# 4. RESULTS

## 4.1. Histological and Histopathological Observations:

### A- Normal rats:

As shown in Figs. (1, 2), the intralobular hepatic tissue is made up of hepatic cells (hepatocytes) which are polygonal in shape, relatively large in size and exhibit distinct limiting membranes. Each hepatic cell has a centrally located nucleus with one or two prominent nuclei in addition to a number of chromatin particles. Occasionally, the liver cells appear binucleate.

The hepatocytes are radially disposed in the liver lobule, they form a layer of two cells thick, these cellular layers or plates anastomose freely forming a labyrinth and sponge – like structure. The spaces between these plates contain capillaries (the liver sinusoids), the liver or blood sinusoids contain phagocytic cells of the mononuclear phagocyte series known as kupffer cells. These cells have processes and large nuclei. Each hepatic lobule has a central vein at its core.

### B- Irradiated rats:

- ***First post-irradiation day:***

As shown in Fig. (3), the liver tissues show mild hydropic degeneration and this pathologic reaction characterized by marked loss of uniformity and regularity of the liver plates, the hepatocytes appeared damaged with aggregation of their nuclei in some sort of haemorrhage infiltrated within sinusoids, the nuclei exhibit low stainability and many

of them showed clear symptoms of coagulative necrosis that progressed to pyknosis.

The blood vessels and sinusoidal spaces are dilated and congested with blood with inflammatory cells surrounding the vessels. Karyolysis and disappearance of the nucleoli are also seen (Fig. 4).

- ***Third post-irradiation day:***

Many hepatocytes showed marked hydropic degeneration with vacuolated cytoplasm, a large number of hepatic cells appeared having necrosis accompanied by extensive haemorrhage represented by masses of red blood cells occupying and replacing the disintegrating cells where reminants of their nuclei are still recognizable. Marked dilatation of the blood vessels appeared congested with haemorrhagic inclusions (Fig. 5).

Inflammatory leucocytic infiltration are abundant and spread over several areas in the hepatic tissue and around the blood vessels. Küpffer cells appeared elongated or slightly hypertrophied denoting high phagocytic activity towards the damaged cells. Karyolysis could also be seen in some hepatic areas indicating advanced degree of pyknosis. There are also well-marked signs of fibrosis around the damaged cells. This damage is progressed to generalized necrosis and fibrosis which is characterized by having no regular pattern (Fig. 6).

- ***Fifth post-irradiation day:***

Dilatation of the blood vessels with blood congestion, fatty infiltration of the hepatocytes, degenerated hepatocytes with pyknotic and densely stained nuclei and haematomas or masses of blood are seen in the hepatic tissues (Fig. 7).

Some hepatic cells appeared with apoptotic cells indicating advanced degree of degeneration. Increased intracellular spaces with cytoplasmic vacuolation is prominent with dilatation of the sinusoidal spaces. Other cells appear with karyolysis. Some liver cells appear with intact cell membranes and healthy nuclei and nucleoli (Fig. 8).

- ***Seventh post-irradiation day:***

Haemorrhage is still evident inside the hepatic tissue with damaged hepatocytes. In the examined field, one bile ductule appears with abnormal nuclei (Fig. 9).

A considerable number of the hepatocytes showed some sort of regeneration where their nuclei restored their normal appearance while others showed that the process of degeneration proceeded to necrotic areas, the inflammatory cellular infiltration was inhibited in many areas. Many of the hepatocytes appeared with intact cell membranes and prominent nuclei and deeply stained nucleoli (Fig. 10).

- ***Fourteenth post-irradiation day:***

Parenchymal cells showed good signs of recovery where regeneration is detected by mitotic activities with the production of multinuclear forms or mitosis with division of the nucleus into two or more daughter nuclei. Therefore, some hepatocytes appeared binucleated indicating good signs of recovery while their cytoplasm is still vacuolated.