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A study to find out the effect of honey bee venom in treating newly developed diabetes

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***Abstract*---**The current study aimed to know the effect of using honey bee venom in the treatment of diabetes, which included the use of (30) rats. The animals were divided into two groups; the first group used a dose of 1 mg / kg. As for the second group, it is the group of rats in which a dose of 2 mg/kg was used. The blood sugar level of the vaccinated animals was measured to confirm the percentage of diabetes and more than once for 40 days of treatment, after which the animals were dissected to remove the pancreatic gland and fix it with fixing solutions, then a series of preparations for tissue slides were performed on them. Through the study, it was found that the pancreatic gland of the islets of Langerhans showed a size close to normal and the secretory cells were few in number compared with the affected group and the control group.

***Keywords*---**induced diabetes, rats, honey bee venom.

Introduction and Literatur review

Diabetes mellitus (D M) is defined as a clinical syndrome characterized by abnormal carbohydrate metabolism. Chronic hyperglycemia is associated with long-term damage, dysfunction, and failure of various organs especially the liver (Ahmed, *et al.* 2019). It is a class of metabolic hyperglycemic disorders caused by insufficient body production or functioning of the pancreas (Mukhlif,. *et al.*2020). It is a chronic and complex disease that affects a large number of people. The current statistics estimate that there are more than 280 million diabetics in the world and this percentage will increase to 420 million in 2030 AD, 80% of them live in developing countries for this increase in the incidence of diabetes. The

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incidence of diabetes increased from 5.2% in 1982 to about 17% in a year 2010 AD and in 2014 the percentage reached approximately 24% of the population over the age of 30 (Bourne, *et al.* 2013).

Honey bee venom is a transparent, colorless, aromatic liquid, bitter in taste; with a specific gravity of 1.13, and it is a complex compound of proteins, enzymes, amino acids and volatile oils that cause pain when stinging. Bee venom contains acetic acid, histamine, sulfur, choline, magnesium phosphate and calcium (Zhang, *et al.* 2018). When excreted, it is a transparent liquid that dries quickly at room temperature and turns into a grayish-white color. The color of the poison may vary according to the season of collection, so it is dark in color at the end of the summer or when exposed to sunlight. It also dries quickly under room temperature and loses about 70 % of its weight turns into a white substance similar in appearance to gum arabic (Omar,. 2011). The poison has therapeutic values against a variety of diseases such as arthritis, nervous system, heart, blood and skin diseases. Moreover, it has been used extensively in the treatment of immune-related diseases and more recently for the treatment of tumors. Several cancer cells, including kidney, lung, liver, prostate, bladder and breast cancer cells, as well as leukemia cells can be targets of bees (Abdela and Jilo, 2016).

Materials and Methods

Used (30) rats with ages ranging between 12-18 weeks and average weights ranging between (200-240) g, which were obtained from where they were placed in the animal house and placed in plastic cages furnished with sawdust on the floor and equipped with water and ration throughout the study period Under standard conditions in terms of ventilation and lighting, diabetes mellitus was induced by injecting animals after starving them for 12 hours with alloxan at a concentration of 150 mg/kg of body weight (Al-Aumar, 1994). Dissolved in physiological saline (9.0%) before use as a single dose under the peritoneal membrane according to the weight of the animal, then the animals were provided with food and water directly. The blood sugar was measured by cutting the tail, taking a blood sample, and measuring the sugar percentage on the third day of the injection. Using a glucose meter, high blood sugar and an increase in urine were observed. After a month of diabetes, these animals were injected with honey bee venom for the purpose of treatment, and they were in the form of two groups, the first dosed with 1 mg / kg of honey bee venom and the second with 2 mg / kg of it. Then the animals were anesthetized using chloroform, then the pancreatic gland was excised and the samples were placed in the fixing solutions. The tissue slides were prepared to know the changes that occurred in the pancreas after treatment according to the method (Luna,. 1968). The tissue sections were examined and the selected sections were photographed using an imaging microscope equipped with a camera.

Results

The results of the current study showed a decrease in the rate of blood sugar in rats treated with honey bee venom with different doses, the first with 1 mg/kg of honey bee venom and the second with 2 mg/kg of it. The picture (1) shows a

cross-sectional histological section of the pancreas of a white rat induced with diabetes. Changes in the section of pancreatic tissue. It was observed after treatment with 1 mg/kg of honey bee venom for a period of 40 days. The size of the islets of Langerhans is close to normal and the secretory cells are few in number compared to the group. Infected and control group.

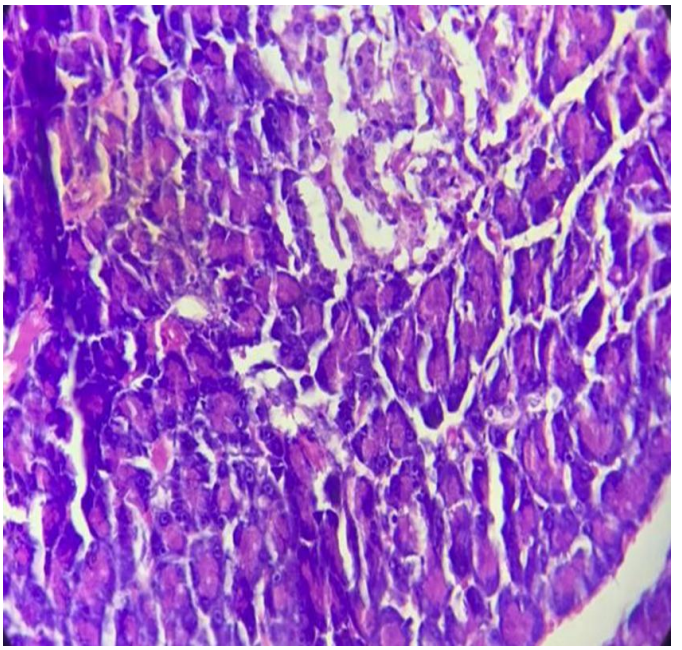

Figure 1. A cross section of pancreatic tissue of a diabetic rat showing the size of the islets of Langerhans close to normal (control group) as a result of using the treatment 1 mg/kg (Honey Bee Venom), under the powers of (400x) (E H&)

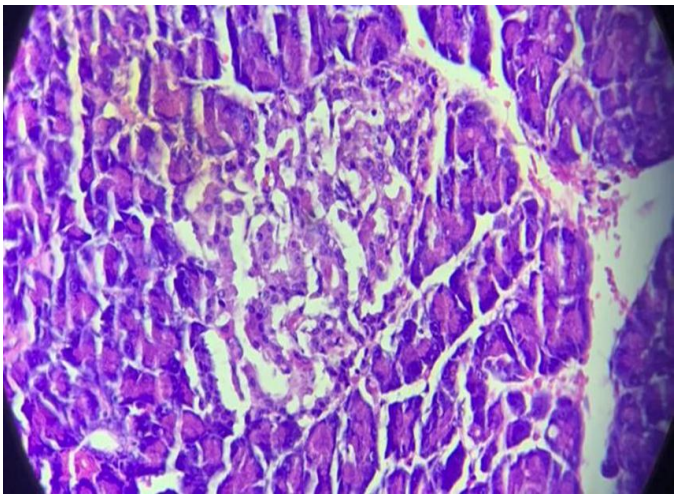

Figure 2. A cross section of pancreatic tissue of a diabetic rat showing the size of the islets of Langerhans close to normal (control group) as a result of using the treatment 1 mg/kg (Honey Bee Venom), under the powers of (400x) (E H&)

While picture (3) Picture shows a cross-sectional histological section of the pancreas of a white rat induced with diabetes by Alloxan. After treatment with 2 mg/kg of honey bee venom for 40 days, the size of the Islet of Lankerhaus appears close to normal and the number of secretory cells is low.

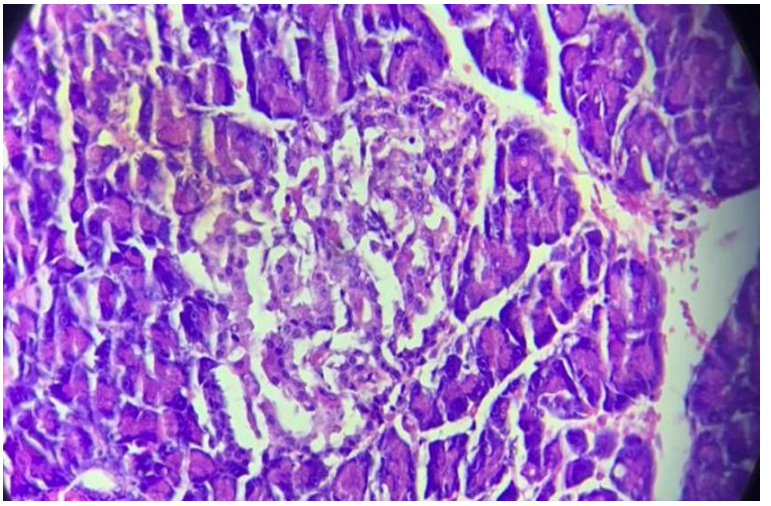

Figure 3. Cross-section of rat white pancreas tissue showing the size of the islets of Langerhans close to normal (control group) as a result of using the treatment 2 mg/kg (Honey Bee Venom), under (400x) (E H&)

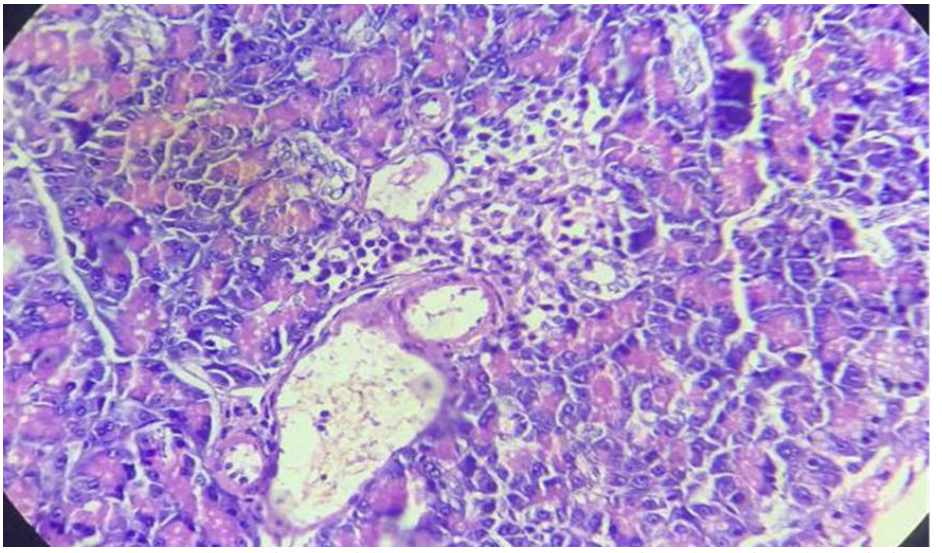

Figure 4. Cross-section of rat white pancreas tissue showing the size of the islets of Langerhans close to normal (control group) as a result of using the treatment 2 mg/kg (Honey Bee Venom), under (400x) (E H&)

Discussions

The group treated with a low dose of (BV) 1 mg/kg showed a significant improvement with the restoration of the size of the islets of Langerhans, also

showed regular islet cells with increased number and abundant cytoplasm and we note the central small nucleus, and most of these cells recovered their round shape while few of them are still oblong. the shape. The islets that cover the connective tissue are also relatively stored and restore their normal tissue as in Figure (1) (Eze *et al.*, 2016).

The histopathological observations in the current work confirmed the improvement in the treated groups when compared to the diabetic group. The pancreatic tissue of diabetic rats showed changes in the cells of the islets of Langerhans, a decrease in their size and a decrease in the number of beta cells. These results were in agreement with both (El-Esawy *et al.*, 2016). Therefore, the level of insulin in the blood decreased and the concentration of glucose increased. When treated with honey bee venom, it restores the normal structure of the pancreas and regenerates B cells. The histopathological results obtained from the current study were consistent with (Hadi et al., 2016) who reported that the size and number of pancreatic islets were decreased in diabetic rats compared to normal rats as in the picture (2). The toxin has a protective role in managing the biochemical and histological changes in the B cells of the islets of Langerhans in diabetic rats. This is either through suppression of pancreatic B-cell inflammation, or activity of antioxidants, or enhancement of insulin secretion, or enhancement of glucose uptake in adipose tissue with hypolipidemic activity through improvement of lipid absorption and hydrolysis of triglycerides (Dhanesha *et al*, 2013).

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