To Study Safety of *Eruca Sativa* as Edible Oil on the Histology of Liver

Inayat Ullah, Asad Ullah, Naik Zada

ABSTRACT

Background: Plants are the basic source of food and medicines directly or indirectly.A large number of phytochemicals have been isolated from plants, which plays an important role in the field of pharmacognosy, to treat various diseases. Among them the species of family Brassicaceae, *Eruca sativa* (ES) is in use as a vital component of salad, hair tonic as well as for the treatment of digestive problems and for cooking various food stuffs. Moreover, it is natural antioxidants and has anticancer and antidiabetic properties.

Objective: To observe the safety of *Eruca sativa* seed oil on the histology of rabbit's liver.

Material and Methods: This experimental study was conducted in the department of Anatomy, Saidu Medical College, Swat from 1st march to 15th April 2017. Twenty animals were included in the study and divided equally into four groups. Each group comprising five animals (n=5). T-4 served as control. T-1, T-2 and T-3 received *Eruca sativa* (ES) seed oil at the dose of 1mL, 2mL and 3mL/ kg body weight per 24hours for six weeks.

Results: No significant alteration was observed in the cytoarchitecture of liver in treated groups when compared to control group animals.

Conclusion: It is concluded that *Eruca sativa* seed oil has not altered the cytoarchitecture of rabbit's liver, so can be used as edible oil.

Keywords: *Eruca sativa*, Pharmacognosy, Liver tissue, Cytoarchitecture

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INTRODUCTION

Natural products isolated from plants are used as food and medicines[1]. *Eruca sativa* (ES)commonly known as rocket, rucola, arugula or taramira, belongs to the family Brassicaceae [2]. The colure of plant is dark green with a height of about 20 to 50 cm. It is an annual herb and its flowers appear mostly in February-April. All parts of the plant have been used for diverse purposes, leaves and flowers as components of salad[3]. The leaves have a pungent taste character due to the presence of specific constituents. Seeds are the rich source of oil, although roots have no consumption value for humans. *Eruca sativa* is cultivated globally but is mostly found in the Mediterranean region. In Pakistan it is grown for the isolation of seed oil known as *Jamba oil*[4].

Nutrients in Eruca sativaplant were estimated as nitrogen (4.32%), phosphorous (0.25%), potassium (5.13%), calcium (2.95%), magnesium (0.5%), sodium (799.88mg/kg), iron (350mg/kg), copper (5.36 mg/kg),manganese (40.58 mg/kg), and zinc (64.86mg/kg)[5]. Other metabolites such as alkaloids, glycosides, flavonoids, saponins, coumarines, resin, terpens and steroids glucosinolate and N-heterocyclic were also quantified from the seeds [6,7].

Generally, *Eruca sativa* seed oil is used for the prevention of hair loss. It is also used as an ointment for burn and a remedy for dyspepsia[8]. In some area of the world including Pakistan, the plant is used as vegetable as well as seed oil for cooking [9,10].Anticancer and other medicinal effects have been reported in human tumors cell lines e.g. liver, larynx, breast, and colon carcinoma [11]. Regarding their medicinal importance, the plant is also reported as gastric antiulcer, antidiabetic [10,12]. It also possesses antimicrobial activity[13], increase testosterone level, decrease sperm mortality and abnormalities [7]. Moreover, its biocompatibility as well as preventive effect on oxidative stress are also reported [14].

Keeping in view the medicinal importance of ES, the present study was conducted to observe the effect of seed oil on the liver histology.

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MATERIAL AND METHOD

According to the experimental designing *Eruca sativa* (ES) seed oil was purchased from the local area extraction plant, with brand name "Jamama oil". Only one brand of oil was selected for quality maintenance and uniformity in the study. Twenty adult rabbits were acclimatized for a specific period in the animal house of Saidu Medical College, Swat and kept under observation for one week, prior to the commencement of the study. Animals were divided into four groups i.e. C, T1, T2 &T3. Each group containing five rabbits.

Group C: Served as control.

Group T-1: Received ES seed oil at a dose of 1mL/kg body weight/24hours.

Group T-2: Received ES seed oil at a dose of 2mL/kg body weight/24hours.

Group T-3: Received ES seed oil at a dose of 3mL/kg body weight/24hours.

Experimental Procedure

At the end of experimental period, all animals were sacrificed, liver excised and fixed immediately in 10 % formalin solution for further processing. Tissue were run in ascending grades of alcohol, infiltrated and embedded in paraffin. 5 micrometer thick sections were taken by microtome and stained with Hematoxylin & Eosin(H&E) and observed under light microscope as reported by Fischer et al., (2008) and Bancroft & Gamble (2008) [15, 16]. Pictures were captured by digital camera of the microscope.

RESULTS

Histology of rabbit's Liver

Control group (C)

The H&E stained 5 µm thick sections in control group (C) showed normal architecture of liver. Central vein and Portal triads are normal in appearance. Hepatocytes are arranged in the form of anastomosing cords in radiating manner. Nuclei are rounded in shape and centrally located (Figure 1).

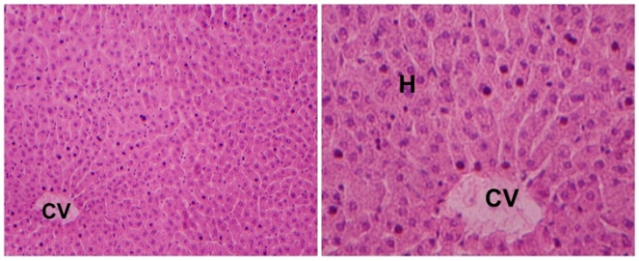


Figure 1 (C):H&E stained, 5 µm thick sections of Liver of control group rabbits, showing Central vein (CV) & Hepatocytes (H) arranged in radiating hepatic cords. (Photomicrograph 10X & 20X).

Experimental groups

The H&E stained sections in T-1 group showed intact architecture of liver. Central vein and Portal triads appear normal. Hepatocytes are rounded in shape, arranged in the form of anastomosing cords. Portal triads with few mononuclear cells around it and branches of portal vein, hepatic artery and bile duct seen. No significant structural changes were observed when compared with control group (C) (Figure 2).

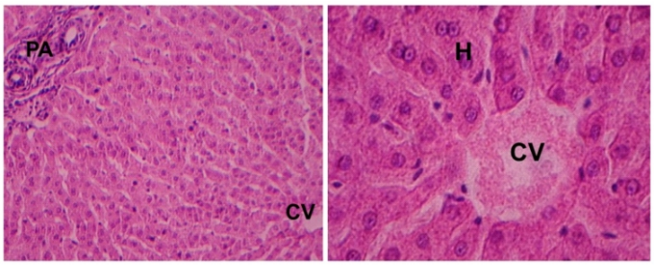


Figure 2 (T-1):H&E stained, 5 µm thick section of liver of experimental group (T-1) rabbits, showing Central vein (CV), Portal area (PA) & Hepatocytes (H) arranged in radiating hepatic cords. (Photomicrograph 10X & 20X).

Similarly, the result showed no significant histopathological alteration in the T-2 group liver when compared with the control and T-1 groups animals respectively. H&E stained sections of T-2 group showed organized histological pattern of liver. The Central vein appears normal. Nuclei were normal in shape and centrally located, hepatocytes were arranged in the pattern of anastomosing cords (Figure 3).

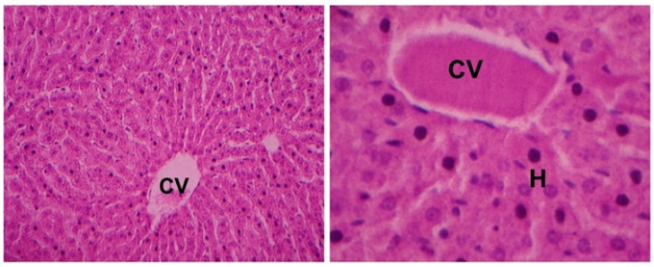


Figure 3 (T-2):H&E stained, 5 µm thick section of liver of experimental group (T-2) rabbits, showing Central vein (CV) & Hepatocytes (H) arranged in radiating hepatic cords. (Photomicrograph 10X & 20X).

Histological details of T-3 group showed no significant pathology as compared with the control, T-1 and T-2 groups animals respectively (Figure 1). H&E stained sections showed normal structure of liver. The Central vein appears normal. Hepatocytes are in the form of anastomosing cords. Portal area was normal. No lipid depositions or other pathological alteration seen.

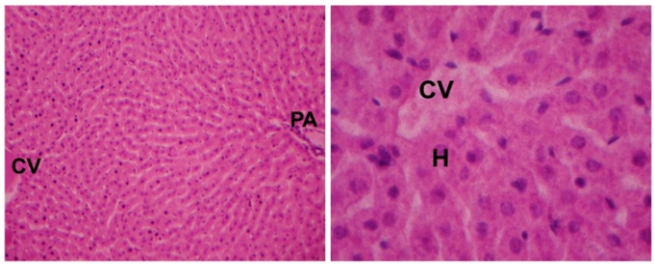


Figure 4 (T-3):H&E stained, 5 µm thick section of liver of experimental group (T-3) rabbits, showing Central vein (CV), Portal area (PA) & Hepatocytes (H) arranged in radiating cords. (Photomicrograph 10X & 20X).

DISCUSSION

There are four types of cellular responses to stimuli that are hypertrophy, hyperplasia, atrophy and metaplasia. Although in the pathogenesis, two basic steps are involved; biochemical changes which is then followed by functional and structural alterations. These changes are the responses of cells to stimuli [17]. Hepatocytes are responsible for most diverse functions in the body such as Detoxification, Carbohydrate storage and metabolism, lipids metabolism and biosynthesis, Protein metabolism and Storage of certain vitamins [18].

Liver tissue isolated from both control and experimental groups were observed under light microscope. The results showed similar cytoarchitecture of the liver in all the treated groups when compared with control group. In the current study no significant histological alterations and lipid deposition were observed (Figures 1 to 4). Such beneficial effect may be due to the antioxidant activity of phytoconstituents found in *Eruca sativa* seed oil[19]. The results are in similarity with that of Alqasoumi et al., who reported anti-secretory, antioxidant, cytoprotective, and anti-ulcer activities of *Eruca sativa* extracts in experimentally-induced gastric lesions[20]. Our results are also in agreement with the previous study conducted by Sajeeth, who observed no pathological alterations in the liver of diabetic and non-diabetic rates treated with *Eruca sativa* at the dose of 500 mg/kg body weight[21]. Although. Bajilan and Al-naqeeb, observed cellular hypertrophy and vacuolation in hepatocytes of mice liver with the administration of *Eruca sativa* leaves extracts for 30 days, at a dose of 250 and 500 mg/ kg body weight, which is a disagreement to our study[22].

CONCLUSION

Based on the present research It is concluded that *Eruca sativa* seed oill has not altered the cytoarchitecture of rabbit's liver, so can be used as edible oil.

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