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Histopathological And Biological Studies On The Role Of Soybean And Broad Bean Against Radiation Induce Damage In Rat Kidney

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Abstract

Most of the physiological and histological activities in the animal body are disturbed after exposure to ionizing radiation. These disturbances are either due to direct harmful effect of radiation on the biological systems or to the indirect effect of free radicals formed in the body after irradiation. There is growing evidence that the type of food plays an important role in the prevention of chronic diseases. The biological disturbance due to ionizing radiation makes search for ways of protecting living organisms essential for controlling the radiation hazards. Much of the world population relies on legumes, as a stable food. Legumes can affectively protect cells and tissues against damage.

Our present study was conducted to investigate the hazardous effects of single dose gamma radiation (6.5 Gy) on the adult male albino rats and the evaluation of the possible protective effect of feeding beans (broad beans and soybeans) against radiation exposure. Histopathological, and biological changes of kidney function in irradiated, and bean fed animals were carried out. Animals were weighted and daily food intake was determined. The result obtained revealed that soybean is an extremely rich source of protein and fat as compared to faba bean. Radiations cause a reduction in food intake and weight gain. It causes great changes in the kidney glomeruli and collecting tubules. The recovery of the cells depend on the type of feeding so, feeding soybean gives a significant radiation protection and decreases the extent of changes induced by radiation

Key words:
Male rats- Radiation- legumes - soybean- broad bean – kidney- histology- pathology

Introduction

Ionizing radiation is a type of radiation that has the ability of ionizing atoms and molecules in an irradiated substance. It includes electromagnetic radiation (e.g., gamma and X rays) and particular radiation (e.g. alpha, Beta particules) (Brunori et al., 1984). The dose of ionizing radiation absorbed by irradiated material has been measured in terms of (Gy), which equals to 100 rad (Martin

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and Harbison, 1979). The weight loss was considered as an indicator for radiation induced injury. Hazardous effects of gamma rays on body weight and food intake in rats have been reported. Izemteva *et al*., (1998) reported a decrease in body weight gain in rats as a response to low dose gamma radiation (2.6) GY. Fekry *et la.,* (1999) found that exposure of rats to 6.0 Gy caused a decrease in mean values of body weight and daily food intake along with a significant increase in daily water intake. Hasegawa *et al*., (2000) studied the effect of Gamma rays on mice. They found that body was significantly decreased in the irradiated mice than the non-exposed control. Rkotoarison *et al*., (1997) and Robinson *et al.,* (1997) stated that antioxidants are important substances which possess the ability to protect the body from damage caused by free radicals, induced oxidative stress. There is currently muchinterest in the antioxidant role of flavonoids and other polyphenols derived from dietary sources as fruits and vegetables.Numerous plants synthesize, among their secondary meta - bolites, phenolic compounds, which possess antioxidant effect. According to Yavelow (1983), Vegetarian populations show a decreased occurrence of breast, colon, and prostate cancers.

Epidemiological studies have ident - ified seeds (maize, corn, and beans) as protective agents in these cancers.

Shimoi *et al.*, (1996) reported that Plant flavonoids, which show anti oxidative potency in vitro, act as antioxidants in vivo and their radio protective effects may be attributed to their scavenging potency towards free radicals such as hydroxyl radicals. Therefore, the flavonoids contained in tea, vegetables and fruits seem to be important as antioxidants in the human diet.

Soy foods and soybean components have received considerable attention lately for their potential role in reducing the risk of cancer. The health benefits of soy foods have been making headlines recently. Countries where soy products are a dietary staple have lower rates of many chronic diseases, and researchers are now beginning to identify specific components in soybeans that appear to be responsible for its good effects. Messina and Bennink (1998) stated that soy foods are the only nutritional relevant diet source that has protective effect against colon cancer. Groot and Raijeji (1999) and Tunali *et al*., (1999) postulated that flavonoids could effectively protect cells and tissues against radiation. Much of the world population relies on Legumes as stable food particularly in combination with cereals. Legumes are often advocated in western diets because of their beneficial effects (Gustnfs~on and Sandherg, 1995).

Soybean (*Glycine max*) is used in human foods in a variety of forms. Tanteeratarm (1993) reported that the average chemical composition of soy beans are about 40% protein, 20% lipid, 35% carbohydrate, 5% as and 13% moister on a dry weight. Donangelo *et al*., (1995) determined the chemical composition of soybean seeds. It contains 41.1% protein, 21,1% fat, 24,8% carbohydrates, 5.4% ashes, and 4.4% cellulose.

Anther important source of protein is broad bean (*Vicia faba*), which is an important food legume, and is considered as a major source of dietary protein in Egypt. It belongs to the fairly Leguminous (Fabaceae). According to Elkowicz and Soulski (1992), Nwokolo and Sartt (1996) and Ci *et al*., (2001).The protein content of Faba bean ranges from 27.7% to 31.6% the major part of this protein is characterized as globulin. The lipid content of faba is 1.63%, and the content of ash is 1.45 %. Benevenga *et al*.,(1993) and Rubio *et al*., (1995) fond that there were great changes in the kidney function and structure_when the diet contained high quality protein. Gentile *et al*., (1998) stated that soy protein diet in rats proved to reduce protein urea, renal damage, and glome - rulus hyper filtration. In addition Anderson *et al*., (1999) reported that Soybean is nutrient dense, fiber rich and high quality sources of protein. Substituting soy protein for animal protein is expected to protect against development of kidney disease.

The purpose of this study was to evaluate on the bases biological evalu - ation and microscopic levels the hazar - dous effects of whole body gamma irradiation (6.5 Gy) on adult male rats and to study the protective role of feeding beans (soy bean and broad bean) against radiation damage and the growth of the animals.

Materials and methods: -

60 Male rats weighing from 50 – 60 gm were used, and kept under normal conditions. All animals were fed basal diet for the first week before starting the experiment. They were divided into2 groups:

1. The first group served as normal group fed a basal diet (casein)
2. The second group was fed experi - mental diet instead of casin (soybean and broad bean respectively).

The basal diet was prepared according to Reeves *et al*., (1993) with the following ingredients and percentage: protein (casein) 10%, corn oil 10%. Vitamin mixture 1% according to Campbell (1963), salt mixture 4% according to Hegsted *et al*. 1941, fiber (cellulose) 5% and the remainder was corn starch. In the experimental diet, dried powders of legumes were added instead of casein to produce the desired level of protein (10%).

Each group was divided into two subgroups the first was considered as control non irradiated and the second was irradiated .

Animas were subjected to whole-body Gamma irradiation (6.5 Gy). Radiation was performed by a Cesium-137 ventilated Gamma Cell-40 belonging to the National Center for Radiation Research and Technology (NCRRT), at a dose rate of 1 Gy/1.5 min.

Biological evaluation:

Biological evaluation of the differ - ent diets was carried out by determination of growth of animals (as judged by daily food intake and body weight gain) according to Chapman *et al*., (1995) who stated that:

Body weight gain percent = {Final weight – initial weight} x 100. Calculation was made for each test diet and for the reference control group

Experimental periods:

For biological evaluation Changes in body weight during 8 weeks for different rat groups fed different protein sources during 8 weeks was investigated while the effect of whole body gamma irradiation (6.5) and /or different protein sources on body weight gain % in different rat groups were calculated at time intervals from 1-30 days. For biological and, histological studies.

Animals were sacrificed by decapitation one and ten days after radiation and after radiation and treatment

Histopathological preparations:

Immediately after sacrifice, the kidneys were dissected out and were fixed with Carnoy's fixative and Bouin's fluid for histopathological examination. The tissue was dehydrated in tertiary butyl alcohol, cleared in amyl acetate, and embedded in paraffin. Serial sections were cut at 7 µm and stained with iron Haematoxylin and eosin.

RESULTS:

Biological Examination:

1-Chemical composition of soybean and faba bean:

The chemical composition of soybean and faba bean is illustrated in Table (a) and fig. (a) .The results indic - ates that soybean is an extremely rich source of protein and fat, It contains 36.7%protein, 19.59% fat 4.27% ash, 6.65 % fiber, 24,2% carbohydrates and 8.6 % moisture and provides about 417.65 (kcal/kg) energy. The values obtained for faba bean are 2813,1.44. 2.86,7.99,49.59 and 9.3 % and provides about 326.26 (kcal/Kg) energy. The results showed that soybean recorded higher than faba bean for all parameters except for moisture, crude fiber, and carbohydrate contents. There are very high significant differences at ($p < 0.00l$) between soybean and faba bean ingredients.

2-Biological values:

Food consumption of different protein sources with or without body irradiation *(6.5* Gy) for different groups of rats (gm/day) is illustrated in Table (b) and fig. (b). The results indicated that irradiation induced reduction in food intake for all irradiated groups allover the experimental periods compared with the corresponding non irradiated groups. The highest reduction in food intake was observed in faba bean irradiated groups. The percentage difference equal to 88.16%, 87.26%, and 88.81 % on the 1st I0th and 30th day post irradiation respectively as compared with the corresponding control groups.

In soybean groups, radiation induced slight reduction in food intake as compared with non-irradiated groups. While in control groups, irradiation induced reduction in food consumed with percentage differences amounting to 97.58% and 96.3% on days 1 and 10 post irradiation, respectively as compared with the corresponding non-irradiated groups and Meanwhile on day 30* after irradiation, the values obtained matched control level.

The rats fed on soybean consumed more food than the control allover the experimental period while the lowest food intake was observed in faba bean groups. The percentage differences equal to 102.68, 103.18, and 101.51% at 1, 10, and 30 day in soybean, respectively as compared with the corresponding control casein groups. Meanwhile the percentage was 91.18%, 93.46%, and 91.67% at 1st and 30th days in faba bean, respectively as compared with the corresponding control casein groups.

Table (c) and fig (c), show the changes in body weight gain during 8 weeks for different rat groups fed different protein source. It was noticed that groups of rats fed soybean recorded non- significant differences in weight gain as compared with control casein groups allover the 8-week period. Meanwhile, faba bean groups recorded the lowest value in weight gain allover the period of 8 weeks. There was highly significant difference between weight gain in faba bean groups and both soybean and casein groups from the first week to the end of the 8^{th} week. Also it was observed that there was gradual reduction in the growth rate in groups fed faba bean, where the percentages differences equal to 89.90. 81.48, 77.08, 70.52, 66.65, 66.33, 60.05, and 56.12 % along the 8 weeks, respectively as compared with the corresponding casein groups.

Effect of whole body gamma irradiation (6.5 Gy) and /or different protein sources on body weight gain (%) in different rat groups is illustrated in table (d) and fig (d), the results showed a decreased body weight in irradiated groups allover the experimental time intervals as compared with the corresponding non-radiated groups. The lowest value was in soybean followed by casein groups. Meanwhile in faba bean groups there was significant difference on the 10^{th} and 30^{th} days between faba bean irradiated and both irradiated soybean and casein groups. The percentage differences in faba bean at 10^{th} and 30 day amounting to 22.36 and 24.97% respectively as compared with the corresponding non radiated groups. Also the results indicated that there was non-significant reduction in body weight gain (%) in soybean groups with percentage differences amounting to 98.65, 98.92, and 93.33% on the 1^{st}, 10^{th}, and 30^{th} day, respectively as compared with control casein values. The faba bean groups and both soybean and control casein groups. The reduction in weight gain in faba bean groups equal to 68.31, and 65.52 % on the 10^{th} and 30^{th} day, respectively as compared with corresp - onding control groups.

Histoological Examination:

Light microscopic examined sections from normal control rat kidney fed with casein, soybean, and broad bean are illustrated in Figs 1,2,3,4,5,6. Fig 1. Is a low power (200x) micrograph of the control Kidney from a rat fed with casein as a standard diet. The Kidney has two main parts the Outer Cortex (OC) and the Inner Medulla (IM). The main structure of the Cortex is the Renal Corpuscles. At this magnification they look like circular blobs. The Renal Corpuscles are the beginning of Nephrons.

Fig2: shows a close up micrograph (400x) of a Renal Corpuscle. The major structural component of the corpuscle is the Glomerulus (G). It is composed of fenestrated capillaries with the visceral layer of bowmans capsule (vl) surrounding the arteries. Bowman's Capsule is a double-layered epithelial cup in which the parietal layer (pl) is composed of Squamous Cells (SC). The Space in which the filtrate is located is called Bowman's space (BS) and it is the clear space that surrounds the entire glomerulus. Various tubules are found near the Renal Corpuscle, note cross sections of 1- Proximal Convoluted Tubules (P), in which the filtrate is first drained from Bowman’s capsule. 2- Distal Convoluted Tubule (D) that is near the end of the nephron . There are some basic differences between the two first is the amount of nuclei. The cells in the proximal tubule are fewer so they don’t contain many nuclei. In the distal tubules, there are more nuclei. Another major difference is the presence of a Brush Border in the cells of proximal tubule and not in the distal tubule (Brush border can not be seen at this magnification). Proximal tubules are a lot darker in staining and less cellular than the Lighter staining Distal tubules.

Fig (3,4) show sections of kidney from a non-radiated rat of group 2 fed with broad bean. they show the same normal structure but dilatation of the interstitial space could be observed. While sections from soybean fed rats showed more elongated and congested tubules the glomeruli look normal (Fig 5,6).

Inspection of kidney sections from animals fed with standard diet and taken one day after irradiation with single dose of gamma radiation (6.5Gy) revealed various signs of degeneration of the structural elements. Bowman's capsule was greatly affected, and Glomerular changes were manifested as pyknotic nuclei in the glomeruli, narcotic change, vacuolation, and degeneration, and epithelial necrosis could be observed. (Fig7).

Break down of tubular epithelial cells, total necrosis of renal tubular and sever necrosis of the renal tubule could also be observed. Some arteries were totally congested and replaced by hyaline collagen (HY) (Fig8).

Examined sections Ten days after exposure to gamma radiation showed fatty degeneration, multi lobulation and congestion of the glomeruli. Bowman's capsule become thickened or shed out (fig 9) the malpigian corpuscles showed widening of the urinary spaces (US). Amorphous fibrinoid assess (F) were occasionally shown in the Lumina of atrophied kidney tubule (fig 10).

Examined section of rat kidney fed with broad bean one and ten days after irradiation comes to the fact that a mild amelioration was observed on the first day while, area of necrosis , fragmented glomeruli, cloudy damage collecting tubules were still observed on the tenth day Figs 11 12).

On the other hand-examined sections from soybean fed irradiated rats showed a sign of protection of Bowman's capsules, the glomeruli were fairly well preserved. Repair and regene - ration of the renal collecting tubules .(Figs13 , 14) the nuclei were activated (Fig 15)

***Table (a) Chemical composition of soybean and faba bean (gm/100gm).**

Components	Moisture	Protein	Fat	Ash	Fiber	Carbohydrate	Energy (Kcal)
Soybean (Mean ± SD)	8.6±0.04	36.70±0.16	19.59±0.07	4.27±0.20	6.65±0.41	24.20±0.42	417.65±3.53
Faba bean (Mean± SD)	(a) 9.31±0.08	(a) 28.73±0.04	(a) 1.44±0.03	(a) 2.86±0.03	(a) 7.99±0.05	(a) 49.59±0.04	(a) 326.26±o.74

- Each value is the mean of 4 replicates ±SD

-(a): significantly difference from the soybean sample at p<0.001.

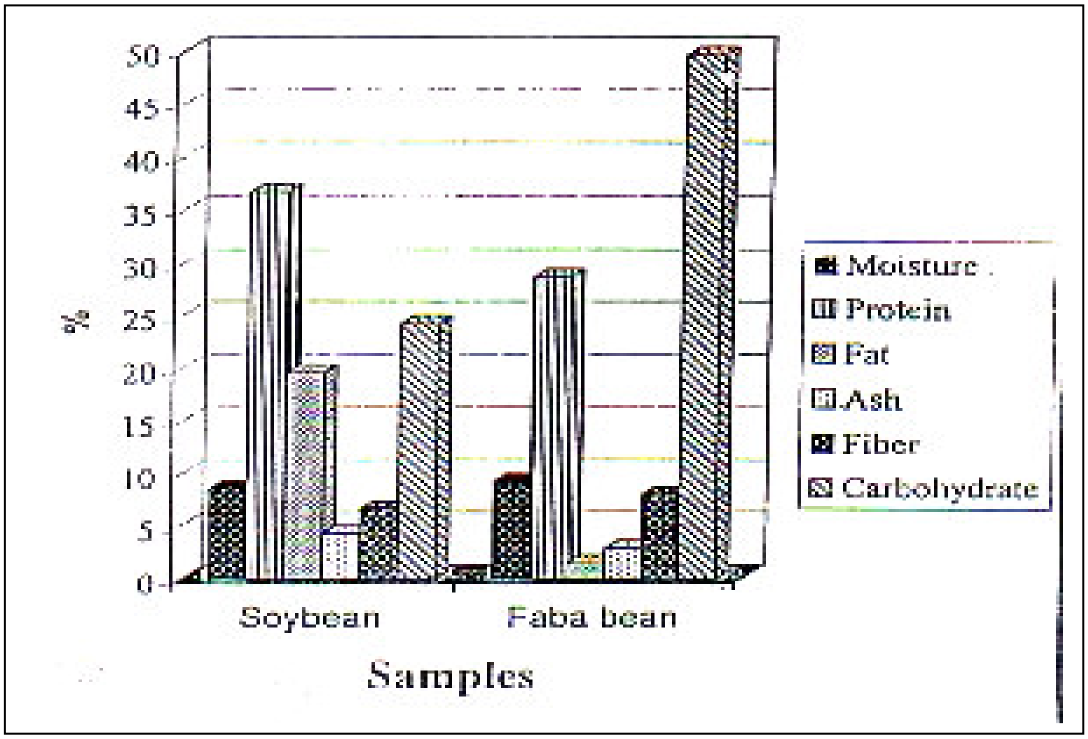

Figure (a): The chemical composition of soybean and faba bean (%).

**Table (b) : Food consumption of different Protein sources with or without gamma irradiation (6.5 Gy) for different rat groups (mean in gm./day)

Time intervals (Days)	Experimental Groups					
	Casein		Soybean		Faba Bean	
	Non-irradiated	Irradiated	Non-irradiated	irradiated	Non-irradiated	irradiated
1	(11.57) 100%	11.29 97.58%	(11.88) 102.68%	11.69 101.04	(10.55) 91.18%	10..20 88.16%
10	11..62 100%	11.19 96.30%	11.99 103.18%	11.84 10189%	10.86 93.46	10.14 87.26%
30	11.98 100%	11.81 99.33%	12.07 101.51%	12.03 101.18%	10.90 91.67%	10.56 88.81%

- Each value is the mean of 6 rats.
- Values between brackets represent the mean of food consumtion of rat groups fed different protein sources
- (mean gm/day) during 8 weeks before radiation exposure

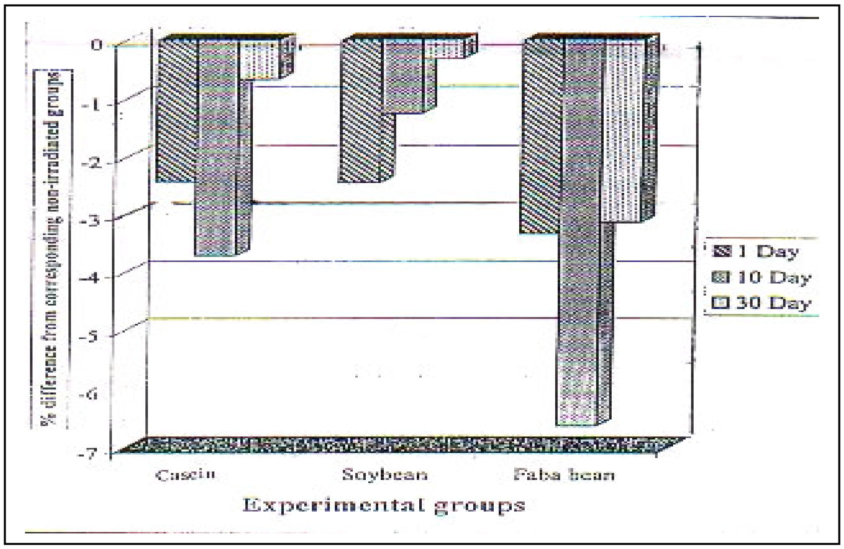

Figure (b): Percent changes in food consumption of irradiated rats fed different protein sources .

***Table © changes in body weight during 8 weeks for different rat groups fed different protein sources (mean in grams)

Time (weeks)	Casein (Mean± SD)	Soy bean (Mean± SD)	Faba bean (Mean ± SD)
0	54.30±3.92 100%	54.23±2.80 99.87	54.47±3.09 100.31%
1	68.93±6.67 100%`	68.30±4.45 99.09%	(a ,b) 61.97±3.95 89.90%
2	84.97 ±7.92 100%	82.97 +6.53 97.65%	(a, b) 69.23+531 81.48%
3	100.97 +11.53 100%	99.47 ±9.19 98.51	(a, b) 77.83±81.9 77.08
4	122.37 ±12.83 100%	120.53 ±13.42 98.50	(a, b) 86.30 ±10.35 70.52%
5	143.10±14.39 100%	137.67 ± 17.09 96.21%	(a, b) 95.37 ±12.79 66.65%
6	160.47 ± 16..76 100%	157.53 ±20.60 98.17%	(a, b) 101.63 ±13.61 63.33%
7	180.53 ± 18.96 100%	175.30 ±23.70 97.10%	(a ,b) 108.40 ±16.86 60.05%
8	198.57 ±19..63 100%	194.50 ±27.53 97.95%	(a, b) 111.43 ± 17.88 56.12 %

- Each value is the mean of 36 rats ±SD.
- (**a**) significant difference from the corresponding casein group at $p<0.01$.
- (**b**) significant difference from the corresponding soybean group at $p<0.01$

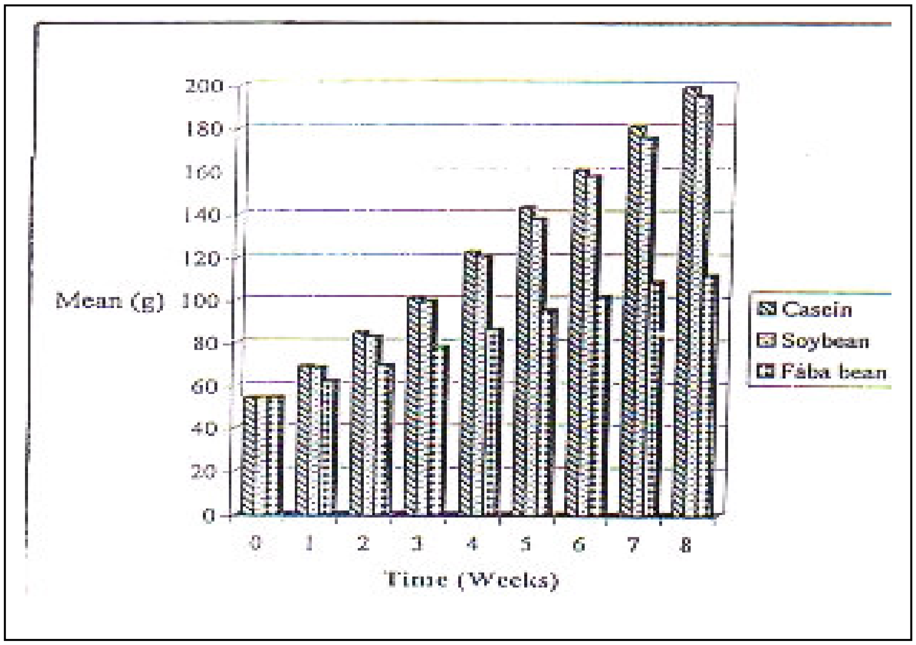

Figure ©: Change in body weight gain during 8 weeks for different rat groups fed different protein sources.

****Table (D) : Effect of whole body gamma irradiation (6.5 Gy) and / or different protein sources on body weight gain % in different rat groups.

Time intervals (Days)	Experimental Groups					
	Casein		**Soybean**		**Faba Bean**	
	Non irradiated	Irradiated	Non irradiated	irradiated	Non irradiated	irradiated
1	1.48 ±0.45 100%	1.47 ±0.20 99.32%	1.46 ± o.11 98.65%	1.42 ±0.13 95.95%	1.22 ±0.29 82.43%	1.21 ±0.29 81.76%
10	14.80 ±4.52 100%	12.74±3.38 86.08%	14.64±1.02 98.92	12.89 ±1.96 87.09%	(a, b) 10.11 ±1.27 68.31%	(a, b, c) 3.31 ±0.59 22.36%
30	29.44 ±5.06 100%	22.18 ±3.39 75.34%	27.48±4.19 93.33%%	24.67±5.13 83.80%	(a, b) 19.2.9±1.25 65.52%	(a ,b ,c) 7.35 ±2.76 24.97%

- Each value is the mean of 6 rats ± SD

-**(a)** Significant difference from the corresponding casein group at $p< 0.05$

--**(b)** Significant difference from the corresponding soybean group at $p< 0.05$

--**©** Significant difference from the corresponding non irradiated group at $p< 0.05$

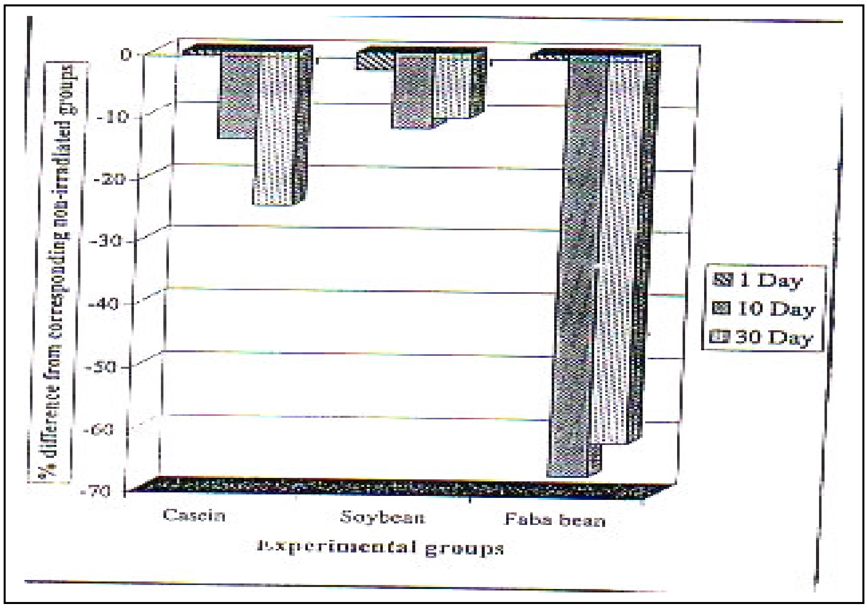

Figure (D) : Percent changes in weight gain of irradiated rats fed different protein sources.

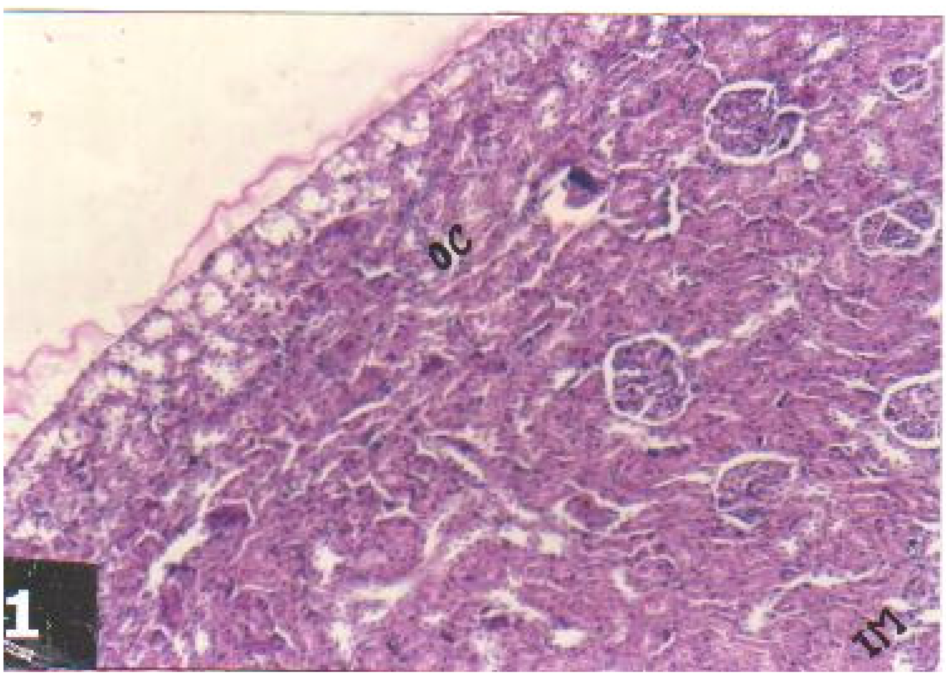

Fig1: A low power micrograph of the control Kidney from a rat fed with casein as a standered diet in longitudinal section. The Kidney has two main parts the Outer Cortex (OC) and the Inner Medulla (IM). The main part of the Cortex is the Renal Corpuscles. At this magnification they look like circular blobs, but they are only found in the cortex of the kidney. (Hx&E 200x)

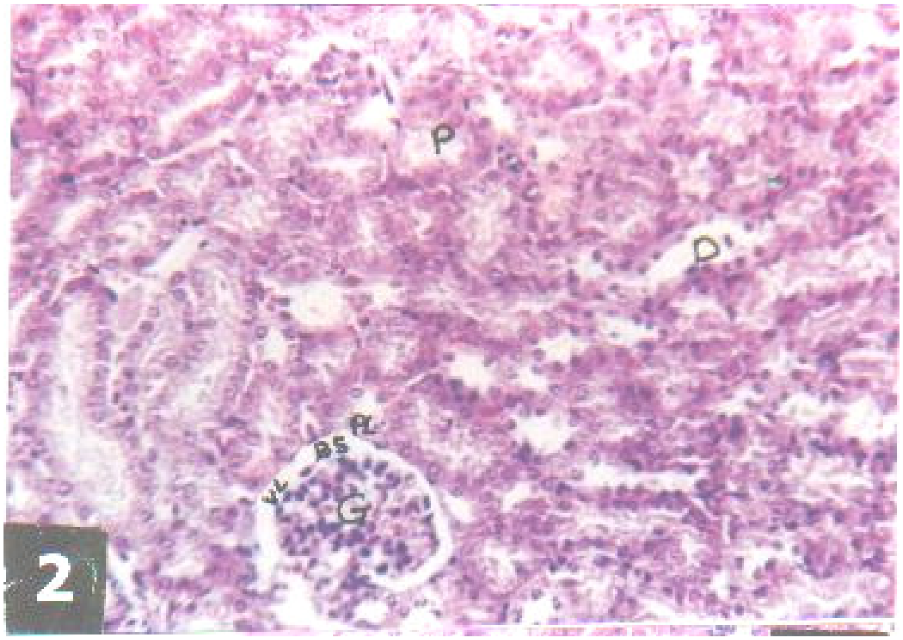

Fig2: Close up image of a Renal Corpuscle. The major structural component of the corpuscle is the Glomerulus (G), Bowman's capsule formed of visceral layer (VL), and Parietal layer (PL) Bowman's space (BS), Proximal Convoluted Tubules (P), - Distal Convoluted Tubules(D)., (Hx.&E 400x)

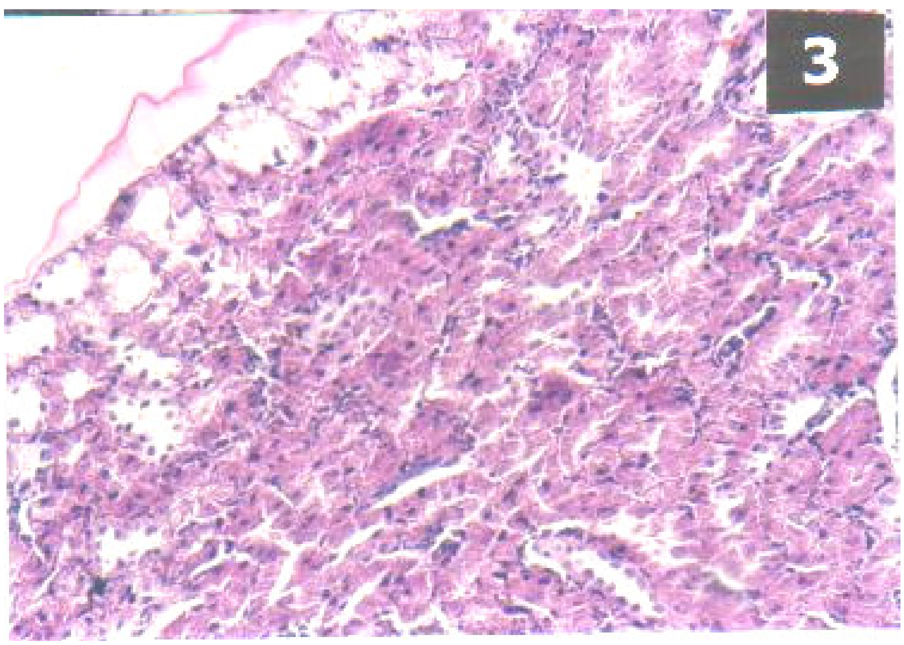

Fig3: Section of kidney from a n on irradiated rat of group 2 fed with broad bean showing the same normal structures but dilatation of the urinary space could be observed. (Hx.&E 200x)

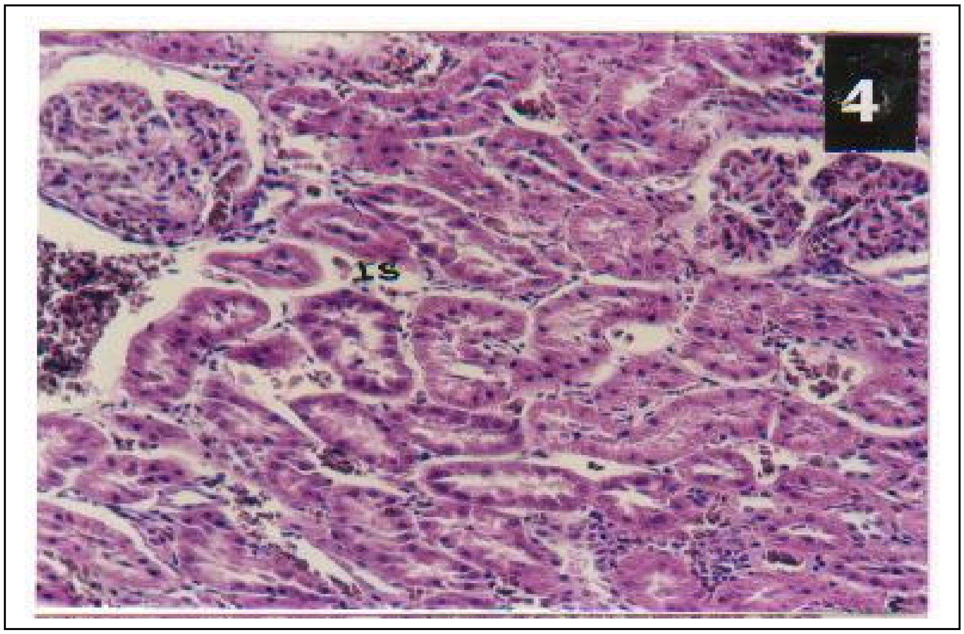

Fig4: **S**ection of kidney from a control rat of group 2 that fed with broad bean showing the same normal structure Notice the dilatation of the interstitial space (IS)(Hx.&E 200x)

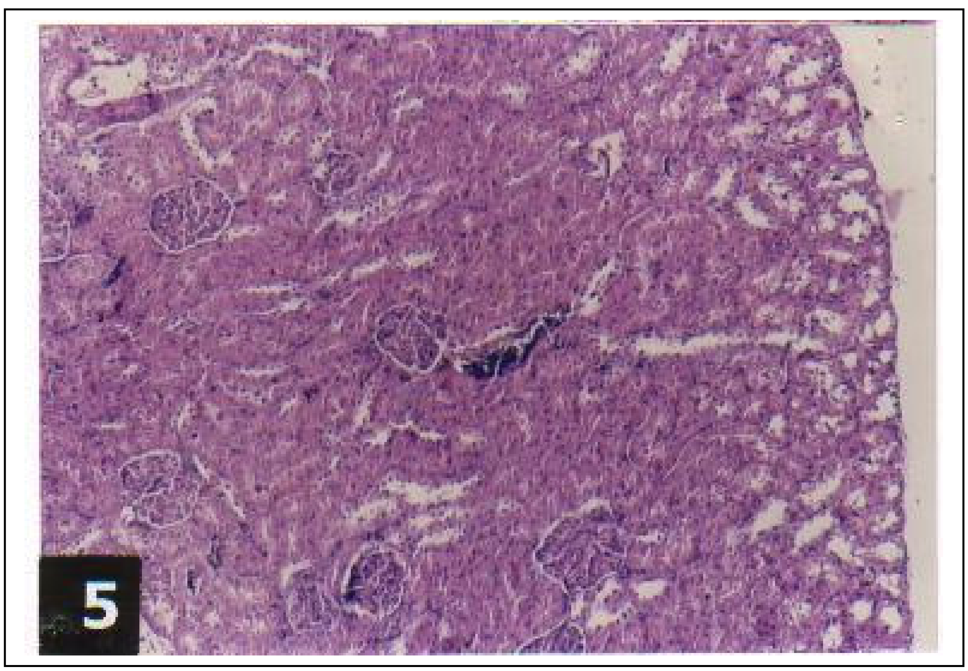

Fig5: Section of kidney (200x) from a soybean fed rats showing more elongated and congested tubules (Hx.&E 200x)

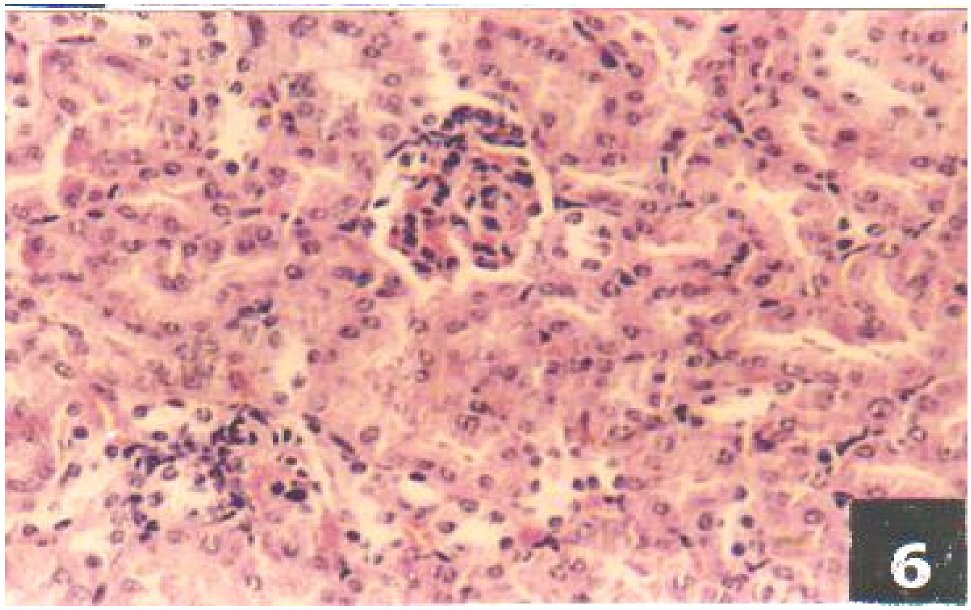

Fig 6: Section of kidney from a soybean fed rats showing that the glomeruli look normal while some were fragmented (Hx.&E 200x)

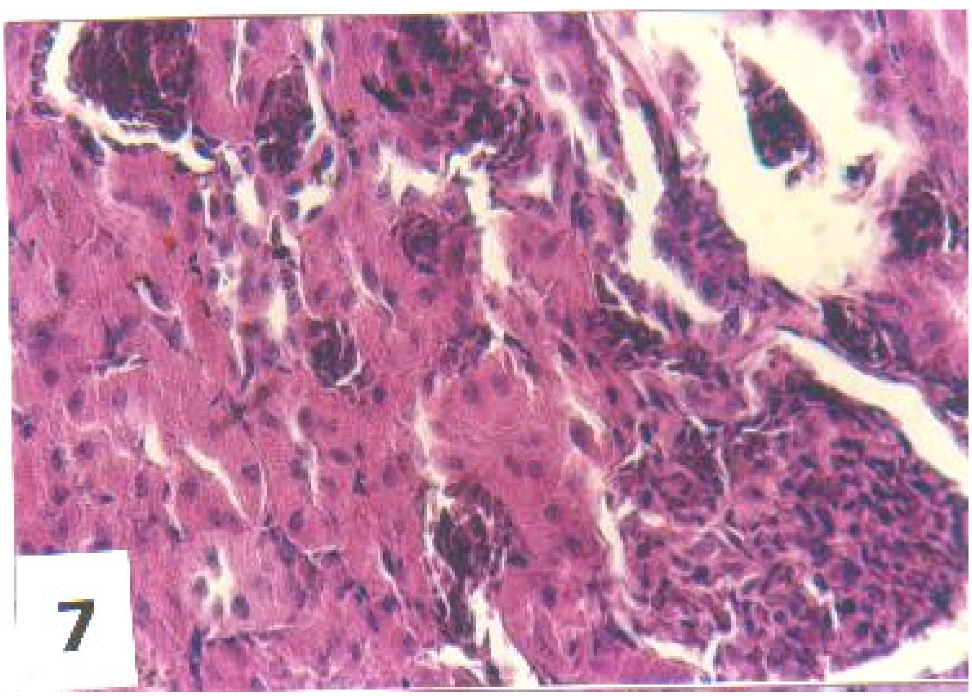

Fig 7: section of kidney of rat fed with standard diet and taken one day after irradiation with single dose of gamma radiation (6.5 Gy) revealed various sign of degeneration of the structural elements. narcotizing change, vacuolation, and degeneration, and epithelial necrosis could be observed. (Hx.&E 200x)

Fig 8: Section of kidney that fed with standard diet and taken one day after irradiation with single dose of gamma radiation (6.5 Gy))**:** showing, total necrosis of renal tubular. Some glomerulus was totally replaced by hyaline collagen (HY). (Hx.&E 00x)

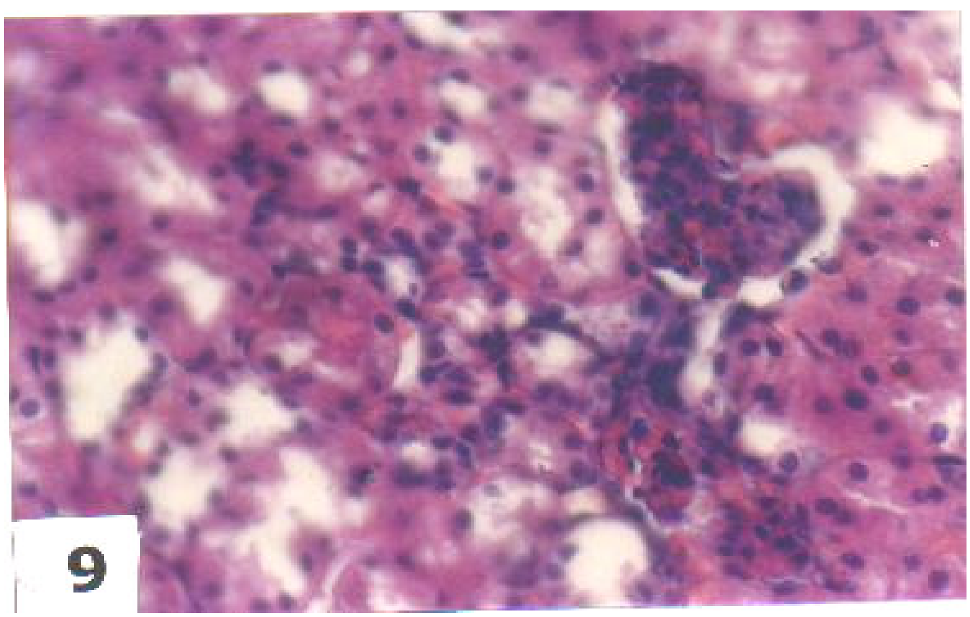

Fig 9: Section of kidney of rat fed with standard diet and taken ten days after exposure to gamma radiation showed fatty degeneration, multi lobulation and congested of the glomeruli bowman’s capsule become thickened or shed out (Hx.&E 200x)

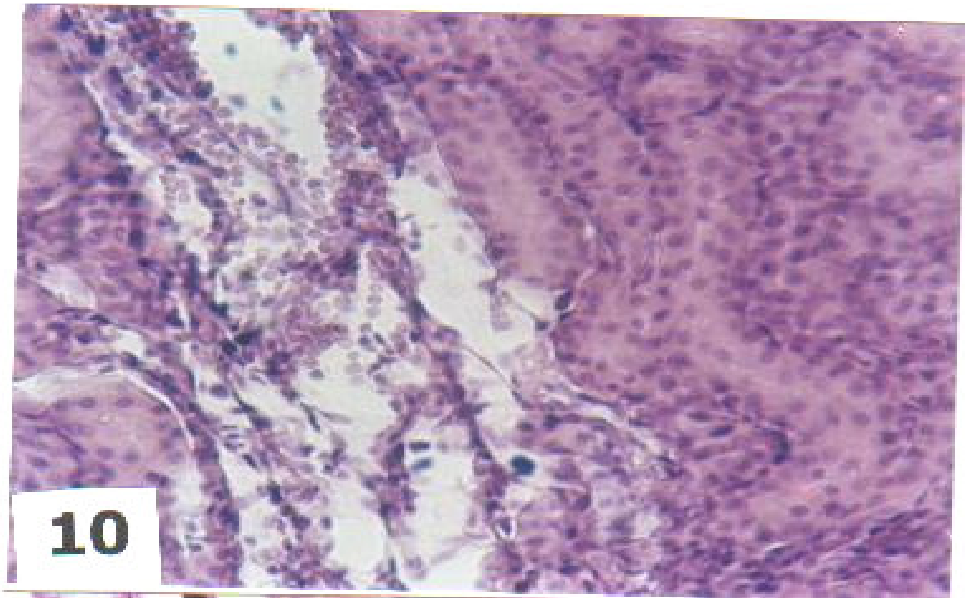

Fig 10: Section of kidney sections from rat fed with standard diet and taken ten days after exposure to gamma radiation the malpigian corpuscles showed widening of the urinary spaces (US). Amorphous fibrinoid assess (F) were occasionally shown in the Lumina of atrophied kidney tubule (Hx.&E 200x)

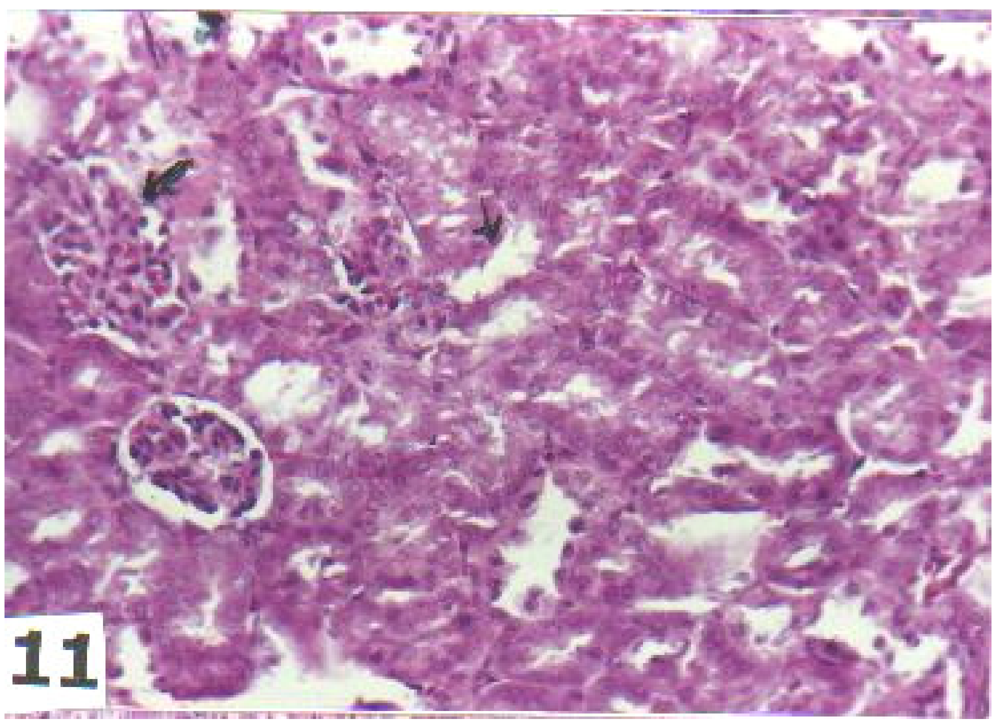

Fig 11: Section of rat kidney from rat fed with broad bean one day after irradiation showing fragmented glomeruli, tubular damage swelling and disorganization of the collecting tubules still observed (Hx.&E 200x)

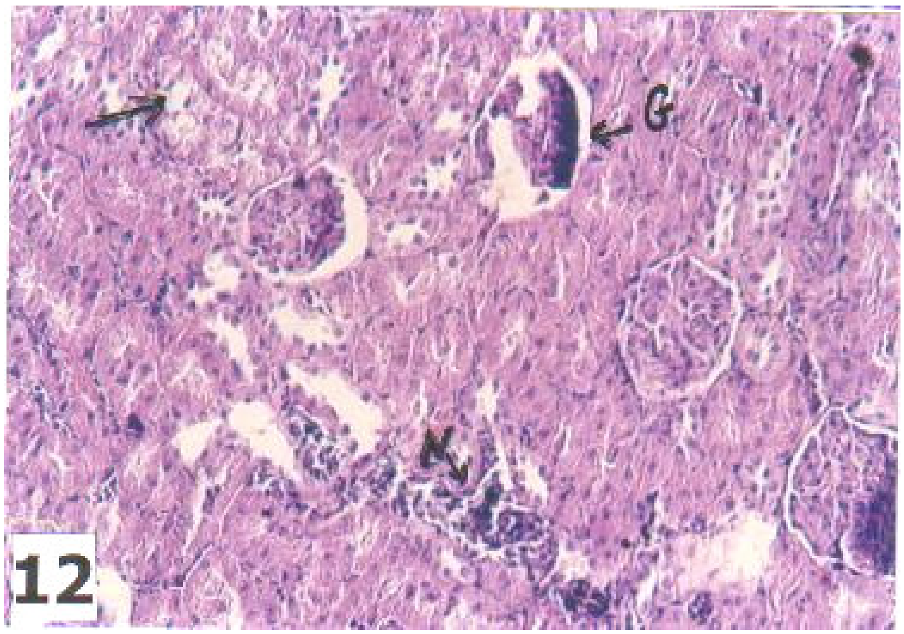

Fig 12: Section of rat kidney from rat fed with broad bean ten day after irradiation showing fragmented glomeruli, tubular damage area of necrosis (N) still observed (Hx.&E 200x)

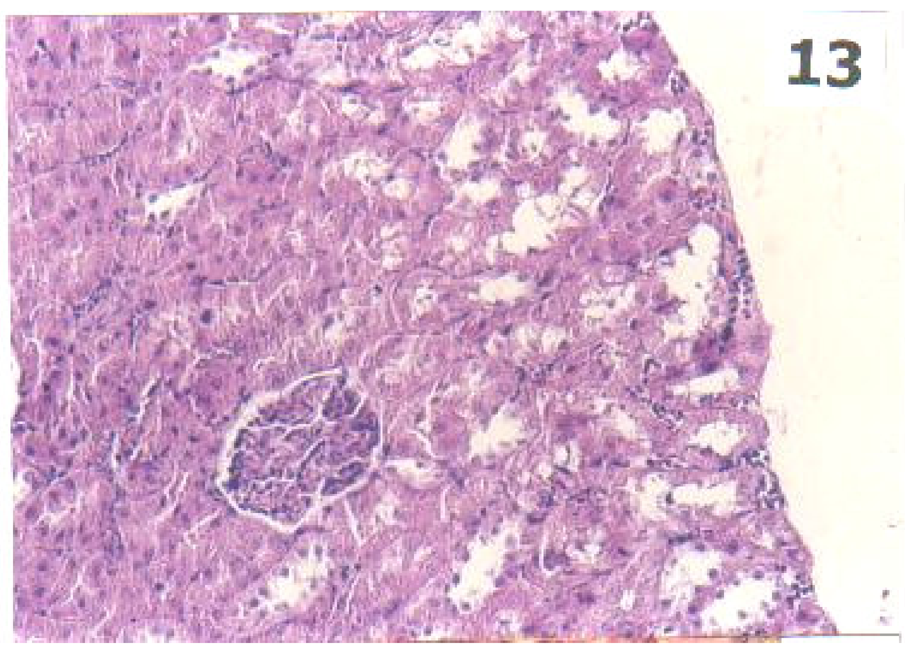

Fig 13: Section of rat kidney from rat fed with soybean one day after irradiation showed that a sign of recovery of bowman's cabsouls (Hx.&E 200x)

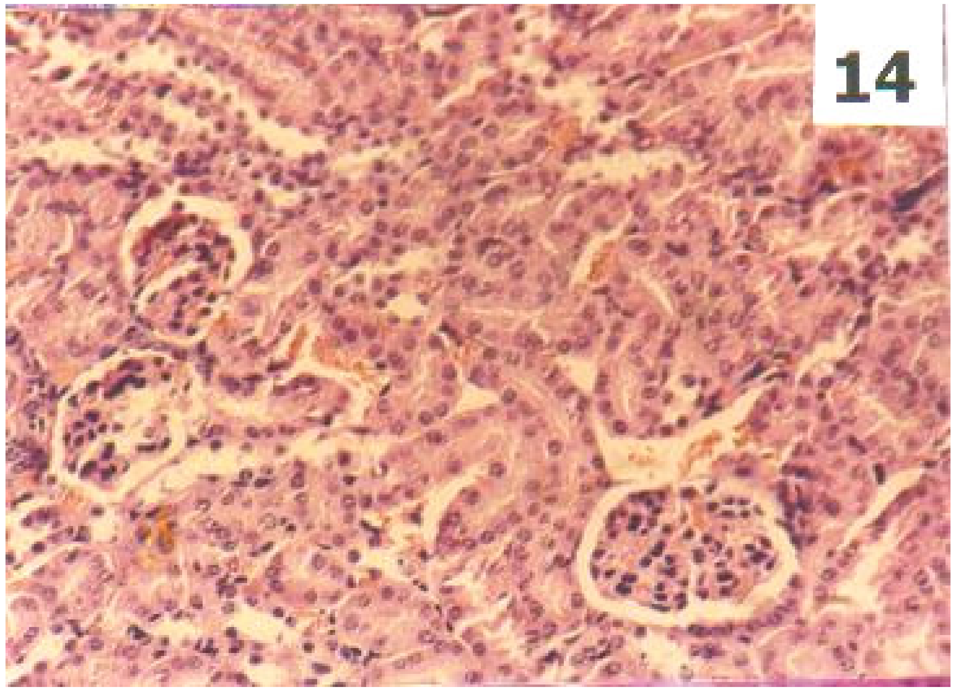

Fig 14: Section of rat kidney from rat fed with soy bean ten day after irradiation showed that the glomeruli were fairly well preserved. (Hx.&E 200x)

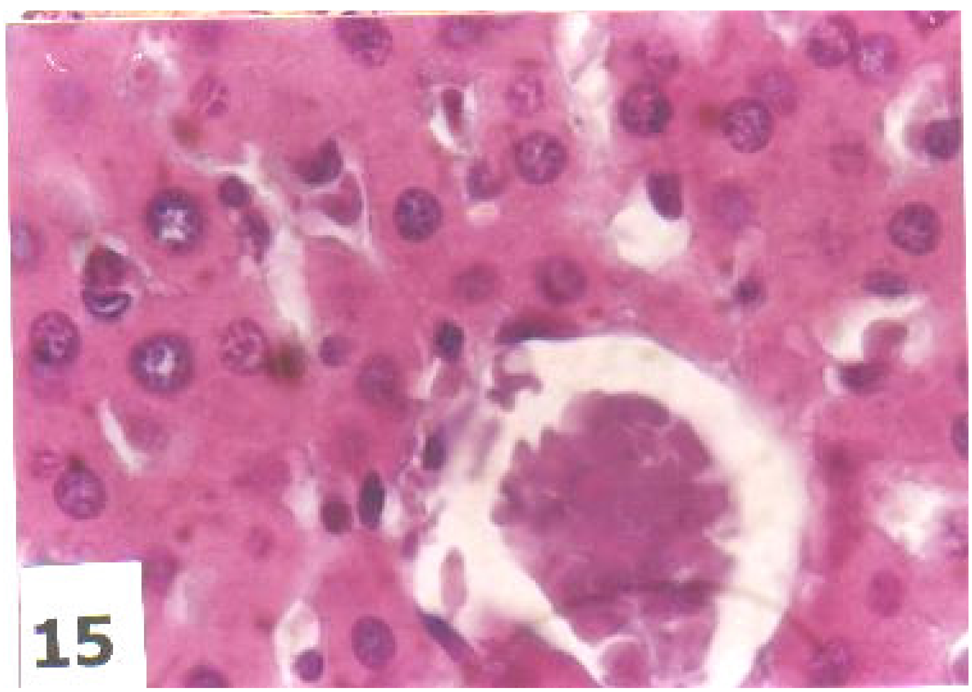

Fig 15: Section of rat kidney from rat fed with soy bean ten day after irradiation showed repair of the renal collecting tubules the nuclei were activated and in mitotic state (Hx.&E 400x)

Discussion:

The present work aimed to study the biological effects of gamma radiation and the possible protective role through feeding process. One of the goals of the present study was to evaluate the role of beans as a cheep source of proteins and bioflavonoids to overcome the radiation injuries induced by gamma radiation as an example of ionizing radiation . Kvacheva, IuE (2002) reported that Radiation may affect living things by affecting the cells that make up the living organism. its effect on a cell is random. That is, the same type and amount of radiation could strike the same cell many times and have a different effect, including no effect, each time. However, in general, the more radiation that strikes the cell, the greater the chances of an effect occurring. If a significant number of cells are affected, the organism may be damaged or even die. When a cell absorbs radiation, there are four possible effects on the cell. First, the cell may suffer enough damage to cause loss of proper function, and the cell will die. Second, the cell may lose its ability to reproduce. Third, the cell's genetic material (i.e., the DNA) may be damaged such that future copies of the cell are altered, which may result in cancerous growth. Finally, the absorption of radiation by a cell may have no adverse effect (Fred et al., 1985). High doses of radiation can kill cells or keep them from growing and dividing. Although some normal cells are affected by radiation, most normal cells appear to recover more fully from the effects of radiation than do cancer cells. As ionizing radiation elaborates the formation of free radical Halliwell, et al., (1995) , studied the role of bioflavonoids as antioxidants in neutralizing free radicals. They found that Antioxidant molecules have the ability to lose electrons without forming a chain reaction. Antioxidants react easily with oxygen and protect the other neighboring cells from damaging react - ions with oxygen. They quench free radicals and promote healthy cells. Markaverich, (1988) suggested that biof - lavonoids, through a certain interaction sites, may be involved in cell growth regulation. There is growing evidence that legumes play an important role in the prevention of chronic diseases. Soybeans continue to be widely investigated for their health protective benefits. Studies have shown that including soy in our diet may help protect against heart disease, cancer, and osteoporosis, and radiation injuries. Also Shimoi *et al.,* (1994) reported that, the radio protective effect of flavonoids in mice may be attributed to the hydroxyl radical scavenging potency in a direct or an endogenous enzyme mediaed manner. Chang *et al*., (1999), reported," most of the legumes have good antioxidant effects".World Cancer Research, (1997); Anderson *et al*., (1999) and Kushi *et al*., (1999)stated that Legumes were shown to lower blood cholesterol concentration and improve vascular health in feeding studies also they may influence estrogen metabolism and, thereby, decrease the risk of hormone- dependent cancers. They improve many aspects of diabetic stat and provide metabolic benefits ..

Nwwokolo and Smartt, (1996) found that soybean is an extremely rich source of nutrients. The raw soybean contains 36.4% protein, which is considered as much as double the protein present in most dry beans, thus soy protein able to improve total protein .The hazardous effect of gamma rays on body weight and food intake in rats may be attributed to severe anorexia for several days post – irradiation, and intestinal damage, which induced a reduction in the gastric secretion with a great decrease in acidity. However, absorption would also be impaired by gamma irradiation (Shebaita et al., 1981 and Cai et al., 2001.)

Mukherjee et al., (1997) stated that whole body gamma irradiation induced observed decrease in food consumption. The pretreatment with radio protectors modify this effect, this reduction in body weight post irradiation may be due to reduction in food intake caused by gamma irradiation. These findings were in agreement with our present result which indicated that reduction in food intake compared with the non radiated ones. Also irradiation caused reduction in weight gain in all irradiated groups. . The lowest reduction in food intake and weight gain was observed in soybean and casein irradiated groups, meanwhile the highest reduction in food in takes and weight gain was observed in faba bean irradiated group.

Anderson, et al., (1999), stated that a relation exists between the excessive intake of protein and a decreased renal function. Excessive protein intake causes hyper filtration and glomerulus hypertension, which results in a progressive deterioration of the kidney function and nephropathy. After a protein-rich meal, the blood flow to the kidneys increases. In individuals suffering from a chronic renal disease, this increase is much more pronounced than in healthy persons (30% versus 10%). The quantity of the protein as well as the quality is important. Concerning the effect of irradiation on kidney tissue many authors believed that renal tubules and interstitial blood vessels are the most susceptible structural elements of the kidney The present study come to the fact that one day after exposure to gamma radiation greatly affected both interstitial tissue and renal tubules which suffered from degen -erative and narcotizing changes. In addition Glomerular changes which mani -fested by pyknosis in the nuclei of some cells, , cellular injury, greatly affected Bowman's capsule and, narco -tizing change, vaculation, total epithelial necr -osis could also be observed. In their study Gipta and Davi1985and Fani and Sawaya,(1998).who stated that the disor -ganization of the cytoplasm may be due to the loss of cytoplasmic component . Soy protein was reported to have a protective effect on the kidney, This was confirmed with studies of Wardl (1998) in rats who found that renal disease advances much more slowly with soy protein than with casein. Substitution of animal protein by soy protein was also reported to decrease protein urea in persons with chronic renal disease (D'Amico, (1999).

The repairing effect of soybean diet could be manifested in this study by regaining of the cytoplasm organization. Repair and regeneration of the renal collecting tubules, well preservation of the glomeruli and Bowman's capsouls. Similar results were reported by (Messina and loprinizi, 2001 Waer ,1998 and Berghofer et al., 1998)

Conclusion:

Soybean is an excellent source of high-quality protein, as complete as the protein found in meat. They are rich in calcium, iron, zinc, several of the B vitamins and fiber. Making soy foods a part of our diet will set us on the road towards a healthier life. Even a single daily serving of soy foods appears to have a protective effect, so one come to the fact that that kidney disease patients would benefit by including soy protein in their diet. . Indeed, research indicates that soy protein favorably affects kidney function.

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دراسات هستوباثولوجية و بيولوجية و نسيجية مقارنه علي الدور الوقائي لفول الصويا والفول البلدي ضد الأضرار الناتجة من الإشعاع

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تهدف الدراسة الحالية إلى تحديد التأثير الضار للتعرض الإشعاعي (جرعة واحدة 6,5 جراي) علي ذكور الفئران وتقييم الدور الوقائي لفول الصويا والفول البادي المعاملان ضد مخاطر التعرض الإشعاعي المحتملة .

- تم تقسيم الفئران إلى ثلاث مجا ميع رئيسية وبعد 8 أسابيع من تغذية الفئران بغذاء ثابت (الكازين)
- تم تقسيم كل مجموعة إلى مجموعتين إحداهما يتم تعريضها للإشعاع والأخرى لا تتعرض للإشعاع وتستخدم كمجموعة ضابطة .
- تم تقدير أوزان الفئران وكذلك كمية الطعام اليومي المتناول من اليوم الأول وخلال ثلاثين يوما بعد الإشعاع .
- تم دراسة التغيرات النسيجية لعينات الكلية في المجموعتين وذلك في اليوم الأول والعشر بعد الإشعاع

أوضحت النتائج ان فول الصويا وهو مصدر غني جدا بالبروتين له تأثير فعال كواقي من الأضرار الناتجة من التعرض الإشعاعي بالمقارنة بالفول البلدي الذي يعتبر اقل في نسبة البروتين واقل في الوقاية . فلقد لوحظ ان هناك تغيرات واضحة ناتجة عن التعرض الإشعاعي لخلايا الكلية المختلفة في اليوم الأول بعد الإشعاع وتقل في اليوم العاشر نسبيا وان التحسن في هذه التغيرات تحدث نتيجة للتغذية بمصدر البروتين المعالج سواء بفول الصويا أو الفول البلدي ز وكانت نتائج التحسن ملموسة و واضحة وسريعه في المجاميع المغذاة علي فول الصويا بالمقارنة بالفول البلدي وعلي هذا يمكننا التوصية بالاهتمام بالغذاء عامه والمصدر البروتيني خاصة للوقاية من أخطار التعرض الإشعاعي والحرص علي استخدام فول الصويا كمصدر أساسي للبروتين النباتي المعادل للبروتين الحيواني و لما له من نتائج مفيدة وفعاله.