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Histological study for the effect of sesame oil on liver and kidney in female albino rats

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***Abstract*---**The current study was conducted to find out the effect of sesame oil on white female rats by studying changes in the histological structure of the liver and kidneys. The study included 20 animals divided into 4 groups; each group included 5 animals dosed with different doses volume (0.5'0.8' 1 ml)/kg. The period of dosing was for a month between one day and another. At the end of the experiment, the animals were sacrificed and the tissue of the liver and kidney was taken and preserved with (10% formalin) for histological procedure, Histologically results showed that sesame oil had a safety effect on both tissues, and the result was very similar to the normal tissue.

***Keywords*---**histological study, sesame oil, liver, kidney, female, albino rats.

Introduction

Sesame (Sesamum indicum L.) is one of the most significant oil seed crops, with seeds and edible oil considered as a traditional healthful dietary element due of the high levels of protein and antioxidants(Sharma, L.,*et al*;2021). Sesamin, sesamolin, and sesaminol lignan fractions are found in sesame oil and are known to contribute to its oxidative stability and antioxidative activity (Nantarat, N. *et al*;2020). The human liver weighs about 1500 grams and accounts for 2% of total body weight, giving it the body's largest gland. It's on the right side of the abdomen, beneath the diaphragm. It has four lobes that aren't totally separated. The big right and smaller left lobes are visible on the lateral edge; the upper caudate and lower quadrate lobes, which are positioned between the right and left nodules, are seen on the visceral surface. The porta hepatis, or liver hilus, is the location where the portal vein and hepatic artery enter the liver, and it separates the quadrate lobe from the caudate lobe., and the hepatic duct exits. Hepatic veins, carrying blood leaving the liver, emerge from the caudate lobe and empty

almost directly into the inferior vena cava. and the hepatic duct excretes. Hepatic veins originate from the caudate lobe and drain practically immediately into the inferior vena cava, transporting blood away from the liver (Metwalli, 2011 ;Kosmas, et al.,2016). Glisson's capsule surrounds the human liver, and at the hilum, the capsular connective tissue joins the interior stroma of the liverThe peritoneal tendons are well-known liver surface markers. The falciform ligament connects the right and left lobes, while the coronary ligament connects the liver to the diaphragm's inferior side. On the underside of the right liver lobe, the gallbladder is located (Rogers and Dintzis, 2018).

The liver has both exocrine and endocrine functions, as well as the protective function of toxin detoxification and erythrocyte removal (Rahman et al.,2021). Hepatocytes provide the majority of the activities done by the liver,which may number in the hundreds. These liver cells generate a variety of endocrine and exocrine secretions in addition to bile (Ben-Moshe, S., and Itzkovitz, S. ,2019). Hepatocytes process the end products of digestion, store them as inclusion products, and then release them in response to hormonal and neurological signals. Drugs and poisons are also removed by liver cells (protecting the body from their deleterious effects) (Briffa, J,et al ;2020) and transport secretory IgA from the Disse space to the bile. Furthermore, Kupffer cells phagocytose foreign particulate materials in the blood as well as defunct erythrocytes (González-Alonso, 2016; Coleman and Tsongalis, 2018). kidneys Approximately 12-cm long, 6-cm wide, and 2.5-cm thick in adults,each kidney has a concave medial border, the hilum— where nerves enter, the ureter exits, and blood and lymph vessels enter and exit—and a convex lateral surface, both covered by a thin fibrous capsule (Naga,O. I. 2020). Within the hilum the upper end of the ureter expands as the renal pelvis and divides into two or three major calyces. Smaller branches, the minor calyces, arise from each major calyx.(Mahadevan, V., 2019).The area surrounding the renal pelvis and calyces contains adipose tissue. The parenchyma of each kidney has an outer renal cortex, a darker stained region with many round corpuscles and tubule cross sections, and an inner renal medulla consisting mostly of aligned linear tubules and ducts (Rossetti, S. R. ,2018). Kidneys each contain 1-4 million functional units called nephrons each consisting of a corpuscle and a long, simple epithelial renal tubule with three main parts along its length. The major divisions of each nephron (Huang, Y.,et al,2021). Renal corpuscle, an initial dilated part enclosing a tuft of capillary loops and the site of blood filtration, always located in the cortex; Proximal tubule, a long convoluted part, located entirely in the cortex, with a shorter straight part that enters the medulla;(Zhou, X. J.,et al, 2017). Loop of Henle (or nephron loop), in the medulla, with a thin descending and a thin ascending limb. Distal tubule, consisting of a thick straight part ascending from the loop of Henle back into the cortex and a convoluted part completely in the cortex; and Connecting tubule, a short minor part linking the nephron to collecting ducts.(Chang, C. H. and Davies, J. A, 2019).

Material and Methods

The experimental animals

20 adult female rats (Rattus norvegicus) weighing (125-250 g) of 6-7 weeks old

were used in the present study. Animals were housed in the animal house of the Biology Department, College of Science, Kufa University, Iraq. Experiments were achieved for month Animals were housed in plastic cage bedded with wooden chips. During the experimental period four animals were kept in each box and they were housed under standard laboratory conditions at 22 ± 2 Cº and relative humidity 45-55% (Merriman, D. K.,et al., 2012). Animals were fed on standard rat pellet and tap water . The standard pellet contains wheat 66.6%, soya 25.6%, and sun flower oil 4.4%, lime stone 1.5%, salt 0.63%, methionine 0.158%, choline chloride 0.062% and trace elements 0.05% (Oudah, S. K., et al;2019).

The experimental design

20 animals were taken and placed in 5 groups, one control, and the remaining groups were dosed with three different doses (0.5-0.8-1) ml of Sesamum indicum oil the experimental design for animals after Period of time the animals were sacrificed and Where the tissue of the liver and kidney was taken and preserved with 1% formalin, histologically cut and formulated with eosin-myosin dyes

Histological preparation

Processing the tissue specimens automatically

According to the procedure mentioned by (Luna, et al 1968) the following steps were done : a) The basket with cassettes (handle the tissue specimens about 1mm3) automatically changes position and takes a bath in different reagents kept in the beakers in order to accomplish. b) Dehydration by increasing concentrations of ethyl alcohol;(70, 80, 90 and 100%), 2hrs for each concentration. c) Clearing; by Xylene / two times / 1 hours for each step. d) Infiltration; the final dip in the warm paraffin at 56 °C. e) The cassettes were opened next day morning for embedding tissues in paraffin blocking.

Tissue sectioning by Rotary Microtome

The rotary microtome used for sectioning the paraffin blocking into slices about(4-5) µm in thickness, fixed on clean slide .

Staining by Hematoxylin & Eosin Stain (H&E)

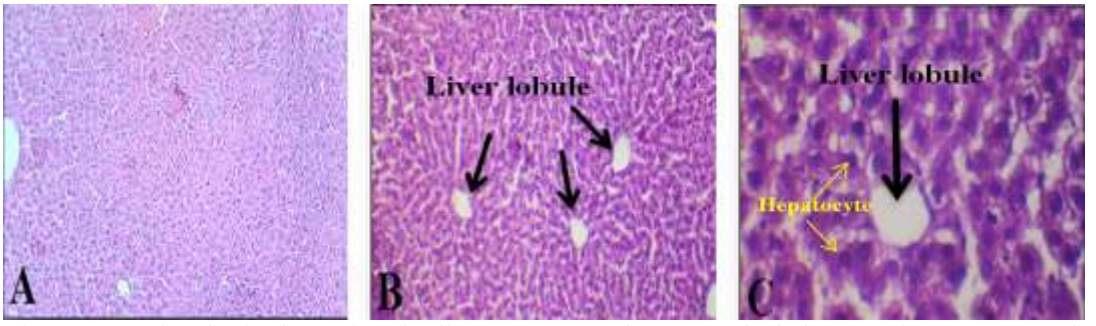
Tissue sections staining (liver, bone and kidney) was done by Harris Hematoxylin stain which was used for staining the nucleus (blue color)and Eosin stain for cytoplasm appeared pink in color (Luna, et al 1968) and(Chong *et al .,* 2012) , as following steps:-

1. Xylene Deparafinization / two times / 15 min.
2. Dehydration by decreasing concentrations of ethanol 100%, 90%, 80%, 70% for 5min for each concentration .
3. Immersion in Hematoxylin stain for 10 min.
4. Discoloration of excess stain by acid alcohol (99 ml of 70% ethanol and 1ml HCl) one dipping.

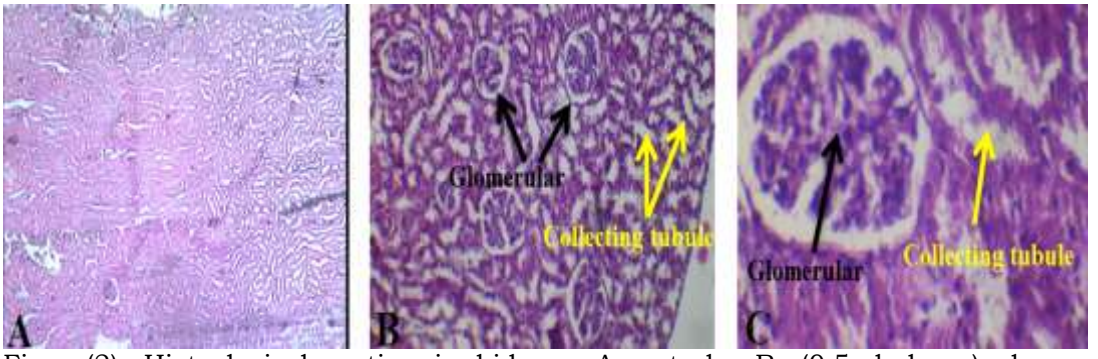
5. Dipping in Eosin stain for 5 min.
6. Up concentrations of ethyl alcohol for dehydration; 70%, 80%, 90% and 100% 5 min for each concentraition.
7. Mounting with D.P.X. and covered with cover slips.

Result and Discussion

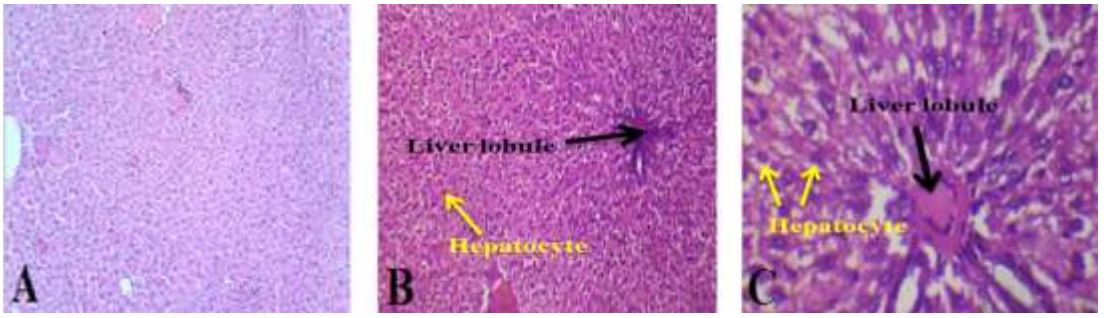
The results showed that sesame oil had a safety effect on both tissues (liver and kidney), and the result was very similar to the normal tissue. Mild effect at the 0.5ml doses , moderate effect at the 0.8ml doses and significant effect at the 1ml doses .



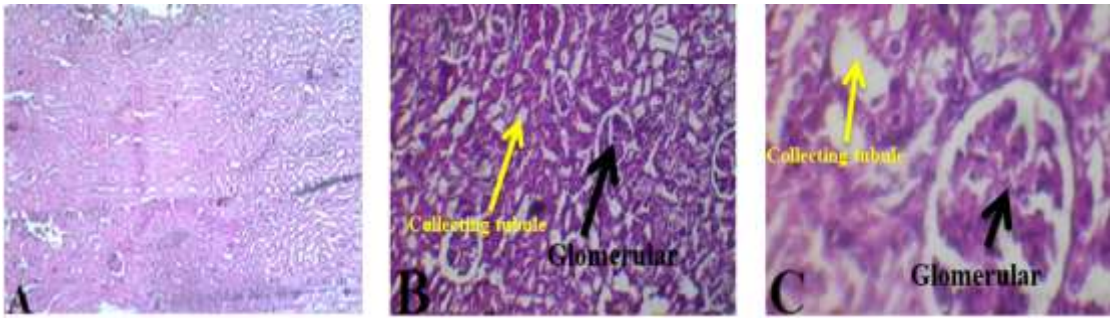
Figure(1): Histological section in liver A;control ; B: (0.5ml doses) shows normel tissue include clear hepatocyte cord ,central vein and normal sinsoid (10X); C: (0.5ml doses) shows miled for normel tissue (40X).The section is stained by H and E stain and the view is captured using digital camera.



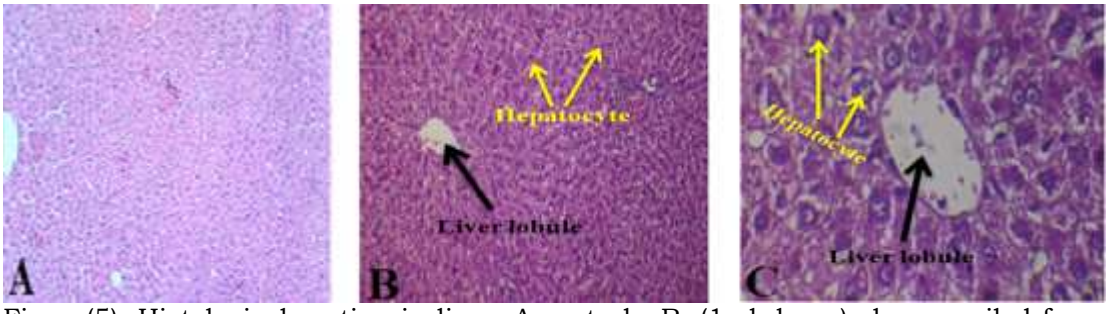
Figure(2): Histoological section in kidney A;control ; B: (0.5ml doses) shows normel tissue like normal glumeruli ,normal taft and proximal ,distal tubules (10X); C: (0.5ml doses) shows miled for normel tissue (40X).The section is stained by H and E stain and the view is captured using digital camera.



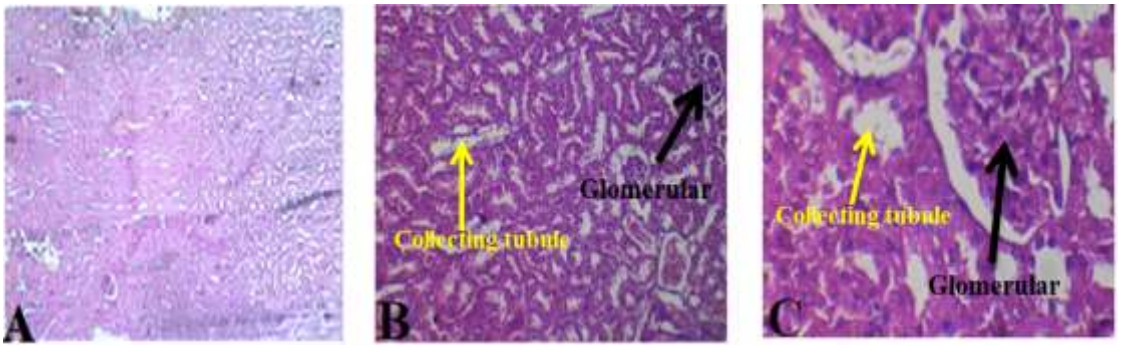
Figure(3): Histological section in liver A;control ; B: (0.8ml doses) shows miled for normel tissue (10X); C: (0.8ml doses) shows miled for normel tissue (40X).The section is stained by H and E stain and the view is captured using digital camera.



Figure(4): Histological section in Kidney A;control ; B: (0.8ml doses) shows miled for normel tissue (10X); C: (0.8ml doses) shows miled for normel tissue (40X).The section is stained by H and E stain and the view is captured using digital camera



Figure(5): Histological section in liver A;control ; B: (1ml doses) shows miled for normel tissue (10X); C: (1ml doses) shows miled for normel tissue (40X).The section is stained by H and E stain and the view is captured using digital camera.



Figure(6): Histlogical section in kideny A;control ; B: (1ml doses) shows miled for normel tissue (10X); C: (1ml doses) shows miled for normel tissue (40X).The section is stained by H and E stain and the view is captured using digital camera.

From all the figer we show that the Sesame is considered as a major source for solving the problem of deficiency of micronutrients deficiencies in modern day nutrition. Its flowers are bell-shaped which is initially yellowish color after that it changes to bluish Purple color It has nutty sweet aroma with milky buttery taste. It is considered as a food material and edible oilseed. Sesame seeds are a high Source of Carbohydrates, Proteins, fats, fibers and minerals also.

It is rich source of oil from its half of the chemical component. It also gives same amount of the amino acids, monosaturated fatty acids, Polyunsaturated fatly acids. It also have ability antioxidant activity which show significant effect ifs for reducing the blood pressure, degeneration of Vessels and also useful for reducing chromic diseases. One another benefits of these sesame seeds are that it is used in culinary purpose also and in traditional medicine.

Sesame is mostly utilized whole seed in overall the world with its many components a perusal of the available literature Stated that there is a dearth of literature on its Physiochemical and mineral composition of its oilseed crop therefore the present study was aim to investigate to evaluate their physio-chemical Characteristics, mineral composition and other components on the vital organ normal histological feature (HR Aglave , 2018).

Conclusion

The results of the current study showed that sesame oil had a safety effect on both tissues, and the result was very similar to the normal tissue.

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