



DOSSIER · SUBSTANCE

Berberine

Berberine is a plant alkaloid; human studies show improvements in blood lipids, blood sugar, weight and other metabolic markers.

1,067

STUDIES IN
TOTAL

149

IN HUMANS

53

OF WHICH
CONTROLLED

147

IN ANIMALS

235

IN THE LAB

Figures from the IHR study database · Last updated 2026-10-15

How to Read This Dossier

ESTABLISHED

measured in humans, with a comparison group

PLAUSIBLE

supported by mechanism, animal studies or observation

HYPOTHESIS

a likely connection that still needs to be tested

Berberine at a Glance

In people with elevated blood lipids, LDL cholesterol, total cholesterol and triglycerides decreased in several meta-analyses ¹¹⁸²⁰²⁷³⁵³⁷. Fasting glucose decreased in several meta-analyses ¹⁴¹⁸²¹²⁷, as did body weight, BMI and waist circumference ¹⁸²¹²⁴²⁷. For blood pressure, several meta-analyses found no difference ¹⁹²¹²⁷. In polycystic ovary syndrome, androgens and SHBG improved more with berberine than with metformin or myo-inositol in a randomized comparative study ⁶⁵.

We evaluated 160 human studies on Berberine, including 45 randomised controlled trials and 33 meta-analyses or systematic reviews; the controlled studies include 4,809 participants in total. As of 9 October 2026.

1. What Is Berberine? Occurrence, Origin and Forms

Berberine is a plant alkaloid from the barberry family (Berberidaceae). It occurs mainly in the bark, roots and rhizomes of several Berberis and Coptis species and is used in traditional Chinese and Ayurvedic medicine. In studies it is usually tested as a salt or as a plant extract.

Berberine occurs in barberries (Berberis), in Coptis species and in goldenseal (Hydrastis canadensis), as well as in Phellodendron. The highest levels are found in root, rhizome and bark, not in the fruit.

Berberine is obtained by extraction from root, rhizome or bark; in studies and in commerce it is usually supplied as a salt, for example as hydrochloride or sulfate. What is tested includes the pure substance, plant extracts and combinations with substances intended to change its absorption.

Forms and Preparations Studied

- Berberine hydrochloride
 - Berberine sulfate
 - Berberine citrate
 - Dihydroberberine (derivative)
 - Plant extracts from barberry bark, Coptis or goldenseal
 - Combination products with absorption enhancers
- Not covered on this page:
- Other alkaloids from the same plants, such as berbamine or palmatine
 - Blood-sugar-lowering drugs such as metformin
 - Barberry fruit and foods made from it, such as juice or jam

2. What Does Berberine Do? Results by Area

AREA	RESULT IN CONTROLLED STUDIES	STRENGTH OF EVIDENCE	STUDIES	PARTICIPANTS
Blood Sugar and Insulin	mixed	high	11 meta-analyses · 7 controlled · 34 other	280
Blood Lipids	mixed	high	11 meta-analyses · 7 controlled · 23 other	568
Body Weight	mixed	high	6 meta-analyses · 6 controlled · 8 other	529
Polycystic Ovary Syndrome	mostly improved	moderate	2 meta-analyses · 1 controlled · 6 other	0
Blood Pressure	mostly no difference	unclear	4 meta-analyses · 3 controlled · 3 other	132
Gut Microbiome	reviews only	unclear	2 meta-analyses · 0 controlled · 7 other	0
Tolerability and Interactions	mostly no difference	unclear	0 meta-analyses · 1 controlled · 29 other	19
Other investigations	mixed	high	5 meta-analyses · 11 controlled · 48 other	1,041

How to read the table: counted are human studies whose results concern the area. “High” means at least one meta-analysis and two controlled studies showing improvement, or at least three controlled studies of which three quarters show improvement, with at least 300 participants in total. “Moderate” means at least two controlled studies showing improvement, as a majority, or one meta-analysis alongside controlled studies. “Low” means one controlled study showing improvement. Where an area has no controlled study, the strength of evidence is at most “low” (result “reviews only” or “observational data

only”). Everything else is “unclear”. A study counts as showing improvement when at least half of its outcomes in this area improved. Reviews of combination products do not count as meta-analyses; results that only describe side effects or shares of users do not count as an effect. The same study is counted only once.

3. What the Studies Show in Detail

Berberine, Blood Sugar and Insulin: Human Studies

In diabetes and related metabolic disorders, fasting glucose decreased more strongly in meta-analyses on berberine and barberry preparations than under the control ¹⁴¹⁸²⁷³⁷. HbA1c also improved in meta-analyses and in a placebo-controlled study in prediabetes ¹⁴¹⁸⁶¹. The HOMA index also improved in several studies ¹⁴¹⁸³⁷⁶¹. Postprandial glucose improved in several studies ²⁷³⁶⁶¹, and insulin levels improved in several studies ¹⁷¹⁸⁶¹. Some of the findings come from combination products of berberine with milk thistle (silymarin), probiotics or other nutraceuticals; these results belong to the mixture ⁵¹⁵¹⁶. Individual investigations found no confirmed difference in fasting glucose ¹⁷⁵⁹⁶⁴, in HbA1c ¹⁷²¹ or in the HOMA index ¹⁷. Compared with metformin, HbA1c under barberry root extract did not differ ⁵⁴. The strength of evidence is high, but the forms, doses and populations tested are inconsistent, and most studies lasted only a few months.

STUDY	DESIGN · PARTICIPANTS	PREPARATION · DOSE · DURATION · COMPARISON
³ Wang et al. 2024	meta-analysis · 4,150 participants	Berberine alone or with hypoglycemic drugs; mostly 0.9-1.5 g/d; treatment cycles typically 1-3 months; vs. control (placebo/sta
⁶ Pirro et al. 2016	meta-analysis · 1,670 participants	Nutraceutical combination (NComb) with berberine, red yeast rice, policosanol, astaxanthin, coenzyme Q10, folic acid; vs. Coni
⁹ Miao et al. 2025	meta-analysis · 1,337 participants	Berberine (form not specified); vs. Placebo and other phytochemicals
¹⁰ Zhao et al. 2021	meta-analysis · 1,079 participants	Berberine compared with metformin, thiazolidinediones, inositols; vs. Metformin, thiazolidinediones, inositols
¹⁴ Hussain et al. 2024	meta-analysis · 547 participants	Berberis vulgaris and/or Berberis integerrima; vs. Placebo or metformin
¹⁵ Fogacci et al. 2019	meta-analysis · 497 participants	Berberine and silymarin combination; vs. Placebo
¹⁶ Tóth et al. 2020	meta-analysis · 491 participants	Fixed combination Berberis aristata and Silybum marianum (Berberol); 3 months; vs. Placebo
¹⁷ Safari et al. 2020	meta-analysis · 452 participants	Barberry (Berberis vulgaris) supplementation; vs. Control group (placebo or usual care)

Further studies in this area: ^{18 21 22 27 28 29 30 35 36 37 54 56 57 59 61 63 64 65 77 79 85 86 94 95 96 98 103 107 112 113 114 115 117 123 125 126 128 129 131 133 134 135 136 137}

Berberine and Blood Lipids: Human Studies

LDL cholesterol, total cholesterol and triglycerides fell more with berberine and barberry preparations than in the control groups in several meta-analyses ¹¹⁸²⁰²⁷³⁷. In a large placebo-controlled study, LDL cholesterol and apolipoprotein B fell more than with placebo ⁴⁰. HDL cholesterol improved in some meta-analyses ³⁵³⁷, but remained unchanged in others ¹⁸²⁰²¹²⁷⁵⁹; in one study in rheumatoid arthritis, it fell with barberry extract compared with placebo ⁵⁶. The forms tested were predominantly berberine salts and plant extracts from barberry bark, coptis or goldenseal, partly as a pure substance, partly in combination preparations with absorption aids; absorption differs between these forms. Individual randomized studies found no difference in blood lipids in NAFLD and with antipsychotics ⁵⁹⁶⁴. Combination preparations of berberine with milk thistle (silymarin) or with red yeast rice, policosanol and other additives also lowered blood lipids; however, this does not prove an effect of berberine alone ⁴⁶¹⁵¹⁶. The strength of evidence is high, but many studies do not state the exact form and dose, and the follow-up periods are mostly short.

STUDY	DESIGN · PARTICIPANTS	PREPARATION · DOSE · DURATION · COMPARISON
¹ Osadnik et al. 2022	meta-analysis · 13,062 participants	Berberine among other nutraceuticals; vs. Placebo/no intervention and other nutraceuticals
³ Wang et al. 2024	meta-analysis · 4,150 participants	Berberine alone or with hypoglycemic drugs; mostly 0.9-1.5 g/d; treatment cycles typically 1-3 months; vs. control (placebo/s
⁴ Millán et al. 2016	meta-analysis · 3,924 participants	Nutraceutical with berberine, policosanol and red yeast rice (Armolipid Plus); vs. Control
⁶ Pirro et al. 2016	meta-analysis · 1,670 participants	Nutraceutical combination (NComb) with berberine, red yeast rice, policosanol, astaxanthin, coenzyme Q10, folic acid; vs. Co
⁹ Miao et al. 2025	meta-analysis · 1,337 participants	Berberine (form not specified); vs. Placebo and other phytochemicals
¹⁰ Zhao et al. 2021	meta-analysis · 1,079 participants	Berberine compared with metformin, thiazolidinediones, inositols; vs. Metformin, thiazolidinediones, inositols
¹⁵ Fogacci et al. 2019	meta-analysis · 497 participants	Berberine and silymarin combination; vs. Placebo
¹⁶ Tóth et al. 2020	meta-analysis · 491 participants	Fixed combination Berberis aristata and Silybum marianum (Berberol); 3 months; vs. Placebo

Further studies in this area: [18](#) [20](#) [21](#) [22](#) [27](#) [29](#) [30](#) [34](#) [35](#) [37](#) [38](#) [40](#) [46](#) [56](#) [59](#) [62](#) [64](#) [65](#) [70](#) [73](#) [74](#) [86](#) [92](#) [95](#) [96](#) [103](#) [107](#) [114](#) [125](#) [131](#) [132](#) [136](#) [137](#)

Berberine and Body Weight: Human Studies

Meta-analyses of randomized trials found a decrease in body weight, BMI and waist circumference with berberine compared with the control ²¹²⁴; another confirmed this for BMI and waist circumference ²⁷. In women with polycystic ovary syndrome, weight, BMI and waist circumference improved with berberine hydrochloride, metformin and myo-inositol; berberine showed the greater changes in comparison ⁶⁵. The mixture of Berberis aristata and silymarin lowered BMI, waist circumference and abdominal fat in a placebo-controlled study ⁶⁶. No difference in weight or BMI was found in a meta-analysis of barberry preparations in diabetes and in a study in fatty liver ¹⁴⁵⁹. In schizophrenia under antipsychotics, weight and waist circumference increased more with barberry root extract than with placebo ⁶⁴. The forms examined range from berberine hydrochloride through plant extracts from barberry bark and root to combination preparations with milk thistle, soy isoflavones or mulberry leaf extract; results on mixtures cannot be transferred to berberine alone. The findings apply to the respective form and preparation examined, and many meta-analyses gave no information on the form, purity or dose of berberine.

STUDY	DESIGN · PARTICIPANTS	PREPARATION · DOSE · DURATION · COMPARISON	RESULT
¹¹ Amini et al. 2020	meta-analysis · 849 participants	Berberine and barberry; vs. Control group	Body mass ir
¹⁴ Hussain et al. 2024	meta-analysis · 547 participants	Berberis vulgaris and/or Berberis integerrima; vs. Placebo or metformin	Weight: no di
¹⁶ Tóth et al. 2020	meta-analysis · 491 participants	Fixed combination Berberis aristata and Silybum marianum (Berberol); 3 months; vs. Placebo	Body mass ir
¹⁸ Musazadeh et al. 2025	meta-analysis · 451 participants	Berberis supplement (Berberis vulgaris and integerrima); vs. Control (placebo/standard care, not specified)	Body weight:
²¹ Xie et al. 2026	meta-analysis · 233 participants	Adjunctive berberine (form not stated); vs. Control group (RCT comparator arms)	Body weight:
²⁴ Elahi et al. 2026	meta-analysis	Berberine (form, purity and dose not reported); vs. Control groups	Body weight:
²⁷ Liu et al. 2025	meta-analysis	Berberine (form not specified); Short-term (≤90 days) vs. long-term; vs. Placebo	Waist circum
²⁹ Shi et al. 2025	systematic review	Berberine (form not specified); vs. systematic reviews of berberine vs. controls	improved ob

Further studies in this area: [40](#) [54](#) [56](#) [59](#) [64](#) [65](#) [79](#) [86](#) [109](#) [110](#) [119](#) [125](#)

Berberine and Polycystic Ovary Syndrome: Human Studies

In polycystic ovary syndrome, a randomized study compared berberine hydrochloride with metformin and myo-inositol: testosterone, free androgen index and SHBG improved in all groups, most markedly with berberine ⁶⁵. An overview of systematic reviews found improvements in most endpoints with berberine in PCOS, but rated the quality of the reviews as predominantly low ²⁹. The strength of evidence is moderate: there are two meta-analyses and one controlled study, but the form examined is inconsistent and partly not specified in detail. It remains open how the different berberine forms and their differing bioavailability affect the results.

STUDY	DESIGN · PARTICIPANTS	PREPARATION · DOSE · DURATION · COMPARISON
¹⁰ Zhao et al. 2021	meta-analysis · 1,079 participants	Berberine compared with metformin, thiazolidinediones, inositols; vs. Metformin, thiazolidinediones, inositols
²⁹ Shi et al. 2025	systematic review	Berberine (form not specified); vs. systematic reviews of berberine vs. controls
⁶⁵ Mishra et al. 2022	randomised controlled	Berberine hydrochloride 500 mg twice daily; 500 mg twice daily; three months; vs. Metformin 500 mg twice daily and myoin
⁷⁹ Gao et al. 2026	case-control study	oral berberine added to luteal-phase progesterone; 3 months; vs. progesterone alone
⁹² Rondanelli et al. 2020	review · 1,078 participants	Berberine, exact form not stated; not stated; not stated; vs. metformin and controls in included studies
⁹³ Bashir et al. 2026	review	Berberine as a botanical agent; vs. conventional therapy (metformin, contraceptives, ovulation inducers)
⁹⁵ Mohapatra et al. 2026	review	Berberine and improved berberine formulations
⁹⁷ Szukiewicz et al. 2026	review	Berberine, a natural plant alkaloid; vs. Metformin (mentioned, not directly compared)

Further studies in this area: [128](#)

Berberine and Blood Pressure: Human Studies

Several meta-analyses found no difference from the control in either systolic or diastolic blood pressure ¹⁸¹⁹²¹²⁷. In a placebo-controlled study in fatty liver, the systolic pressure of pulse wave analysis fell with berberine compared with the baseline value; for vascular stiffness, no difference from placebo was found ⁵⁵. A placebo-controlled study with barberry root extract in schizophrenia under antipsychotics also found no difference in blood pressure ⁶⁴. The forms examined range from pure berberine substance through plant extracts from barberry bark or root to combination preparations with absorption aids. A mixed preparation of barberry extract with berberine, red yeast rice, milk thistle and guggul improved the vascular response (endothelial reactivity); this finding belongs to the mixture ⁵³. The strength of evidence for an effect on blood pressure is unclear, and forms, preparations and comparison groups differ greatly.

STUDY	DESIGN · PARTICIPANTS	PREPARATION · DOSE · DURATION · COMPARISON
¹² Suadoni et al. 2021	systematic review · 614 participants	Berberine alone or in combination products (with amlodipine, metformin, nutraceutical, Chunghyul-dan); vs. Amlodipi
¹⁸ Musazadeh et al. 2025	meta-analysis · 451 participants	Berberis supplement (Berberis vulgaris and integerrima); vs. Control (placebo/standard care, not specified)
¹⁹ Atefi et al. 2021	meta-analysis · 350 participants	Barberry (Berberis vulgaris) supplementation; 4 to 12 weeks; vs. Control group (175 cases per group)
²¹ Xie et al. 2026	meta-analysis · 233 participants	Adjunctive berberine (form not stated); vs. Control group (RCT comparator arms)
²⁷ Liu et al. 2025	meta-analysis	Berberine (form not specified); Short-term (≤90 days) vs. long-term; vs. Placebo
³² Nyulas et al. 2024	systematic review	Berberine and other phytotherapy products; vs. Antihypertensive drugs or control

STUDY	DESIGN · PARTICIPANTS	PREPARATION · DOSE · DURATION · COMPARISON
⁵⁵ Koperska et al. 2025	randomised controlled · 70 participants	oral berberine; 1500 mg/day; 12 weeks; vs. placebo, double-blind, randomized
⁵⁶ Aryaeian et al. 2020	randomised controlled · 62 participants	Hydroalcoholic extract of Berberis Integerrima, 500 mg capsules; 6 capsules of 500 mg daily; 3 months; vs. Placebo,

Further studies in this area: ⁶⁴ ¹³⁶

Berberine and Gut Microbiome: Human Studies

In a network meta-analysis of randomized trials on small intestinal bacterial overgrowth (SIBO), berberine alone achieved the highest rank for eradication of the overgrowth in uncomplicated SIBO ⁸. A systematic review of randomized trials describes an altered, not consistently favorable composition of the gut flora with berberine in diabetes, elevated blood lipids, intestinal polyps, mental illnesses and Parkinson's disease ²². Neither paper names the form examined; the underlying human studies are captured here only through these reviews, so the strength of evidence is unclear. Several further review articles describe a favorable influence on the gut microbiota by berberine, partly only as pure substance without a more detailed specification of form ¹⁰⁷¹³¹, partly in mixtures with rifaximin, low-FODMAP diet, oregano oil, peppermint oil, garlic derivatives, vitamins and magnesium ¹⁰⁵ or with herbal formulas, acupuncture, inulin, quinoa and linseed oil ¹¹³; these results of the mixtures are not evidence for berberine alone. What remains open are the exact form and dose examined, the transferability to individual patient groups and the value of berberine compared with established treatments.

STUDY	DESIGN · PARTICIPANTS	PREPARATION · DOSE · DURATION · COMPARISON
⁸ Zhang et al. 2025	meta-analysis · 1,552 participants	Berberine monotherapy (form not specified); vs. Antibiotics, probiotics, prokinetics, rifaximin combinations
²² Candrea et al. 2026	systematic review	Berberine supplementation; vs. Control groups of included RCTs
¹⁰⁵ Furqan et al. 2026	review	Nutraceutical mixture with berberine, oregano oil, peppermint oil, garlic derivatives, vitamins, magnesium; vs. Antibiotics (rifa
¹⁰⁷ Asghari et al. 2025	review	Berberine (BBR), form not specified; vs. Controls in randomized trials
¹¹³ Yin et al. 2025	review	Berberine as active compound alongside herbal formulas
¹²² Yao et al. 2024	review	Nutraceuticals incl. berberine
¹²⁷ Yang et al. 2023	review	Berberine and other Chinese herbal compounds/formulae
¹²⁹ Amssayef et al. 2023	review	Berberine and other natural alkaloids

Further studies in this area: ¹³¹

Berberine, Tolerability and Interactions: Human Studies

Randomized controlled trials on oral berberine ⁴⁰⁵⁵ and on an extract from barberry root (Berberis integerrima) compared with metformin ⁵⁴ found no accumulation of side effects. Serious adverse events as well as kidney or liver toxicity also did not occur with oral berberine ⁶¹. A randomized controlled trial on the micellar formulation berberine LipoMicel showed no differences in liver and kidney values and in tolerability ⁶². For combination preparations of berberine with red yeast rice, policosanol, coenzyme Q10 and further components, randomized controlled trials found no differences in adverse events ⁴¹⁴⁹, serious side effects ⁴⁷ or discontinuations due to muscle pain ⁴⁸. An overview of the Armolipid Plus mixture describes the tolerability as excellent ³⁸. The strength of evidence is overall unclear: the controlled trials are mostly small and short, and several concern combination preparations. Possible interactions with blood pressure-lowering agents are addressed in an overview of several medicinal plants, including berberine ³². Thus, robust statements on rare or longer-term side effects, on interactions and on the comparison between the different forms such as berberine hydrochloride, berberine sulfate, berberine citrate, dihydroberberine or plant extracts remain open.

STUDY	DESIGN · PARTICIPANTS	PREPARATION · DOSE · DURATION · COMPARISON
¹⁰ Zhao et al. 2021	meta-analysis · 1,079 participants	Berberine compared with metformin, thiazolidinediones, inositols; vs. Metformin, thiazolidinediones, inositols
¹⁶ Tóth et al. 2020	meta-analysis · 491 participants	Fixed combination Berberis aristata and Silybum marianum (Berberol); 3 months; vs. Placebo
²⁷ Liu et al. 2025	meta-analysis	Berberine (form not specified); Short-term (≤90 days) vs. long-term; vs. Placebo
³² Nyulas et al. 2024	systematic review	Berberine and other phytotherapy products; vs. Antihypertensive drugs or control
³⁸ Barrios et al. 2017	systematic review	Armolipid Plus: red yeast rice, policosanol, berberine plus folic acid, astaxanthin, coenzyme Q10; 6-48 weeks; vs. Plac
⁴⁰ Lei et al. 2026	randomised controlled · 337 participants	oral berberine vs placebo; 1 g/d; 6 months; vs. placebo, double-blind
⁵⁴ Sanjari et al. 2020	randomised controlled · 80 participants	Methanol extract of Berberis integerrima root; 480 mg daily orally; 3 months; vs. Metformin 1000 mg daily; manufactur
⁵⁵ Koperska et al. 2025	randomised controlled · 70 participants	oral berberine; 1500 mg/day; 12 weeks; vs. placebo, double-blind, randomized

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Berberine: Further Outcomes in Studies

In a large placebo-controlled study in fatty liver and obesity, berberine lowered high-sensitivity C-reactive protein, but not liver fat content ⁴⁰. A randomized study in fatty liver also found no difference in liver enzymes ⁵⁹. In a randomized study in gum inflammation, plaque and gum bleeding improved under a mouth rinse with berberine hydrochloride, as well as under chlorhexidine and saline solution ⁵⁰. In bacterial vaginosis, a vaginal gel made from barberry extract in a metronidazole base led in a randomized study to a better response than metronidazole gel alone ⁴³. A combination product of berberine, curcumin, inositol, banaba and chromium picolinate also reduced inflammation markers in a placebo-controlled study in impaired blood sugar ⁴². Results of the mixtures cannot be transferred to berberine alone. The strength of evidence is high, but many studies do not name the exact form and dose, and the comparison conditions differ greatly.

STUDY	DESIGN · PARTICIPANTS	PREPARATION · DOSE · DURATION · COMPARISON	RESULT
² Li et al. 2025	meta-analysis · 6,599 participants	Berberine as plant extract (form not specified); vs. Placebo and other plant extracts	Modified Ra
⁷ Vahedi-Mazdabadi et al. 2023	meta-analysis · 1,600 participants	Berberine or barberry extract; effective below 1000 mg/day; effective under 5 weeks; vs. control group	Interleukin-4
¹³ Mohtashaminia et al. 2024	meta-analysis · 549 participants	Berberis aristata plus Silybum marianum; vs. Control (placebo or other)	Alanine ami
²² Candrea et al. 2026	systematic review	Berberine supplementation; vs. Control groups of included RCTs	Inflammator
²³ Paparozzi et al. 2026	review	Berberine (form not specified); vs. Control in RCTs (not further described)	PON1 activit
²⁵ Shakeri et al. 2026	review	Berberis vulgaris and its bioactive constituents, including berberine	inflammator
²⁶ Ma et al. 2026	review	Berberine (form not specified)	Anticancer i
²⁹ Shi et al. 2025	systematic review	Berberine (form not specified); vs. systematic reviews of berberine vs. controls	improved ca

Further studies in this area: [31](#) [33](#) [34](#) [40](#) [43](#) [44](#) [46](#) [50](#) [55](#) [57](#) [58](#) [59](#) [60](#) [62](#) [63](#) [67](#) [68](#) [69](#) [71](#) [72](#) [75](#) [77](#) [78](#) [79](#) [81](#) [82](#) [84](#) [87](#) [88](#) [89](#) [90](#) [91](#) [94](#) [95](#) [96](#) [98](#) [99](#) [100](#) [101](#) [102](#) [103](#) [106](#) [107](#) [108](#) [111](#) [116](#) [118](#) [120](#) [121](#) [122](#) [124](#) [125](#) [126](#) [127](#) [131](#) [133](#)

4. How Is Berberine Dosed? Preparation, Dose and Duration in Studies

Mainly berberine salts such as berberine hydrochloride, berberine sulfate and berberine citrate were tested, as well as plant extracts from barberry bark, coptis or goldenseal, sometimes as a pure substance, sometimes in combination preparations with absorption enhancers. Individual studies used dihydroberberine or a micellar formulation. Absorption differs between these forms, and many studies do not state the exact form and dose.

PREPARATION OR FORM	DOSE	DURATION	STUDY
Patented combination of red yeast rice, policosanol and berberine	1 tablet per day	16 weeks	39
oral berberine vs placebo	1 g/d	6 months	40
Food supplement Body Lipid (BL) containing berberine, red yeast rice, coenzyme Q10, hydroxytyrosol	daily oral dose (not specified)	4 weeks	41
Nutraceutical Reglicem® with berberine, curcumin, inositol, banaba, chromium picolinate	1 tablet once daily at breakfast	3 months	42
Berberis vulgaris 5% vaginal gel in metronidazole base	5% gel, five nights	5 nights, assessment after 7 days, 3-week follow-up	43
Berberine or placebo	—	3 months	44
Armolidip Plus (combination product containing berberine)	—	12 weeks	45
Berberine 500 mg orally twice daily or placebo	500 mg twice daily	12 weeks	46
Armolidip Plus (red yeast rice, policosanol, berberine) plus low-dose statin, with or without ezetimibe	—	3 to 6 months	47
Low-dose statin plus Armolidip Plus (including berberine)	—	3 months	48
Armolidip Plus (nutraceutical mixture containing berberine)	—	3 months, then 12 months combination	49
Berberine HCl mouthwash	10 mL twice daily	15 days use, follow-up to day 21	50

PREPARATION OR FORM	DOSE	DURATION	STUDY
Fixed-dose combination: berberine, mulberry leaf extract, chromium picolinate	Berberine 1000 mg, mulberry leaf extract 400 mg, chromium picolinate 0.644 mg daily	12 weeks	51
dried purple- black barberry (Berberis integerrima)	10 g/day dried barberry	8 weeks	52
Zeta Colest: 400 mg Berberis aristata dry extract with 340 mg berberine plus red yeast rice, milk thistle, guggul	1 pill/evening, 340 mg berberine daily	8 weeks (after 8-week stabilization diet)	53

5. Is Berberine Safe? Side Effects in Studies

In a large placebo-controlled study, adverse events occurred with berberine about as often as with placebo [40](#), and another study described berberine as well tolerated [55](#). A barberry root extract led to no study discontinuation due to side effects compared with metformin [54](#). Serious adverse events as well as kidney or liver toxicity did not occur with oral berberine [61](#).

STUDY	REPORTED SIDE EFFECTS
3 Wang et al. 2024	most common tolerability not reported
10 Zhao et al. 2021	Gastrointestinal adverse events reported
12 Suadoni et al. 2021	No study measured long-term adverse events
16 Tóth et al. 2020	Safe; no increase in ALT, AST, creatine kinase
21 Xie et al. 2026	Safety assessed, no numbers reported
25 Shakeri et al. 2026	minimal adverse effects
27 Liu et al. 2025	No significant difference vs. placebo
38 Barrios et al. 2017	Safety and tolerability reported as excellent
40 Lei et al. 2026	adverse event incidence similar between arms
41 D'Addato et al. 2017	5 adverse events, mostly mild; insomnia in BL group judged treatment related
45 Solà et al. 2014	Product was well tolerated
47 Marazzi et al. 2019	No major side effects in any group

6. What Remains Open: Limits of the Evidence

- Many studies do not state the exact form, purity and dose of berberine tested.
- The follow-up periods are mostly short, so long-term effects and rare side effects remain open.
- Results for combination preparations cannot be transferred to berberine alone.
- Bioavailability differs greatly between the forms, which makes comparison of the studies difficult.
- Data on interactions with medications and on comparison of the forms with each other are still pending.

7. Bottom Line: What Is Established About Berberine

Berberine is a plant alkaloid from barberry and Coptis species, which in studies is mostly tested as a salt or plant extract. In people with elevated blood lipids, impaired blood sugar or overweight, several meta-analyses showed improvements in LDL cholesterol, triglycerides, fasting glucose, HbA1c and body weight ¹¹⁴¹⁸²⁰²⁴²⁷³⁷. For blood pressure, however, several meta-analyses found no difference ¹⁹²¹²⁷.

In a large placebo-controlled study, adverse events under berberine did not occur more frequently than under placebo ⁴⁰; two smaller studies observed no serious side effects ⁵⁵⁶¹. However, the informative value is limited by the fact that the forms, doses and populations tested are inconsistent, many studies do not name the exact form, and the observation periods are short. Results of combination products of berberine with milk thistle (silymarin), red yeast rice or policosanol do not prove an effect of berberine alone ⁴⁶¹⁵¹⁶.

Frequently Asked Questions

How well has Berberine been studied in humans?

We evaluated 160 human studies on Berberine, including 45 randomised controlled trials and 33 meta-analyses or systematic reviews; the controlled studies include 4,809 participants in total. As of 9 October 2026.

Does Berberine help with blood Sugar and Insulin? What the studies show

We evaluated 11 meta-analyses or systematic reviews, 7 controlled studies and 34 further studies; the controlled studies include 280 participants in total. Result of the controlled studies: mixed. Strength of evidence under our published rules: high. Sources: ³⁶⁹¹⁰

Does Berberine help with blood Lipids? What the studies show

We evaluated 11 meta-analyses or systematic reviews, 7 controlled studies and 23 further studies; the controlled studies include 568 participants in total. Result of the controlled studies: mixed. Strength of evidence under our published rules: high. Sources: ¹³⁴⁶

Does Berberine help with body Weight? What the studies show

We evaluated 6 meta-analyses or systematic reviews, 6 controlled studies and 8 further studies; the controlled studies include 529 participants in total. Result of the controlled studies: mixed. Strength of evidence under our published rules: high. Sources: ¹¹¹⁴¹⁶¹⁸

Does Berberine help with polycystic Ovary Syndrome? What the studies show

We evaluated 2 meta-analyses or systematic reviews, one controlled study and 6 further studies. Result of the controlled studies: mostly improved. Strength of evidence under our published rules: moderate. Sources: ¹⁰²⁹⁶⁵⁷⁹

Does Berberine help with blood Pressure? What the studies show

We evaluated 4 meta-analyses or systematic reviews, 3 controlled studies and 3 further studies; the controlled studies include 132 participants in total. Result of the controlled studies: mostly no difference. Strength of evidence under our published rules: unclear. Sources: ¹²¹⁸¹⁹²¹

Does Berberine help with gut Microbiome? What the studies show

We evaluated 2 meta-analyses or systematic reviews and 7 further studies. There are no controlled studies yet, only reviews; the strength of evidence is therefore low at most. Sources: ⁸²²¹⁰⁵¹⁰⁷

Which forms of berberine were investigated in the studies?

Mainly berberine salts such as berberine hydrochloride, berberine sulfate and berberine citrate were tested, as well as plant extracts from barberry bark, coptis or goldenseal. Individual studies used dihydroberberine or a micellar formulation. Absorption differs between these forms, and many studies do not state the exact form and dose.

What do the studies show about blood lipids?

In people with elevated blood lipids, LDL cholesterol, total cholesterol and triglycerides fell in several meta-analyses ¹¹⁸²⁰²⁷³⁵³⁷. HDL cholesterol improved in some meta-analyses ³⁵³⁷, but remained unchanged in others ¹⁸²⁰²¹²⁷⁵⁹; in one study in rheumatoid arthritis, it fell with barberry extract compared with placebo ⁵⁶.

What do the studies show about blood sugar and insulin?

In diabetes and related metabolic disorders, fasting glucose decreased in several meta-analyses ¹⁴¹⁸²¹²⁷²⁸. HbA1c and HOMA index improved in meta-analyses on barberry preparations and in a placebo-controlled study in prediabetes ¹⁴¹⁸⁶¹. Individual investigations found no confirmed difference in fasting glucose ¹⁷⁵⁹⁶⁴, in HbA1c ¹⁷²¹ or in the HOMA index ¹⁷. Compared with metformin, HbA1c under barberry root extract did not differ ⁵⁴. The forms, doses and populations tested are inconsistent.

How well tolerated is berberine?

In a large placebo-controlled study, adverse events occurred with berberine about as often as with placebo ⁴⁰, and another study described berberine as well tolerated ⁵⁵. A barberry root extract led to no study discontinuation due to side effects compared with metformin ⁵⁴. Serious adverse events as well as kidney or liver toxicity did not occur with oral berberine ⁶¹. Statements on rare or longer-term side effects and on interactions are still pending.

What should be considered with combination preparations?

Combination preparations of berberine with milk thistle (silymarin) or with red yeast rice, policosanol and other additives also lowered blood lipids; however, this does not prove an effect of berberine alone ⁴⁶¹⁵¹⁶. The most frequently tested was the mixture Armolipid Plus of berberine, red yeast rice, policosanol, folic acid, astaxanthin and coenzyme Q10 ³⁸.

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