

## BIOBERIN – A BERBERINE-BASED POWDERED DIETARY SUPPLEMENT

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### Abstract

This article provides an in-depth analysis of BioBerin, a powdered dietary supplement based on berberine, examining its composition, metabolic effects, and potential medical applications. Berberine is an alkaloid extracted from barberry and other plants that has been used in traditional medicine for thousands of years. Currently, berberine is being extensively studied for type 2 diabetes mellitus, obesity, cardiovascular diseases, metabolic syndrome, and other conditions. The lemon powder, inulin, stevia, ginger, and other components in BioBerin's formulation enhance berberine's efficacy and provide additional support to the digestive system. Based on contemporary medical literature, this article comprehensively describes berberine's intracellular mechanisms of action, blood glucose regulation, lipid metabolism improvement, anti-inflammatory effects, and beneficial properties for intestinal microflora.

### Keywords

berberine, BioBerin, dietary supplement, diabetes mellitus, metabolic processes, inulin, ginger, lipid metabolism, anti-inflammatory effect, intestinal microflora.

### INTRODUCTION

In modern medicine, metabolic diseases, particularly type 2 diabetes mellitus, obesity, and cardiovascular diseases, have become global healthcare challenges. According to World Health Organization data, the number of patients with diabetes mellitus is rapidly increasing. Consequently, biologically active substances derived from natural plants, especially alkaloids, are receiving considerable attention.

BioBerin contains berberine hydrochloride along with lemon powder, inulin, stevia, ginger powder, and other beneficial components. Each of these ingredients possesses unique beneficial properties, and together they support the body's metabolic processes.

Article objective: To analyze the components of the BioBerin dietary supplement from a scientific perspective, examine the effects of berberine and

supporting components on bodily functions, and identify applications in contemporary medicine.

#### MAIN BODY

##### Berberine: Chemical Structure and Mechanisms of Action

Berberine belongs to the isoquinoline alkaloid group, with the molecular formula  $C_{20}H_{18}NO_4$ . This substance has a yellow color and forms crystals in anhydrous environments. One of the primary sources of berberine is the roots of the barberry plant.

Upon entering the body, berberine can activate several important enzymes within cells. One of its primary effects is activating the adenosine monophosphate-activated protein kinase enzyme. This enzyme plays a crucial role in regulating energy metabolism. Animal studies have demonstrated that berberine activates this enzyme in cells of the heart, liver, muscles, and other tissues.

Berberine also improves glucose uptake by cells and reduces hepatic glucose production. This property is particularly important for patients with diabetes mellitus.

##### Berberine's Effects on Metabolic Processes

Berberine has been tested in numerous studies as an effective agent against metabolic syndrome and type 2 diabetes mellitus. Clinical trials conducted in Japan, China, and European countries have shown that berberine significantly reduces blood serum glucose levels.

In one study, patients with type 2 diabetes mellitus consumed one gram of berberine daily. Over a three-month period, a reduction in fasting blood glucose levels was observed. Additionally, hemoglobin A1c, an indicator of long-term blood sugar control, also improved. These data confirm that berberine has nearly equivalent efficacy to certain conventional medications.

Berberine also positively affects lipid metabolism. It reduces blood levels of low-density lipoproteins, total cholesterol, and triglycerides, while increasing high-density lipoproteins. This property is important for reducing cardiovascular disease risk.

##### Berberine and Weight Management

Another significant property of berberine is its assistance with weight loss. Research has shown that berberine inhibits adipocyte growth at the molecular level. In trials with obese patients, taking five hundred milligrams of berberine three times daily resulted in an average weight loss of two and a half kilograms. Simultaneously, body fat percentage also decreased significantly.

Berberine also shows beneficial effects in patients with non-alcoholic fatty liver disease. It reduces fat accumulation in liver tissues and decreases inflammatory processes in the liver.

#### Anti-inflammatory and Antimicrobial Properties of Berberine

Berberine possesses strong anti-inflammatory effects. It blocks certain enzymes and signaling pathways that trigger inflammation. This property is beneficial for arthritis, metabolic syndrome, and other inflammation-related diseases.

Microbiological studies have demonstrated that berberine exhibits effective action against various bacteria and fungi. It helps eliminate pathogenic bacteria that cause intestinal infections. Simultaneously, berberine supports beneficial gut bacteria and regulates intestinal microflora.

#### Inulin: Prebiotic and Digestive System Support

The two grams of inulin in BioBerin's formulation is a soluble fiber with prebiotic properties. Inulin is found in many plants, including chicory roots, onions, and garlic. This substance passes through the upper digestive tract undigested, reaches the colon, and provides nutrition for beneficial bacteria there.

Inulin stimulates the proliferation of beneficial gut bacteria, particularly bifidobacteria and lactobacilli. These bacteria improve digestion, strengthen immunity, and prevent inflammatory diseases. Studies have shown that consuming twelve grams of inulin daily significantly reduces constipation problems.

Inulin also improves the absorption of minerals such as calcium and magnesium. This property plays an important role in strengthening bone health. Inulin also helps regulate blood sugar levels, as it slows carbohydrate absorption.

#### Lemon Powder and Vitamin Supply

The eight hundred milligrams of lemon powder in BioBerin's formulation delivers numerous beneficial substances to the human body, including organic acids, pectin, and trace elements. Lemon is a natural vitamin source, particularly rich in ascorbic acid (vitamin C).

Ascorbic acid is a powerful antioxidant and reduces oxidation processes in cells. It participates in strengthening the immune system, collagen synthesis, and iron absorption. Lemon powder also helps regulate the body's acid-base balance.

#### Ginger Powder: Metabolic Activity-Enhancing Component

The one hundred milligrams of ginger powder in BioBerin's formulation is valuable due to its unique bioactive compounds, particularly gingerol. Ginger has been used as a medicinal plant in Asian countries for thousands of years.

Ginger has anti-inflammatory effects and is effective in reducing various pains, including muscle pain, headaches, and joint pain. It improves digestion, eliminates nausea, and destroys harmful bacteria that cause stomach ulcers.

Research has shown that ginger helps reduce blood sugar and cholesterol levels. It also improves blood circulation and supports cardiovascular system health. Ginger's antimicrobial properties strengthen defense against infections.

#### Stevia and Erythritol

The six hundred milligrams of stevia and erythritol mixture in BioBerin's formulation provides a pleasant taste to the product while not negatively affecting blood sugar. Stevia is a natural sweetener derived from the stevia plant that, despite being hundreds of times sweeter than sugar, has very low caloric content.

Erythritol is also a natural sweetener found in fruits and fermented products. It has a mild effect on the gastrointestinal tract and has virtually no effect on blood insulin levels. This property is very important for patients with diabetes mellitus.

#### Maltodextrin and Product Stability

The one thousand two hundred milligrams of maltodextrin in BioBerin's formulation ensures product stability and facilitates its dissolution. Maltodextrin is a polysaccharide derived from starch that is quickly digested and becomes an energy source. It prevents product deterioration and extends its shelf life.

#### Complex Effects of BioBerin Product

All components in BioBerin's formulation work together synergistically, meaning each component enhances the beneficial properties of others. While berberine regulates metabolic processes as the primary active substance, inulin supports intestinal health and improves berberine absorption. Ginger provides anti-inflammatory effects and facilitates digestion, while lemon enriches with vitamins and provides antioxidant protection.

#### CONCLUSION

BioBerin is a high-quality dietary supplement that harmonizes modern scientific approaches with traditional medicine practices. The berberine hydrochloride, inulin, lemon powder, ginger powder, and other components in its formulation collectively demonstrate effective action in improving bodily metabolism, regulating blood sugar and lipid levels, supporting intestinal health, and strengthening overall well-being.

Research has shown that berberine exhibits beneficial effects in conditions such as type 2 diabetes mellitus, obesity, cardiovascular diseases, and metabolic syndrome. Inulin's prebiotic properties regulate intestinal microflora and strengthen immunity. Ginger and lemon powder provide additional vitamin and antioxidant support and demonstrate anti-inflammatory effects.

BioBerin's powdered formulation enhances its convenience and efficacy. All components in the product are combined in scientifically validated ratios, ensuring maximum benefit and minimal risk.

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