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IMMUNOLOGICAL STUDY OF HUMAN ALLERGIC DISEASE CAUSED BY VENOM HONEY BEE

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ABSTRACT

The study aims to show the effect of Honey bees stings on immune and blood parameters of human male and female. The results show ed. that the effect of stings of these insects were; average of immune high factor (1157)10^3/ul and (1120)10^3/ul in tow samples, average basophils (0.1)/10^3/ul, average eosinophil's (0.33)/10^3/ul, average HP (14.1)/gdl and average blood pressure systolic (113.2) mmHg and average edistatic (72) mmHg.

INTRODUCTION

Insect venom is one of the most frequent elicitors of anaphylaxis In the countries and Honeybee venom (HBV) allergy is the most common form of allergy to Hymenoptera venom, and is especially prevalent in children, beekeeper sand their family members, and people who are more likely to be stung. (Burzynska ana Kwatkowska 2021). The venom of honey bees is a complex mixture of proteins, peptides, and small organic molecules (Schmidt, 1992).

The most dangerous components for humans are *phospholipases* and *hyaluronidase*, individuals can become sensitized to these materials and subsequently even die from a serious allergic reaction.

Bee venom contains large quantities of a potent membrane-disrupting material called *melittin*, which makes membranes extremely susceptible to attack by phospholipases. Melittin also causes pain, increases capillary blood flow and cell permeability, triggers lysis of red blood cells, Honeybee venom is a source of proteins with allergenic properties which can result in in various symptoms, ranging from local reactions through to systematic life-threatening anaphylaxis, or even death. According to the World Allergy Organization (WAO), honeybee venom allergy is one of the most common causes of anaphylaxis (Burzynska and Kwiatkowska 2021).

The severity and duration of reaction to bee venom can differ from one person to another. Most people experience a local non-serious allergic reaction to bee venom, however, depending on the location and number of bee stings, previous history of allergic reactions may increase possibility of severe life-threatening event (Rayamane et al. 2014). Bee venom contains proteins that affect the skin cells and immune system resulting in pain and swelling at the site of the sting, the venom triggers a more severe immune system reaction, these people may not have an allergic reaction the first time they are stung but may have an allergic reaction to a second bee sting, so will cause the immune system to produce a type of antibody called immunoglobulin E (IgE) that protects the body from dangerous substances, such as viruses and parasites.

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THE AIM OF THE RESEARCH

In order to determine and estimate human allergy to honey bee venom was studied by examining the IgE antibody and CBC differential.

MATERIAL AND METHODS

Colleting samples: Blood samples for thus study were taken from (64) selected persons from the north of Basra where there are many of agricultural nursies that produce honey from honey bee, as well as all donors are of different ages and of both genders, where (36) persons age (32-37) years stung with honey bee venom, and others (28 year) persons ages (31-32) years no stung with

honey bee venom, *(Apis mellifera)* as measured and health.

Blood samples were collected from these volunters, pressure were measured and health information was obtained from them, samples were collected from 4/12/2023 to 28/12/2023, consent was obtained from all patients before blood samples were taken.

A blood sample consisting of 5 ml was obtained from the middle cubital vein by means of a sterile disposable syringe from each patient. Each blood sample was poured into an EDTA tube and gel tube, then centrifuged at 4000 rpm for 6–10 minutes, and analyzes were performed in pathological analysis department laboratory to test for igE-Serum, CBC-DIFF and Blood Group & RH testing and blood pressure.

Device and Equipment: CBC device; Biobase CBC Machine 5 parts Hematology Analyzer for blood count. Maglumi x3, from snibe Diagnosis, full Auto Chemiluminescnce immunoassay CLIA Immunoassay Analyzer. Centerfuge, Benchmark scientific LC-8 Cecterfuge with 8 x. 15m/rotor, General purpose centerfuge. Blood pressure monitors; Automatic upper arm blood pressure cuff. Sterile cotton, Torniquet, Syring 5cc, Blaster.

Photo 1: Bee venom Biting human practically and laboratory.

RESULTS AND DISCUSSION

Many people who react to insect stings will experience a mild to moderate irritant reaction in the form of localized redness and swelling and cause systemic allergic reactions, which spread all over the body, Bee venom contains proteins that affect the skin cells and immune system, resulting in pain and swelling at the site of the sting, The result of IgE showed that the average (1138.5) IU/ml was in samples test in compare with the average (10.105) IU/ml in controls the detailed data is shown in figure (1).

	Sample 1	Sample 2	Control 1	Control 2
Test IgE	1157	1120	11.2	9.01

The bee sting will cause the immune system to produce a type of antibody called immunoglobulin E (IgE) that protects the body from. dangerous. Substances, where the IgE causes immune responses.

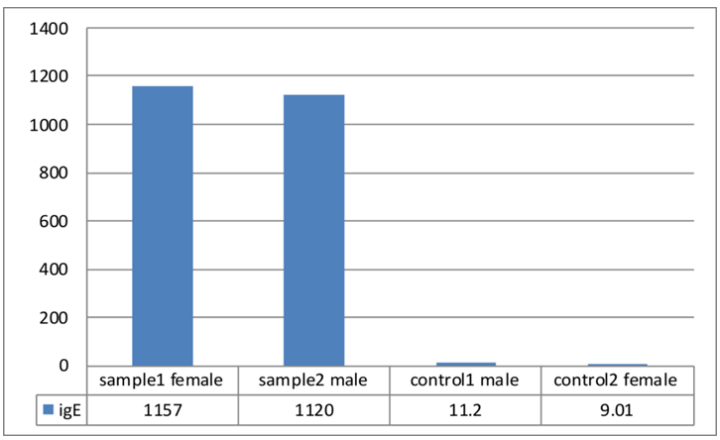

Figure 1: Female and male IgE poked blood with honey bees.

Bee sting venom contains proteins that affect skin cells and the immune system, causing pain and swelling around the sting area. In people with a bee sting allergy, bee venom can trigger a more-serious immune system reaction.

It is capable of triggering severe immunologic reactions owing to its allergenic fraction. Venom components are presented to the T cells by antigen-presenting cells within the skin. These Th2 type T cells then release IL-4 and IL-13 which subsequently direct B cells to class switch to production of IgE.

Ordinarily, bee venom is not toxic and will only cause local pain and swelling. The allergic reaction comes when the immune system is over sensitized to the venom and produces antibodies to it. Histamines and other substances are released into the bloodstream, causing blood vessels to dilate and tissues to swell Curtis et al. 2023.

The results of basophils showed that the average (0.1) 10^3/ul was in samples in compare with the average (0.0) 10^3/ul in controls the detailed data is shown in figure 2.

	Sample 1	Sample 2	Control 1	Control 2
Basophils	0.1	0.1	0	0

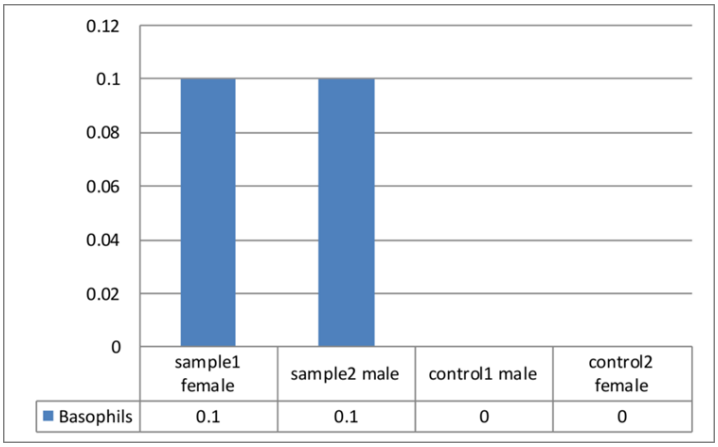

Figure 2: female and female human basophil poked with honey bees.

The result of eosinophils showed that the average (0.35) 10^3/ul was in samples in compare with the average (0.1) 10^3/ul in controls the detailed data is shown in figure 3.

	Sample 1	Sample 2	Control 1	Control 2
Eosinophile	0.3	0.4	0.1	0.1

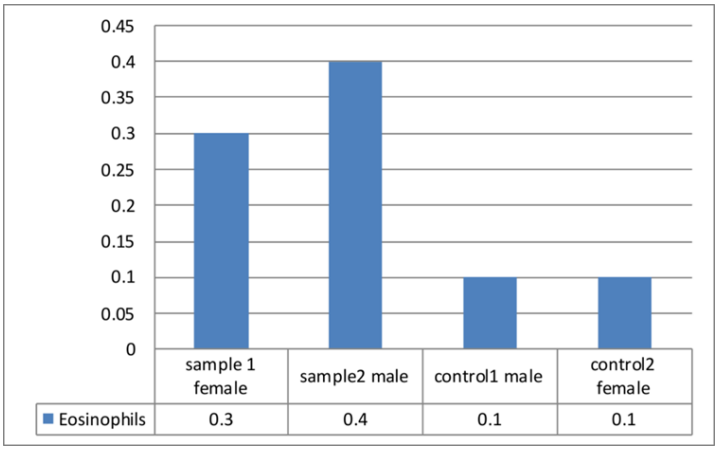

Figure 3: female and male Eosinophile humn blood.

The result of eosinophils showed that the average (0.35) 10^3/ul was in samples in compare with the average (0.1) 10^3/ul in controls the detailed data is shown in figure 3.

	Sample 1	Sample 2	Control 1	Control 2
Neutrophil	5.1	2.1	1.4	2.3

Bee venom cures diseases by reducing the sensitivity of leukocytes to allergens and increasing the number of T cells and support cells. Also, bee sting activates PLA2 enzyme and is effective in the production of melittin. It causes an increase in the synthesis of cytokine activation, which ultimately increases the secretion of arachidonic acid in the immune system. Melittin, a significant peptide found in bee venom is a promising possibility for cancer treatment Rady et al. 2017.

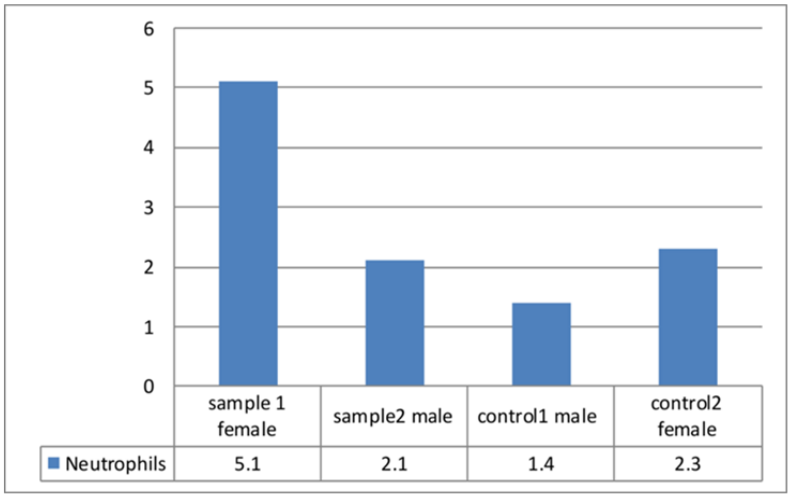

Figure 5: female and male Neutrophils human blood poked with honeybees.

The result of Hb showed that the average (14.1) g/dl was in samples in compare with the average (14.7) g/dl in controls the detailed data is shown in figure 4.

	Sample 1	Sample 2	Control 1	Control 2
Test Hb	13.2	15	14.6	14.6

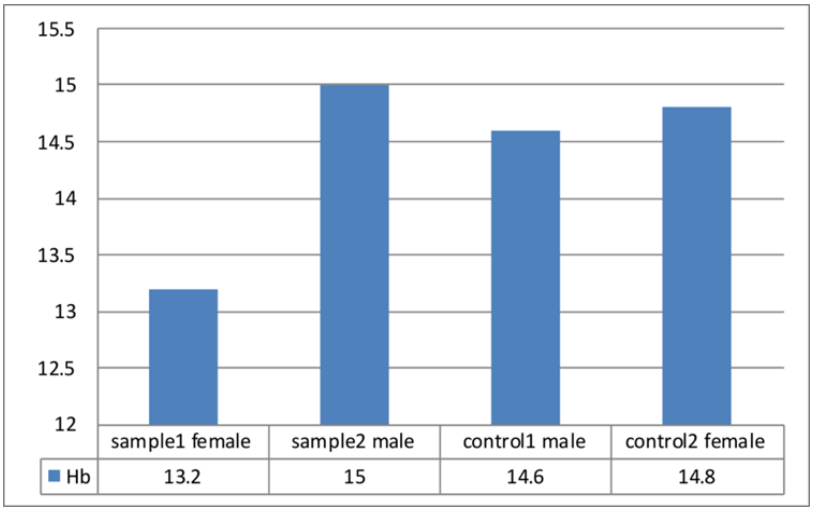

Figure 4: female and male human Hb with poked honeybees.

Bee venom contains many toxic fractions, the most important being mellitin, which alters capillary permeability, causes local pain, haemolyses red cells and lowers blood pressure (Goldsmid et al. 2003).

Bee venom cures diseases by reducing the sensitivity of leukocytes to allergens and increasing the number of T cells and support cells. Also, bee sting activates PLA2 enzyme and is effective in the production of melittin cells (Rady et al. 2017).

The result of the blood pressure systolic (upper) showed that the average (113.2) mmHg was in samples in compare with the average (127.5) mmHg in controls and the average of diastolic (lower) (72) mmHg was in samples in compare with the average (82) mmHg in controls the detailed data is shown in figure 6.

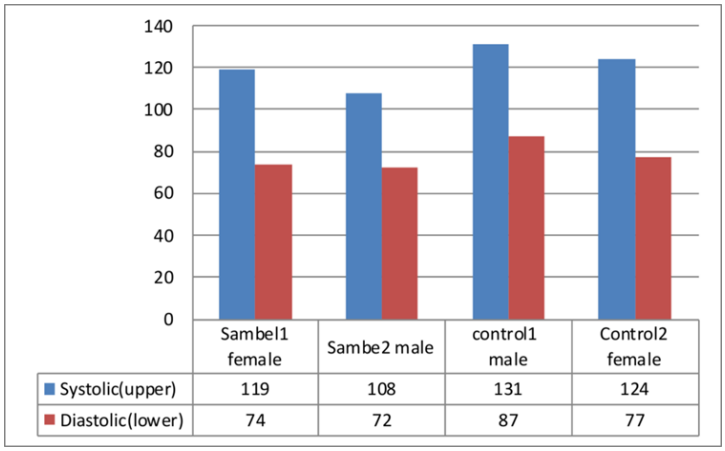

Figure 6: female and male human systolic and diastolic blood with poked honey bees.

High doses of Bee venom contains many toxic fractions, the most important being mellitin, which alters capillary permeability, causes local pain, haemolyses red cells and lowers blood pressure (Goldsmid et al. 2003), bee stings it case anaphylaxis, allergic reaction so the immune system releases a flood of chemicals Histamines, the substances released by the body during an allergic reaction, cause the blood vessels to expand, which in turn causes a dangerous drop in blood pressure that can cause the body to go into shock and the blood pressure drops suddenly.

Bee venom (above 1 mg per kg) cause an immediate fall in blood pressure to levels of irreversible shock (Kaplinsky et al.1977), bee stings it case anaphylaxis, an allergic reaction so the immune system releases a flood of chemicals such as Histamines, the substances released by the body during an allergic reaction, cause the blood vessels to expand, which in turn causes a dangerous drop in blood pressure that can cause the body to go into shock and the blood pressure drops suddenly.

Most insect poisons cause allergies to humans, and bee venom is one of them, through the results of this research, this has been confirmed. In figure (1), we notice an increase in IGE, and this is because the bee venom (antigens or allergen) are presented to T-cells by Antigen-presenting cells (APCs) during the sensitization phase of Type I hypersensitivity. T-cells then signal for stimulation of B-cells to produce IgE antibodies, which bind to the Fc receptors on mast cells and basophils. Subsequently, the free antigen induces the crosslinking of these mast cell and basophil bound IgE antibodies.

This results in the degranulation of the cells and the release of histamine, proteolytic enzymes, and other mediators (i.e., prostaglandin, cytokines (IL-3, IL-4, IL-5, IL-6), etc.) In figure (2) we notice basophilia due to the effect of IL-3. In figure (3) we note Eosinophilia and this is due to IL-5 because IL-5 is particularly important in the recruitment and activation of eosinophils thus promoting their maturation, activation, survival and migration from the bloodstream. Histamines, the substances released by the body during an allergic reaction, cause the blood vessels to expand, which in turn causes a drop in blood pressure. This is what we see in figure (4). Hb and Neutrophils did not have a change in the sensitization process, and this indicates that they may not participate in this allergic reaction, as in the figures (5) and (6).

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