obese children after administration of metformin; c- comparison of sirtuin gene expression in obese children before and after administration of metformin; d- determination AMPK levels in obese children before administration of metformin; e- determination AMPK levels in obese children after administration of metformin; f- comparison of sirtuin gene expression in obese children before and after administration of metformin; g- comparison of BMI and waist circumference in obese children before and after administration of metformin; h- comparison of metabolic parameters in obese children before and after administration of metformin; i- comparison of HOMA-IR in obese children before and after administration of metformin 2) Design: This study is designed as a double blind placebo-controlled randomly-assigned clinical trial 3) setting and conduct: all the participants undergo clinical evaluation and height, weight, waist circumference, hip circumference and blood pressure is recorded for them. Blood sample is withdrawn from participants before the beginning of intervention and after finishing it, and routine biochemical tests including blood glucose, serum insulin, and lipid profile including total triglyceride, total cholesterol, LDL and HDL are performed. These measurements are performed by calorimetric methods using conventional commercial kits. HOMA-IR is calculated based on data from fasting blood glucose and insulin levels. 5 ml of each blood sample is processed, plasma and PBMC are separated and kept frozen after separation of plasma and PBMC, until later analysis. SIRT1 gene expression is analyzed by real-time PCR with SYBR-green using gene specific primers after extraction of RNA and synthesis of cDNA. Plasma insulin and AMPK levels are measured by ELISA method. 4) Participants and criteria: a total of 60 participants from obese children and adolescents who are referred to outpatient clinic of Hazrat Aliasghar hospital are included and randomly assigned to two 30-cases groups. a. inclusion criteria: children who have BMI more than 95th percentile (regarding their age and gender), absence of any illnesses or history of it, not

consuming medications including antihypertensive drugs or any other medication known to affect metabolism of lipid or carbohydrate b. exclusion criteria: major illnesses including endocrine, cardiovascular, renal, etc. or having a recent history of these diseases, BMI lower than 5th percentile or between 85th and 95th percentile. Intervention: 30 participants receive metformin with the dose of 1000 mg/m2 body surface. The other group receives placebo. The total intervention duration is 3 months. Main outcome measures: weight, BMI, waist circumference, hip circumference, waist to hip circumference ratio, fasting blood glucose, total triglyceride, LDL, HDL, insulin, sirt1 gene expression, AMPK

General information

Acronym

IRCT registration information

IRCT registration number: **IRCT201104164585N4**
Registration date: **2016-06-18, 1395/03/29**
Registration timing: **registered_while_recruiting**

Last update:
Update count: **0**

Registration date

2016-06-18, 1395/03/29

Registrant information

Name

Maryam Razzaghy-Azar

Name of organization / entity

Country

Iran (Islamic Republic of)

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Email address

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Recruitment status

Recruitment complete

Funding source

Vice chancellor for research, Iran University of Medical Sciences

Expected recruitment start date

2016-05-21, 1395/03/01

Expected recruitment end date

2016-09-22, 1395/07/01

Actual recruitment start date

empty

Actual recruitment end date

empty

Trial completion date

empty

Scientific title

Investigation of metformin effect on sirtuin gene expression in peripheral blood mononuclear cells with obesity and metabolic syndrome in children and adolescents of 8-18 years old

Public title

The effect of metformin on sirtuin gene expression in obese children and adolescents

Purpose

Supportive

Inclusion/Exclusion criteria

Inclusion criteria: obese subjects (BMI>95th percentile); not having any specific ilnesses; not taking medications including antihypertensive drugs or those interfering lipid or carbohydrate metabolism Exclusion criteria: having any endocrine disease other than obesity or diseases such as gastrointestinal, renal, cardiovascular, etc. ; taking any mediacation; BMI less than 5th percentile or between 85th and 95th percentiles

Age

From **8 years** old to **16 years** old

Gender

Both

Phase

2-3

Groups that have been masked

No information

Sample size

Target sample size: **60**

Randomization (investigator's opinion)

Randomized

Randomization description

Blinding (investigator's opinion)

Double blinded

Blinding description

Placebo

Used

Assignment

Parallel

Other design features

Secondary Ids

empty

Ethics committees

1

Ethics committee

Name of ethics committee

Ethics Committee of Iran University of Medical Sciences

Street address

Department Of Biochemistry, School of Medicine, Iran University of Medical Sciences, Hemmat High way

City

Tehran

Postal code

1449614535

Approval date

2016-02-23, 1394/12/04

Ethics committee reference number

IR.IUMS.REC.1394.26992

Health conditions studied

1

Description of health condition studied
obesity
ICD-10 code
E66.0
ICD-10 code description
Obesity due to excess calories

Primary outcomes

1

Description
sirt1 gene expression
Timepoint
90 days
Method of measurement
real-time PCR

2

Description
AMPK
Timepoint
90 days
Method of measurement
ELISA

Secondary outcomes

1

Description
insulin resistance
Timepoint
90 days
Method of measurement
HOMA-IR calculated from insulin and glucose levels

2

Description
blood glucose
Timepoint
90 days
Method of measurement
colorimetric

3

Description
waist circumference
Timepoint
90 days
Method of measurement
measuring tape

4

Description
blood pressure
Timepoint
90 days
Method of measurement
sphygmomanometer

5

Description
weight
Timepoint
90 days
Method of measurement
scale

6

Description
cholesterol
Timepoint
90 days
Method of measurement
colorimetric

7

Description
LDL
Timepoint
90 days
Method of measurement
colorimetric

8

Description
HDL
Timepoint
90 days
Method of measurement
colorimetric

9

Description
Triglyceride
Timepoint
90 days
Method of measurement
colorimetric

10

Description
BMI
Timepoint
90 days
Method of measurement
calculation from weight and height

11

Description
insulin
Timepoint
90 days
Method of measurement
ELISA

Intervention groups

1

Description
Metformin 1000 mg/m2 body surface as tablet, daily for 12 weeks, oral
Category
Treatment - Drugs

2

Description
placebo one tablet daily for 12 weeks, oral
Category
Placebo

Recruitment centers

1

Recruitment center
Name of recruitment center
H. Aliasghar Hospital
Full name of responsible person
Dr. Amirkashani
Street address
Dastgerdi st., Modarres Highway
City
Tehran

Sponsors / Funding sources

1

Sponsor
Name of organization / entity
Vice chancellor for research, Iran University of Medical Sciences
Full name of responsible person
Dr. Seyed Ali Javad Mousavi
Street address
Vice chancellor for research, Iran University of Medical Sciences, Hemmat High way
City
Tehran
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, Iran University of Medical Sciences
Proportion provided by this source
100
Public or private sector
empty
Domestic or foreign origin
empty
Category of foreign source of funding
empty
Country of origin
Type of organization providing the funding
empty

Person responsible for general inquiries

Contact
Name of organization / entity
H. Aliasghar Hospital, Iran University of Medical Sciences
Full name of responsible person
Davod Amirkashani
Position
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Sharing plan

Deidentified Individual Participant Data Set (IPD)
empty

Study Protocol
empty

Statistical Analysis Plan
empty

Informed Consent Form
empty

Clinical Study Report
empty

Analytic Code
empty

Data Dictionary
empty