

Bee Venom and Its Therapeutic Uses

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SUMMARY

Bee venom is derived from the poison glands of honeybee workers. In their venom glands, bees generate their poison. The alkaline Dufour's gland (below) and the branching acid gland (above) are where the bee venom is produced; these two secretions are combined to create the final product. One sting contains about 100 µg of dry bee venom. Bee venom is a clear liquid with sharp, bitter taste, an aromatic odour and an acid reaction. It contains histamine, apamine, tryptophan, phospholipase, hyaluronidase, lecithinase, hydrochloric acid and magnesium sulphate. It is a valuable remedy for rheumatism. It helps to lower blood pressure and decreases cholesterol level. It also neutralizes alcohol poison.

INTRODUCTION

Honeybee venom is a transparent liquid dries up easily even at room temperature, odourless, ornamental pungent smell, a bitter taste, hydrolytic blend of proteins with acidic pH (4.5 to 5.5) that is used by bees for defense [1], [2]. Drones do not have stings; however worker and queen bee have stings. When being exposed to bee venom the mucous membranes or eyes, it causes considerable burning and irritation. Bee venom is soluble in water and insoluble in alcohol and ammonium sulfate. When it comes in contact with air, it forms grayish-white crystals. Dried venom takes on a light yellow colour and some commercial preparations are brown due to oxidation of some of the venom proteins [3].



A bee venom drop



Dried bee venom powder

Composition of Bee venom

Substance	Group Component	% of dry weight
Proteins (Enzymes)	PhospholipaseA2	10-12
	PhospholipaseB	1
	Hyaluronidase	1-2
	Phosphatase	1
	α - Glucosidase	0.6
Peptides	Melittin	40-50
	Apamine	2-3
	MCD Peptide	2-3
	Secapine	0.5-2
	Pamine	1-3
	Minimine	2
	Adolapine	0.5-1
	ProcamineA, B	1-2
	Protease inhibitor	0.1-0.8

	ertiapine, cardiopep, melittin	1-2
Phospholipids		1-3
Biogenic amines	Histamine Dopamine Noradrenalin	0.5-2 0.2-1 0.1-0.5
Amino acids	minobutyric acid, α -amino ac	1
Sugars	Glucose, fructose	2-4
Volatiles(pheromones)	Complex ethers	4-8
Minerals	P, Ca, Mg	3-4

Source: [Bogdanov, S., 2015]

Properties of major components of Bee Venom

Melittin: which accounts for nearly 50 percent of the dry weight of the venom, is the most prevalent peptide in honey bee venom. Strongly antibacterial, anti-inflammatory, and capable of rupturing cell membranes [4].

Apamin: This little peptide constitutes 2 percent of honey bee venom. Apamin inhibits a specific kind of ion channel in the neurological system, which can result in convulsions and trembling of the muscles [5].

Phospholipase A2: This enzyme contributes between 10 and 12 percent of the venom from honey bees. Cell membranes can be damaged by phospholipase A2, which can also lead to inflammation [6].

Hyaluronidase: This enzyme contributes 1–2 percent of the venom of honeybees. Hyaluronic acid, a key component of connective tissue, may be broken down by the enzyme hyaluronidase. This can increase the venom's potency by facilitating easier tissue penetration.

Histamine: This chemical makes up roughly 0.5 percent of the venom of honey bees. Strongly acting as a vasodilator, histamine can expand blood arteries and boost blood flow. Itching and swelling are other side effects of histamine [7].

Dopamine: Around 1 percent of the neurotransmitter dopamine may be found in the venom of honey bees. Depending on the dosage, dopamine can either produce hypertension or pupil constriction[8].

Adolapin: This peptide constitutes roughly 0.1 percent of the venom of honey bees. A strong anti-inflammatory drug called adolapin can lessen pain and swelling[9].

Depending on the environment, the time of year, and the specific bees that create the venom, honey bee venom's precise chemical makeup can change.

Therapeutic Use Of Bee Venom

The sting apparatus of worker and queen bees have venom glands that produce and store venom, which is then administered through the sting apparatus when stinging. Bee venom is primarily used to treat many inflammatory disorders such as arthritis, cancer, diseases of the nervous system, heart and blood system abnormalities, skin diseases, and others due to its anti-oxidants, anti-coagulants, anti-inflammatory properties, and bioactive substances like melittin and phospholipase [10].

Bee venom against Arthritis

Bee venom is used to treat arthritis by reducing the growth of rheumatoid synovial cells and preventing the production of pro-inflammatory chemicals such as cytokinine, PGE-2, NO, tumour necrosis factor TNF-2, and enzyme COX-2 [11]. Good success rates of between 60 and 90% have been attained after using a variety of venom delivery techniques, including bee stings, api-puncture, injections, electrophoresis, and application with ultrasonic waves (phonophoresis). Bee venom is also used to treat a variety of pain disorders, including rheumatoid arthritis, osteoarthritis of the knee, neck pain, low back pain, ruptured lumbar and disc pain, shoulder discomfort following a stroke, acute ankle and wrist sprains, and shoulder pain.

Bee venom against Nervous System Disorder

Bee venom has diverse effects on the central and peripheral nervous systems and is used to treat a variety of neurological disorders including Multiple Sclerosis (MS), Amyotrophic Lateral Sclerosis (ALS) and Alzheimer [12].

Bee venom is useful in lowering glutamatergic cell toxicity in neurodegenerative illnesses because it prevents cell death and greatly suppresses glutamate cellular toxicity, and pre treatment with bee venom changed MAP kinase activity after glutamate exposure [13].

Bee venom against Skin Diseases

Bee venom has therapeutic effects against many skin diseases like eczema, dermatitis, psoriasis furunculosis (recurring boil), cicatrices, baldness, acne and other diseases [14].

Bee venom on Heart and Blood System Abnormalities

Bee venom enhances blood microcirculation, slows down the heart at low dosages and stimulates it at large doses, decreases blood pressure, acts as an antiarrhythmic against blood coagulation and fibrinolysis, and stimulates the formation of erythrocytes.

Bee venom against Cancer

Melittin and phospholipase A2 are the two chemicals that have been identified and given specific characteristics, that bee venom provide its anti-cancer properties (phospholipase A2). Although many studies have described the antitumoral effects of melittin and phospholipase A2 are two main components in the venom of the *Apis mellifera* species [15]. Melittin, a potent anticancer peptide, found in bee venom, fights several forms of cancer in cells.

CONCLUSION:

In contrast to bee venom therapy, which uses live bee stings or injectable venom to treat a variety of ailments, apitherapy involves the use of honeybee products for medicinal purposes. The Bee venom has tremendous ability to fight many skin diseases, body pain, and having anti-cancerous properties, etc. The bee venom contains 88 per cent water. Despite the fact that bee venom is safe for human usage, it should only be administered under the guidance of a certified health care practitioner.

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