Agricultural Research Service

Dr. Duke's Phytochemical and Ethnobotanical Databases

Ethnobotanical uses

Amorphophallus konjac (ARACEAE)

Cancer Hartwell

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* = Chemical(s) found in plant shown to be effective for the ailment medicated
** = Plant itself shown to be effective for the ailment medicated

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Phytochemical Database, USDA - ARS - NGRL, Beltsville Agricultural Research Center, Beltsville, Maryland
Wed Oct 27 14:44:16 EDT 2004

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Agricultural Research Service

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Chemicals and their Biological Activities in: *Amorphophallus konjac* K. KOCH (Araceae) -- Devil's Tongue, Elephant Yam, Konjac, Leopard Palm, Snake Palm, Umbrella Arum

Chemicals

ADENINE *Root*:
Antianemic *1.5 g/day*; Antigranulocytopenic; Antiviral; CNS-Stimulant; Diuretic; Hyperuricemic; Insectifuge; Lithogenic; Myocardiotonic; Pesticide; Vasodilator

ALUMINUM *Root*:
Antisilicotic; Antivaginitic; Candidicide; Encephalopathic; Pesticide

ASH *Leaf 2,000 - 77,000 ppm Root 24,000 ppm*;
No activity reported.

BETA-CAROTENE *Root*:
Allergenic; Androgenic?; Antiacne; Antiaging; Antiasthmatic; Anticancer; Anticarcinomic; Anticoronary *50 mg/man/2 days*; Antihyperkeratotic; Antiichythyotic; Antileukoplakic; Antilupus *150 mg/man/day/2 mos*; Antimastitic; Antimutagenic; Antioxidant; Antiozenic; Antiphotophobic *30-300 mg/man/day*; Antipityriasic; AntiPMS; Antiporphyric; Antiproliferant; Antipsoriac; Antiradicular; Antistress; Antitumor; Antiulcer *12 mg 3x/day/man/orl*; Antixerophthalmic; Cancer-Preventive *22 ppm*; Colorant; Immunostimulant *180 mg/man/day/orl*; Interferon-Synergist; Mucogenic; Phagocytotic; Prooxidant *20 ug/g*; Thymoprotective; Ubiquiot

CALCIUM *Leaf 170 - 6,538 ppm Root 234 ppm*;
Antiallergic *500 mg/day*; Antianxiety; Antiatherosclerotic; Antidepressant; Antidote (Aluminum); Antidote (Lead); Antihyperkinetic; Antihypertensive; Antiinsomniac; Antiosteoporotic; Antiperiodontitic *750 mg/day*; AntiPMS *1 g/day*; Antitic; Calcium-Channel-Blocker; Diuretic; Hypocholesterolemic *500 mg/day*; Hypotensive *1 g/day*; Vasodilator

CARBOHYDRATES *Leaf 23,000 - 885,000 ppm*
No activity reported.

CHOLINE ***Root***:
Antialzheimeran *5-16 g/man/day*; Antichoreic; Anticirrhotic *6,000 mg/man/day*; Anticystinuric; Antidementia; Antidiabetic; Antidyskinetic *150-200 mg/kg/man/day*; Antihomocysteine; Antimanic *15-30 g/man/day/orl*; Cardiodepressant; Cerebrotonic; Cholinergic; Hepatoprotective; Hypotensive; Ileorelaxant; Lipotropic; Memorigenic; Parasympathomimetic *(1/1,000th acetylcholine)*

CHROMIUM ***Root***:
Amphiglycemic?; AntiAGE *200-1,000 ug*; Antiaging; Antiatherosclerotic *20 ug/day*; Anticorneotic; Antidiabetic *200-1,000 ug*; Antidote (Lead); Antiglycosuric; Antiobesity; Antisyndrome-X *200-800 ug*; Antitriglyceride *20 ug/day 200-1,000 ug*; Hypocholesterolemic *20 ug/day 200-1,000 ug*; Hypoglycemic; Hypotensive; Insulinogenic

COBALT ***Root*** *125 ppm*;
Cardiomyopathogenic; Erythrocytogenic

FAT ***Root*** *9,000 ppm*;
No activity reported.

FIBER ***Leaf*** *1,000 - 38,000 ppm* ***Root*** *88,000 ppm*;
Angiotensin-Receptor-Blocker; Antidiabetic; Antihypertensive; Antiobesity; Antitumor; Antiulcer; Beta-Blocker; Cancer-Preventive; Cardioprotective; Diuretic; Hypocholesterolemic; Hypotensive *10 g/man/day/orl*; Hypouricemic; Laxative; Vasodilator

GLUCOMANNAN ***Root***:
Anorectic?; Antidiabetic; Hypocholesterolemic

GLUCOSE ***Root***:
Acetylcholinergic; Antiedemic; Antihepatotoxic; Antiketotic; Antivaricose; Hyperglycemic; Memory-Enhancer

IRON ***Leaf*** *3 - 115 ppm* ***Root***:
Antiakathisic; Antianemic; Anticheilitic; Antimenorrhagic *100 mg/day/wmn/orl*

KILOCALORIES ***Leaf*** *80 - 3,080 /kg* ***Root*** *2,610 /kg*;
No activity reported.

MAGNESIUM ***Root***:
Antiaggregant *400 mg/day*; Antianginal; Antianorectic; Antianxiety; Antiarrhythmic; Antiarthritic; Antiasthmatic; Antiatherosclerotic; Anticonvulsant; Anticoronary; Antidepressant; Antidiabetic *400-800 mg/man/day*; Antidysmenorrheic *100 mg 4 x/day*; Antiepileptic *450 mg/day*; Antiglaucomic; Antihyperkinetic; Antihypertensive; Antihypoglycemic; Antiinflammatory *100 mg 4 x/day*; Antiinsomniac; Antilithic; Antimastalgic; Antimigraine *200 mg/day*; Antineurotic; Antiosteoporotic *500-1,000 mg/day/wmn/orl*; AntiPMS *400-800 mg/day/wmn/orl*; Antiretinopathic *400 mg/day*; Antispasmophilic *500 mg/day*; Antistroke *400 mg/day*; Antisyndrome-X *400 mg/man/day*; Calcium-Antagonist; CNS-Depressant; Diuretic; Hypocholesterolemic *400 mg/day*; Hypotensive *260-500 mg/day*; Insulinogenic *400 mg/day*; Myorelaxant *100 mg 4 x/day*; Uterorelaxant; Vasodilator

MANGANESE ***Root***:
Antialcoholic; Antianemic; Antidiabetic *10-30 mg/man/day 3-5 mg/day*; Antidiscotic; Antidyskinetic; Antiepileptic *450 mg/day*; Antiototic; Antisyndrome-X *10-30 mg/man/day*; Hypoglycemic

NIACIN ***Root***:
Allergenic; Antiacrodynic; Antiallergic *50 mg/2x/day*; Antiamblyopic; Antianginal; Antichilblain; Anticonvulsant *3 g/day*; Antidermatitic; Antidysphagic; Antiepileptic; Antihistaminic *50 mg/2x/day*; Antihyperactivity *1.5-6 g/day*; Antiinsomnic *1 g/day*; AntiMeniere's; Antineuralgic; Antiparkinsonian *100 mg/day*; Antipellagric; Antiscotomic; Antispasmodic *100 mg/2x/day*; Antivertigo; Cancer-Preventive; Hepatoprotective; Hypoglycemic; Hypolipidemic; Sedative; Serotoninergic; Vasodilator

PHOSPHORUS ***Leaf*** *70 - 2,692 ppm* ***Root*** *39 ppm*;
Antiosteoporotic; Immunostimulant; Osteogenic

POTASSIUM ***Root*** *1,740 ppm*;
Angiotensin-Receptor-Blocker; Antiarrhythmic; Antidepressant; Antifatigue; Antihypertensive; Antispasmodic; Beta-Blocker; Cardiotoxic *18,000 mg/man/day*; Diuretic; Vasodilator

PROTEIN ***Leaf*** *1,000 - 38,000 ppm* ***Root*** *39,000 ppm*;
No activity reported.

RIBOFLAVIN ***Bark***:
Antiarabiflavinotic *2-10 mg orl/day*; Anticarpal-Tunnel *50 mg/day*; Anticataract *15 mg/day*; Anticheilitic; Antidecubitic; Antiglossitic; Antikeratitic; Antimigraine; Antipellagric; Antiphotophobic; Cancer-Preventive

SELENIUM ***Root***:
Analgesic *200 ug/day*; Anorexic; Antiacne; Antiaggregant; Antiangiogenic *2 uM 230 ug/kg orl rat*; Anticirrhotic; Anticoronary *200 ug/day*; Antidandruff; Antidote (Mercury); Antikeshan; Antileukemic *1.6 mg/kg ipr mus*; Antileukotriene; Antimelanomic *480 ug/kg*; Antimetastatic; Antimyalgic *200 ug/day*; AntiNF-kB; Antiosteoarthritic; Antioxidant *100-200 (-400) ug/man/day*; Antiproliferant *2 uM*; Antiradicular *100-200 (-400) ug/man/day*; Antisyndrome-X; Antitumor; Antitumor (brain) *38-150 ug/kg*; Antitumor (Breast) *0.8 mg/kg scu mus 150 ug/kg diet rat 230 ug/kg orl rat 333.6 ug/day*; Antitumor (Lung) *240 ug/kg diet*; Antiulcerogenic; AP-1-Inhibitor *2-50 uM*; Apoptotic; Cancer-Preventive; Depressant; Fungicide; Immunostimulant *100-200 (-400) ug/man/day*; Ornithine-Decarboxylase-Inhibitor; Pesticide; Polyamine-Synthesis-Inhibitor; Prostaglandin-Sparer; Protein-Kinase-C-Inhibitor *IC50=2-50 uM*; VEGF-Inhibitor

SILICON ***Root***:
Antiarteriosclerotic

SODIUM ***Root*** *130 ppm*;
Hypertensive

THIAMIN ***Root***:
Analgesic *1-4 g/day*; Antialcoholic; Antialzheimeran *100-3,000 mg/day*; Antianorectic;

Antibackache *1-4 g/day*; Antiberiberi; Anticardiospasmic; Anticolitic; Antidecubitic; Antideliriant; Antiencephalopathic; Antifatigue; Antigastritic; Antiheartburn; Antiherpetic; Antimigraine; Antimyocarditic; Antineuralgic; Antineurasthenic; Antineuritic; Antineuropathic *50 mg*; Antipoliomyelitic; Insectifuge *75-150 mg/man/day*; Pesticide

TIN ***Root***:
Antiacne; Antibacterial; Pesticide; Taenicide

TRIGONELLINE ***Root***:
Anticancer (Cervix); Anticancer (Liver); Antihyperglycemic; Antimigraine; Antiseptic; Antitumor (Cervix); Antitumor (Liver); Epidermal-Stimulant; Hypocholesterolemic; Hypoglycemic *50 mg/kg orl rat 500-3,000 mg/man/day*; Mutagenic; Osmoregulator; Pesticide; Propecic

TRIMETHYLAMINE ***Root***:
Antioxidant

WATER ***Leaf 974,000 ppm***;
No activity reported.

ZINC ***Root***:
ACE-Inhibitor; Antiacne *135 mg/day*; Antiacrodermatitic *8-34 mg/day/orl/chd*; Antialopecic; Antialzheimeran *50 mg/day*; Antianorexic; Antiarthritic? *50 mg/3x/day/orl/man*; Anticanker *100 mg/day*; Anticataract *30 mg/day*; Anticoeliac; Anticold *50 mg*; Anticolitic; Anticoronary *30 mg/day*; AntiCrohn's; Antidandruff; Antidiabetic; Antidote (Cadmium); Antieczemic *150 mg/day*; Antiencephalopathic; Antiepileptic *100 mg/day*; Antifuruncular *45 mg/3x/day/man*; Antiherpetic? *25 mg/day*; Antiimpotence; Antiinfective *50 mg/day*; Antiinfertility *60 mg/day*; Antiinsomniac; Antilepric; Antileukonychic; Antiobesity *30 mg/day*; Antiplaque; Antiprolactin; Antiprostatitic *50 mg/man/day/orl*; Antirheumatic; Antispare-Tire *30 mg/day*; Antistomatitic *50 mg/man/3x/day*; Antisyndrome-X *30 mg/day*; Antitinnitic *60-120 mg/day*; Antitriglyceride *30 mg/day*; Antiulcer *50 mg/3x/day/man 88 mg/rat/day/15 days*; Antiviral?; Astringent; Copper-Antagonist; Deodorant; Hypotensive *30 mg/day*; Immunostimulant; Immunosuppressant *300 mg/day/6 wks/orl/man*; Insulinogenic *30 mg/day*; Leptingenic *30-60 mg/man/day*; Mucogenic; Pesticide; Spermigenic *60 mg/day*; Testosteronigenic; Trichomonicide; Vulnerary

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ppm = parts per million
tr = trace

Phytochemical Database, USDA - ARS - NGRL, Beltsville Agricultural Research Center, Beltsville, Maryland
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Please send questions and comments to:

James A. Duke

Agricultural Research Service

Phytochemical and Ethnobotanical Databases

Amorphophallus konjac K. KOCH - Araceae

Activities

The number in () indicates how many separate chemicals this species has for that activity, for example, ***Analgesic (3)*** indicates this species has three separate chemicals that have Analgesic activity. Select the activity to see the chemicals.

ACE-Inhibitor (1)
AP-1-Inhibitor (1)
Acetylcholinergic (1)
Allergenic (2)
Amphiglycemic? (1)
Analgesic (2)
Androgenic? (1)
Angiotensin-Receptor-Blocker (2)
Anorectic? (1)
Anorexic (1)
AntiAGE (1)
AntiCrohn's (1)
AntiMeniere's (1)
AntiNF-kB (1)
AntiPMS (3)
Antiacne (4)
Antiacrodermatitic (1)
Antiacrodynic (1)
Antiaggregant (2)
Antiaging (2)
Antiakathisic (1)
Antialcoholic (2)
Antiallergic (2)
Antialopecic (1)
Antialzheimeran (3)
Antiamblyopic (1)
Antianemic (3)
Antianginal (2)
Antiangiogenic (1)
Antianorectic (2)
Antianorexic (1)
Antianxiety (2)

Antiarabiflavinotic (1)
Antiarrhythmic (2)
Antiarteriosclerotic (1)
Antiarthritic (1)
Antiarthritic? (1)
Antiasthmatic (2)
Antiatherosclerotic (3)
Antibackache (1)
Antibacterial (1)
Antiberiberi (1)
Anticancer (1)
Anticancer (Cervix) (1)
Anticancer (Liver) (1)
Anticanker (1)
Anticarcinomic (1)
Anticardiospasmic (1)
Anticarpal-Tunnel (1)
Anticataract (2)
Anticheilitic (2)
Antichilblain (1)
Antichoreic (1)
Anticirrhotic (2)
Anticoeliac (1)
Anticold (1)
Anticolitic (2)
Anticonvulsant (2)
Anticorneotic (1)
Anticoronary (4)
Anticystinuric (1)
Antidandruff (2)
Antidecubitic (2)
Antideliriant (1)
Antidementia (1)
Antidepressant (3)
Antidermatitic (1)
Antidiabetic (7)
Antidiscotic (1)
Antidote (Aluminum) (1)
Antidote (Cadmium) (1)
Antidote (Lead) (2)
Antidote (Mercury) (1)
Antidyskinetic (2)
Antidysmenorrheic (1)
Antidysphagic (1)
Antieczemic (1)
Antiedemic (1)
Antiencephalopathic (2)
Antiepileptic (4)
Antifatigue (2)
Antifuruncular (1)
Antigastritic (1)

Antiglaucomic (1)
Antiglossitic (1)
Antiglycosuric (1)
Antigranulocytopenic (1)
Antiheartburn (1)
Antihepatotoxic (1)
Antiherpetic (1)
Antiherpetic? (1)
Antihistaminic (1)
Antihomocysteine (1)
Antihyperactivity (1)
Antihyperglycemic (1)
Antihyperkeratotic (1)
Antihyperkinetic (2)
Antihypertensive (4)
Antihypoglycemic (1)
Antiichythyotic (1)
Antiimpotence (1)
Antiinfective (1)
Antiinfertility (1)
Antiinflammatory (1)
Antiinsomniac (3)
Antiinsomnic (1)
Antikeratitic (1)
Antikeshan (1)
Antiketotic (1)
Antilepric (1)
Antileukemic (1)
Antileukonychic (1)
Antileukoplakic (1)
Antileukotriene (1)
Antilithic (1)
Antilupus (1)
Antimanic (1)
Antimastalgic (1)
Antimastitic (1)
Antimelanomic (1)
Antimenorrhagic (1)
Antimetastatic (1)
Antimigraine (4)
Antimutagenic (1)
Antimyalgic (1)
Antimyocarditic (1)
Antineuralgic (2)
Antineurasthenic (1)
Antineuritic (1)
Antineuropathic (1)
Antineurotic (1)
Antiobesity (3)
Antiosteoarthritic (1)
Antiosteoporotic (3)

Antiototic (1)
Antioxidant (3)
Antiozenic (1)
Antiparkinsonian (1)
Antipellagric (2)
Antiperiodontitic (1)
Antiphotophobic (2)
Antipityriasic (1)
Antiplaque (1)
Antipoliomyelitic (1)
Antiporphyric (1)
Antiprolactin (1)
Antiproliferant (2)
Antiprostatitic (1)
Antipsoriac (1)
Antiradicular (2)
Antiretinopathic (1)
Antirheumatic (1)
Antiscotomic (1)
Antiseptic (1)
Antisilicotic (1)
Antispare-Tire (1)
Antispasmodic (2)
Antispasmophilic (1)
Antistomatitic (1)
Antistress (1)
Antistroke (1)
Antisyndrome-X (5)
Antitic (1)
Antitinnitic (1)
Antitriglyceride (2)
Antitumor (3)
Antitumor (Breast) (1)
Antitumor (Cervix) (1)
Antitumor (Liver) (1)
Antitumor (Lung) (1)
Antitumor (brain) (1)
Antiulcer (3)
Antiulcerogenic (1)
Antivaginitic (1)
Antivaricose (1)
Antivertigo (1)
Antiviral (1)
Antiviral? (1)
Antixerophthalmic (1)
Apoptotic (1)
Astringent (1)
Beta-Blocker (2)
CNS-Depressant (1)
CNS-Stimulant (1)
Calcium-Antagonist (1)

Calcium-Channel-Blocker (1)
Cancer-Preventive (5)
Candidicide (1)
Cardiodepressant (1)
Cardiomyopathogenic (1)
Cardioprotective (1)
Cardiotoxic (1)
Cerebrotonic (1)
Cholinergic (1)
Colorant (1)
Copper-Antagonist (1)
Deodorant (1)
Depressant (1)
Diuretic (5)
Emetic (1)
Encephalopathic (1)
Epidermal-Stimulant (1)
Erythrocytogenic (1)
Fungicide (1)
Hepatoprotective (2)
Hyperglycemic (1)
Hypertensive (1)
Hyperuricemic (1)
Hypocholesterolemic (6)
Hypoglycemic (4)
Hypolipidemic (1)
Hypotensive (6)
Hypouricemic (1)
Ileorelaxant (1)
Immunostimulant (4)
Immunosuppressant (1)
Insectifuge (2)
Insulinogenic (3)
Interferon-Synergist (1)
Laxative (1)
Leptingenic (1)
Lipotropic (1)
Lithogenic (1)
Memorigenic (1)
Memory-Enhancer (1)
Mucogenic (2)
Mutagenic (1)
Myocardiotonic (1)
Myorelaxant (1)
Ornithine-Decarboxylase-Inhibitor (1)
Osmoregulator (1)
Osteogenic (1)
Paralytic (1)
Parasympathomimetic (1)
Pesticide (7)
Phagocytotic (1)

Polyamine-Synthesis-Inhibitor (1)
Prooxidant (1)
Propecic (1)
Prostaglandin-Sparer (1)
Protein-Kinase-C-Inhibitor (1)
Sedative (1)
Serotoninergic (1)
Spermigenic (1)
Taenicide (1)
Testosteronigenic (1)
Thymoprotective (1)
Trichomonicide (1)
Ubiquiot (1)
Uterorelaxant (1)
VEGF-Inhibitor (1)
Vasodilator (6)
Vulnerary (1)

WARNING and DISCLAIMER

Please send farmacy comments to Jim Duke at:

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[Production Version]

Amorphophallus konjac K. KOCH - Araceae

Chemicals with Antidiabetic Activity:

CHOLINE
CHROMIUM
FIBER
GLUCOMANNAN
MAGNESIUM
MANGANESE
ZINC

Exit

Amorphophallus konjac K. KOCH - Araceae

Chemicals with Antihyperglycemic Activity:

TRIGONELLINE

Exit

Amorphophallus konjac K. KOCH - Araceae

Chemicals with Antihypoglycemic Activity:

MAGNESIUM

Exit

Amorphophallus konjac K. KOCH - Araceae

Chemicals with Antiobesity Activity:

CHROMIUM
FIBER
ZINC

Exit

Amorphophallus konjac K. KOCH - Araceae

Chemicals with Antioxidant Activity:

BETA-CAROTENE
SELENIUM
TRIMETHYLAMINE

Exit

Amorphophallus konjac K. KOCH - Araceae

Chemicals with Antisyndrome-X Activity:

CHROMIUM
MAGNESIUM
MANGANESE
SELENIUM
ZINC

Exit

Amorphophallus konjac K. KOCH - Araceae

Chemicals with Antitriglyceride Activity:

CHROMIUM
ZINC

Exit

Amorphophallus konjac K. KOCH - Araceae

Chemicals with Diuretic Activity:

ADENINE
CALCIUM
FIBER
MAGNESIUM
POTASSIUM

Exit

Amorphophallus konjac K. KOCH - Araceae

Chemicals with Hypocholesterolemic Activity:

CALCIUM
CHROMIUM
FIBER
GLUCOMANNAN
MAGNESIUM
TRIGONELLINE

Exit

Amorphophallus konjac K. KOCH - Araceae

Chemicals with Hypoglycemic Activity:

CHROMIUM
MANGANESE
NIACIN
TRIGONELLINE

Exit

Amorphophallus konjac K. KOCH - Araceae

Chemicals with Hypolipidemic Activity:

NIACIN

Exit

Amorphophallus konjac K. KOCH - Araceae

Chemicals with Hypotensive Activity:

CALCIUM
CHOLINE
CHROMIUM
FIBER
MAGNESIUM
ZINC

Exit

Amorphophallus konjac K. KOCH - Araceae

Chemicals with Immunostimulant Activity:

BETA-CAROTENE
PHOSPHORUS
SELENIUM
ZINC

Exit

Amorphophallus konjac K. KOCH - Araceae

Chemicals with Insulinogenic Activity:

CHROMIUM
MAGNESIUM
ZINC

Exit

Amorphophallus konjac K. KOCH - Araceae

Chemicals with Vasodilator Activity:

ADENINE
CALCIUM
FIBER
MAGNESIUM
NIACIN
POTASSIUM

Exit

Amorphophallus konjac K. KOCH - Araceae

Chemicals with Angiotensin-Receptor-Blocker Activity:

FIBER
POTASSIUM

Exit

Amorphophallus konjac K. KOCH - Araceae

Chemicals with Antiaging Activity:

BETA-CAROTENE
CHROMIUM

Exit

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Effects of konjac extract on insulin sensitivity in high fat diet rats

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KEY WORDS konjac extract; drugs; Chinese herbal drugs; insulin; lipids; rats

ABSTRACT

AIM: To evaluate the effects of konjac extract (KE) on insulin sensitivity in insulin resistance (IR) rats induced by high fat diet (HFD). **METHODS:** Wistar rats were fed on HFD for 4 weeks, then treated with KE 1.5, 3.0 $g \cdot kg^{-1} \cdot d^{-1}$ and metformin (Met) 0.1 $g \cdot kg^{-1} \cdot d^{-1}$ for 4 weeks, respectively. The effects of KE on intake of food and drink, body weight, and excretion were investigated. Serum insulin was measured by double-radioimmunoassay. Blood glucose, total cholesterol (TC), triglycerides (TG), and high-density lipoprotein-cholesterol (HDL-C) were measured by enzyme methods, respectively. Low-density lipoprotein-cholesterol (LDL-C) was calculated. Tissue glycogen was determined by modified anthracene ketone method and tissue TG by glycerin phosphor sour oxidation enzyme method. Insulin sensitivity was measured by modified glucose-insulin tolerance test (K value). **RESULTS:** HFD caused IR after 4 weeks (K value: 5.2±0.9 *vs* 8.3±0.7, $P<0.01$), the levels of blood insulin, TG, and LDL-C increased, while HDL-C, glycogen in liver and skeletal muscle decreased. The storage of TG in liver and skeletal muscle increased. After HFD rats were treated with KE 1.5 and 3.0 $g \cdot kg^{-1} \cdot d^{-1}$ for 4 weeks, respectively, the fasting blood glucose (FBG) was decreased from 6.4±0.4 to 6.05±0.26, 6.0±0.3 ($P<0.01$). Serum TC, TG, LDL-C were decreased, while HDL-C/TC was increased as compared with HFD rats. There was no significant effect on insulin level. KE 1.5, 3.0 $g \cdot kg^{-1} \cdot d^{-1}$, and Met 0.1 $g \cdot kg^{-1} \cdot d^{-1}$ could improve insulin sensitivity (K values were 6.1±0.5, 5.9±0.6, and 6.5±0.8 *vs* 5.2±0.9, $P<0.05$), elevate glycogen, and decrease TG in liver and skeletal muscle. **CONCLUSION:** KE could promote glycogen syntheses and adjust blood lipid metabolism so as to improve IR in HFD rats.

INTRODUCTION

Insulin resistance (IR) which widely exists in type II diabetic patients, is a risk factor which can cause complications. Now the ways to increase insulin sensitivity include: diet, exercise, and drugs such as metformin (Met), they can clearly improve IR, protect the function of β-cell and control blood glucose for a long term[1]. Konjac extract (KE) was refined from *Amorphophallus konjac* K Koch, a kind of Chinese herbs. KE is a kind of white crystal grain obtained

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g·kg^{-1}·d^{-1} groups were watery, and in KE 1.5 and 3.0 g·kg^{-1}·d^{-1} groups increased accordingly as compared with control group.

Effect on the blood lipid The levels of TC, TG, LDL-C of KE 1.5, 3.0 g·kg^{-1}·d^{-1} , and Met 0.1 g·kg^{-1}·d^{-1} groups were lower than those of HFD model group, while HDL-C was higher than that in HFD model group, but it was only raised slightly. The ratio of HDL-C/TC in KE 1.5, 3.0 g·kg^{-1}·d^{-1} was higher than that in HFD model group (Tab 1).

Effect on FBG and insulin FBG and insulin in HFD model group were markedly increased ($P<0.01$ *vs* control group), and FBG of KE 1.5 and 3.0 g·kg^{-1}·d^{-1} groups were lower than that of HFD model group ($P<0.05$) (Tab 2).

Effect on insulin sensitivity In glucose-insulin tolerance test, blood glucose had no difference at 3 min after injecting insulin, but at 6, 9, 12 min, blood glucose levels in KE 1.5, 3.0 g·kg^{-1}·d^{-1} , and Met 0.1 g·kg^{-1}·d^{-1} treated groups were lower than that in HFD model group. Insulin sensitivity indexes of each group were expressed as K value respectively: K value of HFD model group was decreased by 37.3 % as compared with control group ($P<0.01$). K value in KE 1.5, 3.0 g·kg^{-1}·d^{-1}, and Met 0.1 g·kg^{-1}·d^{-1} groups were increased by 17.3 %, 13.5 %, and 25 %, respectively ($P<0.05$, Tab 3).

Effect on tissue glycogen and TG After treated with KE 1.5, 3.0 g·kg^{-1}·d^{-1}, and Met 0.1 g·kg^{-1}·d^{-1} for 4 weeks, glycogens in liver and skeletal muscle were

Tab 2. Effect on FBG and insulin after treated with KE in HFD rats. n=10. Mean±SD. $^cP<0.01$ *vs* control. $^eP<0.05$ *vs* HFD model.

Group	FBG/mmol·L^{-1}	Insulin/mU·L^{-1}
Control	5.0±0.4	7.3±1.0
HFD model	6.4±0.4^c	20±4^c
KE 1.5 g·kg^{-1}·d^{-1}	6.05±0.26^{ce}	20±3^c
KE 3.0 g·kg^{-1}·d^{-1}	6.0±0.3^{ce}	20±3^c
Met 0.1 g·kg^{-1}·d^{-1}	6.0±0.4^{ce}	20.4±2.9^c

Tab 1. Effect on the blood lipid after treated with KE for 4 weeks in HFD rats. n=10. Mean±SD. $^bP<0.05$, $^cP<0.01$ *vs* control. $^eP<0.05$, $^fP<0.01$ *vs* HFD model.

Group	TC/mmol·L^{-1}	TG /mmol·L^{-1}	HDL-C/mmol·L^{-1}	LDL-C/mmol·L^{-1}	HDL-C/TC
Control	2.6±0.5	0.42±0.05	1.07±0.18	0.85±0.17	0.39±0.05
HFD model	3.6±0.3^c	0.88±0.17^c	0.8±0.3^c	1.20±0.09^c	0.23±0.06^c
KE 1.5 g·kg^{-1}·d^{-1}	3.30±0.19^{cf}	0.62±0.19^{cf}	1.0±0.2	0.93±0.25^f	0.29±0.06^{be}
KE 3.0 g·kg^{-1}·d^{-1}	3.27±0.25^{cf}	0.74±0.13^{ce}	1.0±0.3	1.05±0.19^{be}	0.30±0.07^{cf}
Met 0.1 g·kg^{-1}·d^{-1}	3.41±0.14^c	0.75±0.09^{cf}	0.93±0.14	0.99±0.28^c	0.28±0.06^{be}

Tab 3. Effect on insulin sensitivity. n=10. Mean±SD. $^cP<0.01$ *vs* control. $^eP<0.05$, $^fP<0.01$ *vs* HFD model.

Group	Blood glucose/mmol·L^{-1}							
	0 min	3 min	6 min	9 min	12 min	15 min	18 min	K value
Control	5.0±0.3	12.41±0.28	9.0±0.4	6.76±0.17	5.2±0.3	4.70±0.22	4.91±0.14	8.3±0.7
HFD model	6.4±0.4^c	13.3±0.4^c	11.7±0.3^c	9.74±0.26^c	8.68±0.20^c	6.65±0.28^c	6.3±0.17^c	5.2±0.9^c
KE 1.5 g·kg^{-1}·d^{-1}	6.05±0.22^{ce}	13.2±0.4^c	11.56±0.22^c	9.4±0.3^c	8.05±0.17^{cf}	6.93±0.26^c	6.11±0.16^c	6.1±0.5^{ce}
KE 3.0 g·kg^{-1}·d^{-1}	5.98±0.19^{ce}	12.83±0.16^c	11.3±0.4^{ce}	9.08±0.25^{cf}	7.9±0.4^{cf}	6.45±0.14^c	5.89±0.23^e	5.9±0.6^{ce}
Met 0.1 g·kg^{-1}·d^{-1}	6.04±0.25^{ce}	12.39±0.09^f	10.02±0.22^{cf}	8.52±0.11^{cf}	7.0±0.3^{cf}	6.3±0.4^c	6.0±0.4^c	6.5±0.8^{ce}

increased, while TG contents in KE 1.5, 3.0 g·kg^{-1}·d^{-1} groups decreased as compared with HFD model group (P<0.05, Tab 4).

Tab 4. Effect on tissue glycogen and TG after treated with KE for 4 weeks. n=10. Mean±SD. ^cP<0.01 *vs* control. ^eP<0.05, ^fP<0.01 *vs* HFD model.

Group	Liver glycogen /mg·g^{-1}wet tissue	Skeletal muscle glycogen /mg·g^{-1} wet tissue	Liver TG /μmol·g^{-1}wet tissue	Skeletal muscle TG /μmol·g^{-1}wet tissue
Control	18±3	5.9±0.9	2.4±0.6	2.69±0.20
HFD model	10±4^c	2.2±0.6^c	5.0±1.0^c	3.8±0.4^c
KE 1.5 g·kg^{-1}·d^{-1}	14±4^{cf}	4.1±0.8^{cf}	4.2±0.5^{ce}	3.4±0.5^{ce}
KE 3.0 g·kg^{-1}·d^{-1}	14±4^{cf}	3.9±0.5^{cf}	4.1±0.8^{ce}	3.5±0.8^c
Met 0.1 g·kg^{-1}·d^{-1}	14±4^{cf}	4.3±1.0^{cf}	4.3±0.8^{ce}	3.5±0.6^c

DISCUSSION

IR is insulin sensitivity decrement. It exists in three main parts: liver, skeleton, and fat tissue. IR in liver exhibits increment of liver glycogen outputting; IR in skeleton and fat tissue indicated that the using rate of glucose decomposition decreased. IR could cause the abnormity of serum glucose and lipid metabolism on type II diabetes. Therefore, IR played a key role in the occurrence and development of type II diabetes[11]. The biological effects of insulin is affected by the backgrounds of inheritance and environmental factors, foodstuff is an important factor affecting insulin sensitivity. It was reported[12] that the fat including saturated fatty acid and poly-non-saturated Ω-6 fatty acid could cause IR. HFD was used to establish IR model in this experiment. TG in liver and skeletal muscle was higher, glycogen in liver and skeletal muscle was lower than that of pre-treatment. It was known that glycogen synthesis was an important way to use glucose by non-oxidation approach. It was suggested that the reduction of glycogen synthesis might be related to assimilating obstruction of glucose induced by IR in HFD animals.

Research indicated that Met could improve insulin sensitivity of diabetic patients. After Met treated IR rats for 4 weeks in this study, results demonstrated that it could increase K value, improve insulin sensitivity, and enhance glycogen synthesis. In addition, Met could lower TC, TG, and LDL-C in HFD rats. These effects were beneficial to improve IR.

It is well known that improving IR would be important in curing type II diabetes and hypertension. IR causes a series of the unconventionality of glucose, lipid, and insulin metabolism. We found that KE was able to decrease glucose in normal animals, as well as in diabetic animals induced by alloxan[13,14]. The present studies discovered firstly that KE might not only improve IR and increase K value, but also lower FBG and glycogen in liver and skeletal muscle, but it had no effect on the release of insulin. The experimental results revealed that KE might improve insulin sensitivity by increasing glucose usage of non-oxidation approach, not depend on the release of insulin. In addition, KE not only decrease serum TC, TG, and LDL-C level, but also increase the glycogen and decrease TG in liver and skeletal muscle in HFD rats. Although KE had no significant effect on HDL-C, KE could increase the ratio of HDL-C/TC. From these results, KE could inhibit the occurrence and development of IR to a certain extent, increase insulin sensitivity, and improve blood glucose and lipid levels in IR rats. Its mechanism of improving IR included increment of glycogen synthesis and the improvement of lipid metabolism.

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[Glucomannan: properties and therapeutic applications]

[Article in Spanish]

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Glucomannan is a dietary fiber employed quite frequently in the western countries since two decades now, as its ingestion plays an important role in human health. However, eastern people have used this fiber for more than a thousand years. This dietary fiber is the main polysaccharide obtain from the tubers of the Amorphophallus konjac plant, a member of the family Araceae found in east Asia. The chemical structure of glucomannan consists, mainly, in mannose and glucose in the ratio 8:5 linked by beta (1-->4) glycosidic bonds. This soluble fiber has a extraordinarily high waterholding capacity, forming highly viscous solutions when dissolved in water. It has the highest molecular weight and viscosity of any known dietary fiber. It has been demonstrated that this product is highly effective in the treatment of obesity due to the satiety sensation that it produces; as a remedy for constipation, because it increases the faeces volume; as hypocholesterolemic agent, interfering in the transport of cholesterol and of bile acids and as hypoglycemic and hypoinsulinemic agent, probably, by delaying gastric emptying and slowering glucose delivery to the intestinal mucosa. To the beneficial properties of this fiber, several disadvantages can be added as the production of flatulence, abdominal pain, esophageal obstruction, lower gastrointestinal obstruction or even the possible modification of the bioavailability of other drugs. This paper reviews the main characteristics of glucomannan, as well as its properties, physiologic effects and therapeutic uses.

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Konjac supplement alleviated hypercholesterolemia and hyperglycemia in type 2 diabetic subjects--a randomized double-blind trial.

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OBJECTIVES: The present study was designed to evaluate effects of konjac glucomannan (KGM) supplement (3.6 g/day) for 28 days on blood lipid and glucose levels in hyperlipidemic type 2 diabetic patients and the possible mechanism for the reductions in blood lipid levels. METHODS: Twenty-two diabetic subjects (age 64.2 + 8.4 years, BMI 25.5 + 3.2 kg/m(2)) with elevated blood cholesterol levels (fasting glucose between 6.7-14.4 mmol/L), but currently not taking lipid-lowering medication, were recruited to participate in a two 28-day period, randomized, double-blind, crossover clinical trial. Fasting blood samples drawn on the initial and final days of each period were determined for plasma lipids and glucose levels. Feces collected at the end of each experimental period were analyzed for neutral sterol and bile acid contents. RESULTS: Compared with placebo, KGM effectively reduced plasma cholesterol (11.1%, p = 0.0001, adjusted alpha = 0.006), LDL-cholesterol (20.7%, p = 0.0004, adjusted alpha = 0.006), total/HDL cholesterol ratio (15.6%, p = 0.0005, adjusted alpha = 0.007), ApoB (12.9%, p = 0.0001, adjusted alpha = 0.006) and fasting glucose (23.2%, p = 0.002, adjusted alpha = 0.008). Plasma triglyceride, HDL-cholesterol, LDL/HDL cholesterol, postprandial glucose and body weight were not significant after adjustment by the Bonferroni-Hochberg procedure. Fecal neutral sterol and bile acid concentrations were increased by 18.0% (p = 0.004) and 75.4% (p < 0.001), respectively, with KGM supplement. CONCLUSIONS: The KGM supplement improved blood lipid levels by enhancing fecal excretion of neutral sterol and bile acid and alleviated the elevated glucose levels in diabetic subjects. KGM could be an adjunct for the treatment of hyperlipidemic diabetic subjects.

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