ENVIRONMENTAL CONDITIONS AFFECTING BEE VENOM PRODUCTION AND QUALITY AT QALYOBIA GOVERNORATE

Thesis Presented By

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الظروف البيئية المؤثرة على إنتاجية وجودة سم النحل في محافظة القليوبية

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Abstract

The quantity and quality of bee venom produced by Apis mellifera L. workers as being affected by the rearing season and the age of workers had been studied. The heaviest venom sac was found in middle aged workers, followed by young and old bees. However, the heaviest poison sac was recorded in the spring, followed by summer, autumn, and winter.

Chemical analysis of bee venom shows that the highest amount of protein content and phospholipase A2 in the venom was obtained in the old bees during the spring season. The same trend could be applied for the amount of Melittin (as an active compound in the bee venom) as being affected by the rearing season and the age of worker. On the other hand the highest amount of apamin was recorded during autumn in young bees. The resultant bee venom was applied on treatment of women suffers from repeated abortions.

Before starting the treatment with bee venom, results of blood analysis of women suffers from repeated abortions showed increase in the viruses taxoplasma, cyto-megalo virus and rubella IgG and IgM, these women had a course of stinging sessions by using 5 bees weekly.

Some of these cases were fully healed, while others need more stinging courses. Results showed that the nature of women work affects the needing of more stinging session such as working in rearing birds or buying food from street vendors that increase the contamination.

After repeated stinging session with venom, the bloods showed decreased levels of viruses and increased the ability of pregnancy was 95% while it was 100% in patients at ages less than 35 years which need only 5 courses of stinging sessions.

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LIST OF ABBREVIATIONS

A12O2	Alumina
BSA	Bovine Serum Albumin
BV	Bee Venom
CNS	Central Nervous System
CV	Coefficients of Variation
ERPC	Evacuation of Retained Products of Conception
HBV	Honey Bee Venom
HPLC	High Pressure Liquid Chromatography
HUVECs	Human Umbilical Vein Endothelial Cells.
IgG	Immunoglobin G
IgM	Immunoglobin M
KDa	Kilo Dalton
L.S.D	Least Significant Difference
LLC	Lewis Lung Carinoma
MCD	Mast Cell Degranuing
MHC	Major Histocompatibility Complex
MS	Multiple Sclerosis
PBML	Peripheral Blood Mononuclear Lymphocytes
PLA2	Phospholipase A2
SDS	Sodium Dodecyl Sulphate
SIO2	Silica Gel

VACSERA	Egyptian Company for Production of Vaccines, Sera & Drugs
VCD	Venom Collector Device
VEGF	Vascular Endothelial Growth Factor
VIT	Venom Immunotherapy

1. INTRODUCTION & AIM OF WORK

Insects have many ways to defend those selves and the most effective defending behavior in order the social insects is stinging behavior that only found in Hymenoptera. According to **Palmer (1961)**, there are four significant Hymenoptera families in insect stinging, i.e., Apidae (honey bees), Bombidae (bumble bees), Vespidae (wasps & yellow jackets), and Formicidae (ants).

There are many enemies to honeybee colony which target it for its honey or brood. The primary role of defending the colony is stinging behavior, using the venom apparatus that modified from ovipositor apparatus **(O'Connor and Peck, 1978)**. A single sting of bee contains a small amount of venom, which acts as a painful deterrent for vertebrates but has lethal effect on a wide variety of invertebrates **(Langer, 1997).**

In the available literature, many researches were conducted on honey bee products. This may be due to their important pharmacological activities, which influence different biological and medical aspects.

Bee venom therapy is part of apitherapy which utilizes bee venom in the treatment of health conditions. Apitherapy is the use of bee products, including honey, pollen, propolis, royal jelly, wax and venom. It has been used since ancient times and in this modern age as an alternative therapy to treat multiple sclerosis, Lyme disease, and chronic fatigue syndrome. Bee venom is a rich source of enzymes, peptides and biogenic amines and contains at least 18 active components **(El-Bassiony, 2007)**.

According to **Shipolini (1994)**, the properties of bee venom is a clear liquid with bitter taste, aromatic odour and acidic reaction. It dissolves completely in water. Bee venom contains a number of pharmacologically active polypeptides, chief among which are apamin, melittin, mast cell degranuing peptide.

The sting apparatus in workers and queens of honey bee is an ovipositor which is modified to play an important role of defense to the colony and stinging behavior is most commonly observed in the proximity of the hive or nest. Pheromones secretion is considered as one of the main stimuli for inducting an aggressive attitude among defending worker bees **(Gary, 1974)**.

According to **De Lima** and **Borchetto Braga (2003)**, venoms of social insects belonging to order Hymenoptera are complex mixtures containing simple organic molecules, proteins, peptides and other bioactive elements. Some of these components have been isolated and characterized, and their primary structures are determined by using several biochemical techniques. These compounds are responsible for many toxic reactions in different organisms, such as local pain, inflammation, itching, irritation, and moderate or severe allergic reactions. The most extensively characterized venoms of Hymenopterous insects are those which are collected from genus Apis, social wasps and ant species. However, there is little information about other Hymenoptera groups. The honey bee venom presents high molecular weight molecules, enzymes with a molecular weight higher than 10.0 KDa and peptides. The same authors added that the most important bee venom enzymes are found to be phospholipase A2; which is responsible for cleaving the membrane phospholipids, hyaluronidase; which degrades the matrix component hyaluronic acid into non-viscous segments, and acid phosphatase which act on organic phosphates. The main peptide compounds of bee venom are found to be lytic peptide melittin, apamin (neurotoxic) and mastocyte degranulating peptide (MCD).

The using of the bee venom for medical purposes is known to be a very old practice, especially for rheumatism and arthritis. Hypocrites (400 B.C.) has mentioned about bee sting therapy used for arthritis. At present, bee venom (epitoxen) is used naturopaths for the treatment of such diseases. It is also used in immunotherapy as a mean for decreasing