RESULTS

THE OVARY

Group (1):

Pregnancies were recorded in all animals of this group.

H & E stain:

It showed that, the ovary was formed of an outer simple cuboidal epithelium covering a cortex (Fig. 1). The cortical connective tissue consisted of spindle shaped fibroblast like stromal cells, between which there were numerous collagenic fibres condensed under the epithelium forming a tunica albuginea. The parenchyma was formed of follicles at different stages of maturity. At the periphery and beneath the epithelial covering, there were the primordial follicles each contained a primary oocyte surrounded with a single layer of squamous follicular epithelial cells. The primary follicles were formed of somewhat deeper and primary oocytes with a deeply stained covering known as zona pellucida and surrounded by cuboidal follicular cells. The walls of the growing follicles contained more than a single layer of epithelial cells. Zona pellucida was more distinct and the stromal cells, surrounding the follicles, were differentiated into a capsule-like structure termed theca folliculi. Pools of follicular fluid appeared among the granulosa cells of the growing follicles. Each of the mature follicles was formed of an ovum at one side

Fig (1) A photomicrograph of an ovary section obtained from a control adult albino rat showing the different ovarian structures, mature follicles (MF), immature follicles (IMF) and atretic follicles (AF), (H and E stain X 100).

surrounded by a deeply acidophilic zona pellucida and a group of follicular cells (cumulus oophorus) surrounding a single large pool of fluid (follicular cavity). The follicular cells (membrana granulosa) were surrounded by theca folliculi that could be differentiated into an innermost cellular layer (theca interna) and a more fibrous outer one (theca externa).

The corpora lutea appeared as large pale structures. Each was formed of cells with pale acidophilic cytoplasm (lutein cells) with dark blue nuclei and collapsed cavity. It contained some collagenic fibres in between its cells.

Atretic follicles appeared with more fibroblasts invading their degenerating bodies. Some interstitial cells were detected in the ovarian stroma.

The medulla was small as compared with the cortex, and its connective tissue was loosely arranged. It contained mainy convoluted veins and small arteries. The stroma was formed of vascular connective tissue.

Masson's trichrome stain:

It showed a regular distribution of collagenic fibres throughout the ovarian stroma, in the theca folliculi (interna and externa), around the atretic follicles and in the blood vessels. However, a small amount was observed in the collapsed corpora lutea (Fig. 2).

Fig (2) A photomicrograph of an ovary section obtained from control adult albino rat showing the collagenic fibres around corpus luteum (CL), atretic follicles (AF) and blood vessels (BV), (Masson's trichrome stain X 100).

Periodic acid Schiff (PAS) reaction:

It was demonstrated all over the ovarian structures (Fig. 3). Follicular cells and connective tissue stroma showed a weak reaction while the liquor folliculi and stromal cells showed a moderate one. However, an intense reaction was observed in the zona pellucida.

Methyl green pyronin staining:

It was intense in the cytoplasm of the follicular cells, moderate in the corpora lutea and weak in the liquor folliculi (Fig. 4).

Feulgen reaction :

It was weak in the outer theca cells, moderate in the follicular cells and the stromal cells (Fig. 5).

Group (2):

No pregnancies were reported in this group.

H & E stain

It showed the presence of all structures as in the control. However, an apparent increase in the number of the atretic follicles and the stromal blood vessels was observed than in the control.

Fig (3) A photomicrograph of an ovary section obtained from control adult animal showing the PAS-positive material in the different ovarian structures, atretic follicles (AF) and immature ones (IMF), (Periodic acid Schiff reaction, X 100).

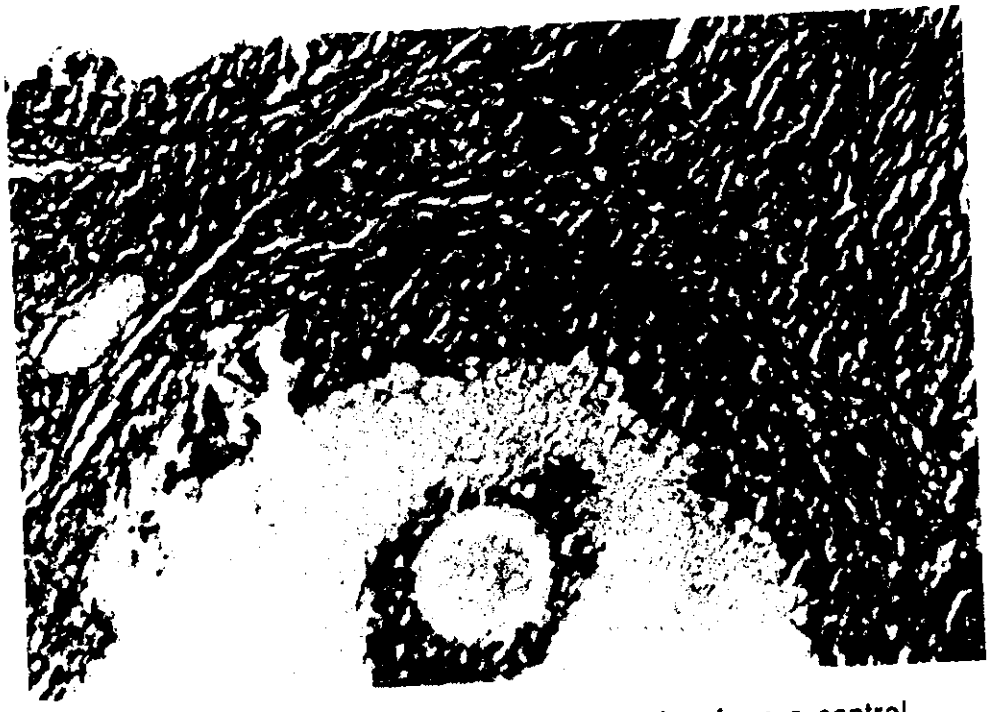

Fig (4) A photomicrograph of an ovary section from a control animal showing an intense RNA stainability in the cytoplasm of follicular cells, (Methyl green pyronin, X 400).

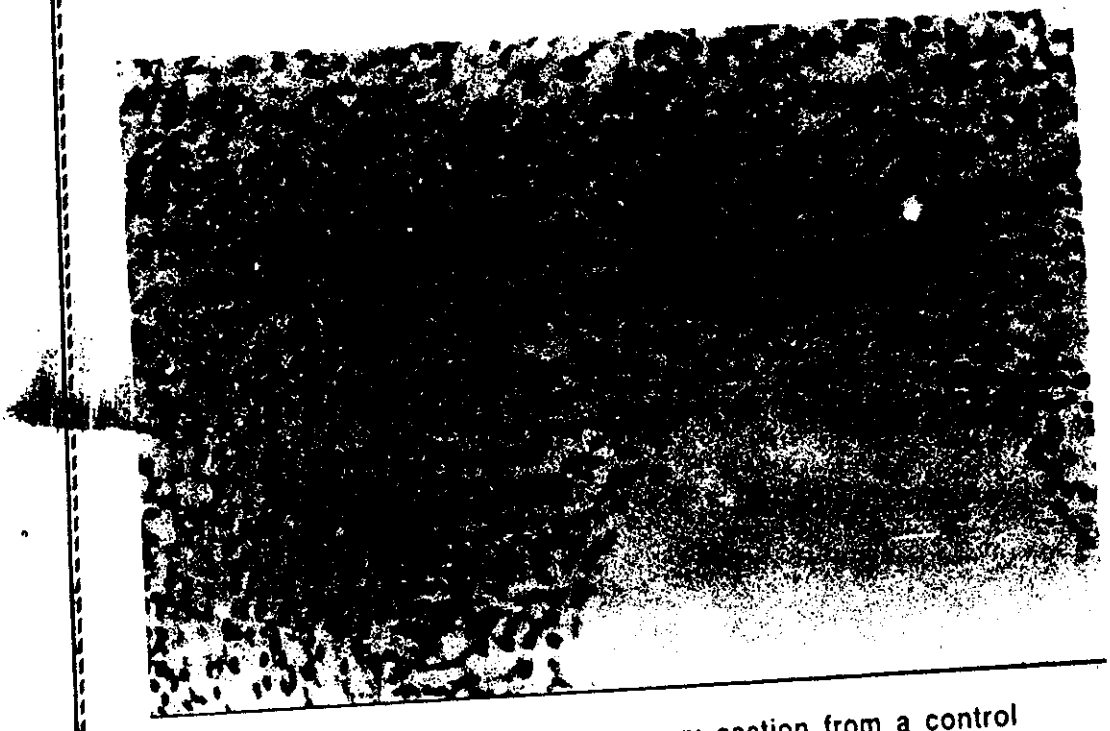

Fig (5) A photomicrograph of an ovary section from a control animal showing moderate nuclear DNA stainability in the follicular cells, (Feulgen reaction, X 400).

Fig (6) A photomicrograph of an ovary section obtained from animals fed 4 gm of cabbage seeds after 15 days showing an increased stainability of collagenic fibres in the ovarian stroma, (Masson's trichrome stain X 100).

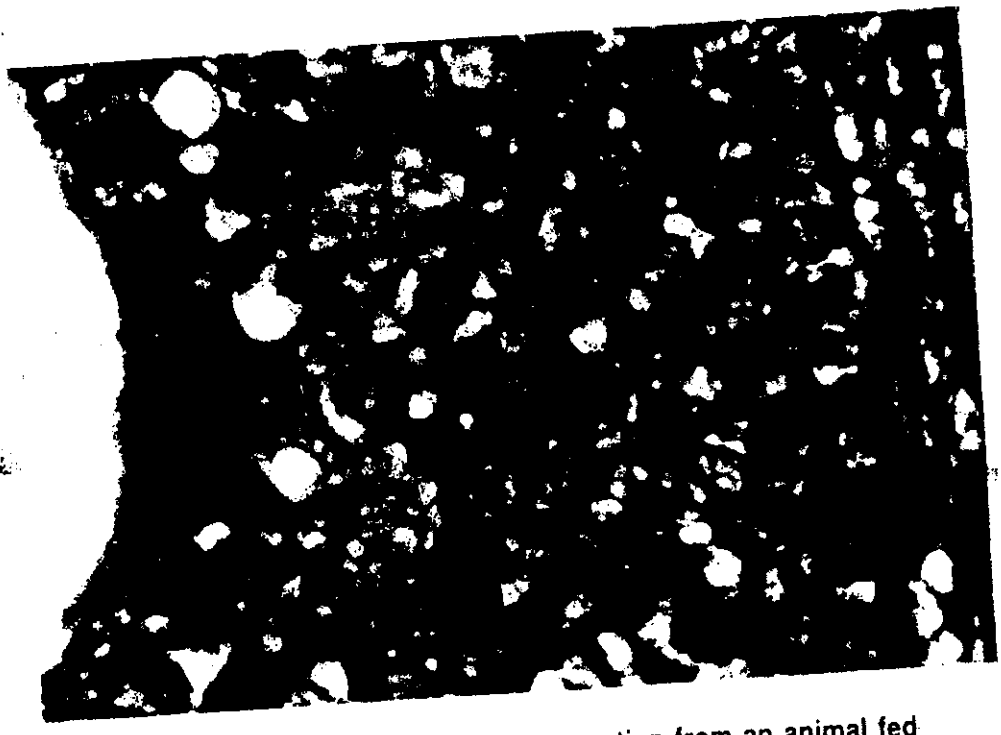

Fig (7) A photomicrograph of an ovary section from an animal fed 4 g of cabbage seeds for 15 days showing the regular distribution of the cytoplasmic RNA in the follicular cells, (Methyl green pyronin stain X 1000).

Fig (8) A photomicrograph of an ovary section from an animal fed 4 g of cabbage seeds for 10 days showing an intense nuclear DNA in the follicular cells, (Feulgen reaction, X 400).

Group (3):

As in group (2), no pregnancies were detected.

H & E stain:

It showed a less number of mature follicles after 15 days. However, the corpora lutea were represented with their vaculated eosinophilic cytoplasm and deeply stained nuclei, as well, the atretic follicles were increased in number at different periods of this group.

Masson's trichrome stain:

It showed a picture more or less as the control at the different periods.

PAS reaction:

It was intense in the follicular cells, moderate in the stroma cells and weak in liquor folliculi and luteal cells at the different periods.

Methyl green pyronin:

It showed a more or less the same grades of reaction as in group (2) in the different ovarian structures.

Feulgen reaction:

It showed darker nuclei than control at the different periods.

Group (4):

No pregnancies were recorded as in the previous group.

H & E stain:

It showed less changes than in the previous groups. These were mainly in the presence of wide blood vessels in the stroma.

Masson's trichrome stain:

It showed an increased amount of collagenic fibres, specially after 15 days intake of the cabbage seeds.

PAS reaction:

It was moderate in the liquor folliculi and follicular cells and weak in the stroma at the different periods.

Methyl green pyronin stain:

It demonstrated a weak reaction in most of the ovarian structures and a moderate one in the follicualr cells.

Feulgen reaction:

It appeared moderate in this group.

Group (5):

As well, no pregnant cases were recorded in this group.

H & E sections:

It showed a picture near to the control.

Masson's trichrome stain:

It showed that after 15 days of feeding, there was an increase in stainability of collagenic fibres than the control. While, this stainability decreased at 10 days and 5 days.

PAS reaction:

In follicular cells, it was intense at 15 days and decreased gradually from 10 days to 5 days. The stromal cells were moderate in the different subgroups.

Methyl green pyronin:

It seemed to be less than in the control. The luteal and stromal cells showed a moderate reaction.

Feulgen reaction:

It showed that the ovarian follicles were intensely stained than the control, while the stromal cells showed a moderate reaction.

THE UTERUS

Group (1):

H & E stain:

It demonstrated that its wall consisted of three coats, a thin serosa covering the outer side, a thick muscle layer, myometrium and a mucous membrane, endometrium (Fig. 9). The myometrium was formed of bundles of smooth muscle fibres arranged into indistinctly differentiated inner circular layer and outer oblique one. There were connective tissue fibres in between them including blood vessels. The sections showed that the endometrium was lined by simple columnar epithelial cells containing basal darkly stained nuclei with lightly stained cytoplasm. The connective tissue stroma or lamina proporia, represented a moderate number of glands lined by simple columnar epithelial cells and their lumens contained small amounts of secretion.

Masson's trichrome stain:

It illustrated that the collagenic fibres were uniformly distributed, mainly throughout the endometrial stroma with a lesser amount in the myometrial layer (Fig. 10).

Fig (9) A photomicrograph of a section of the uterus obtained from a control animal demonstrating its normal histological structure, with endometrial glands (GL), endometrium and myometrium, (H & E stain, X 100).

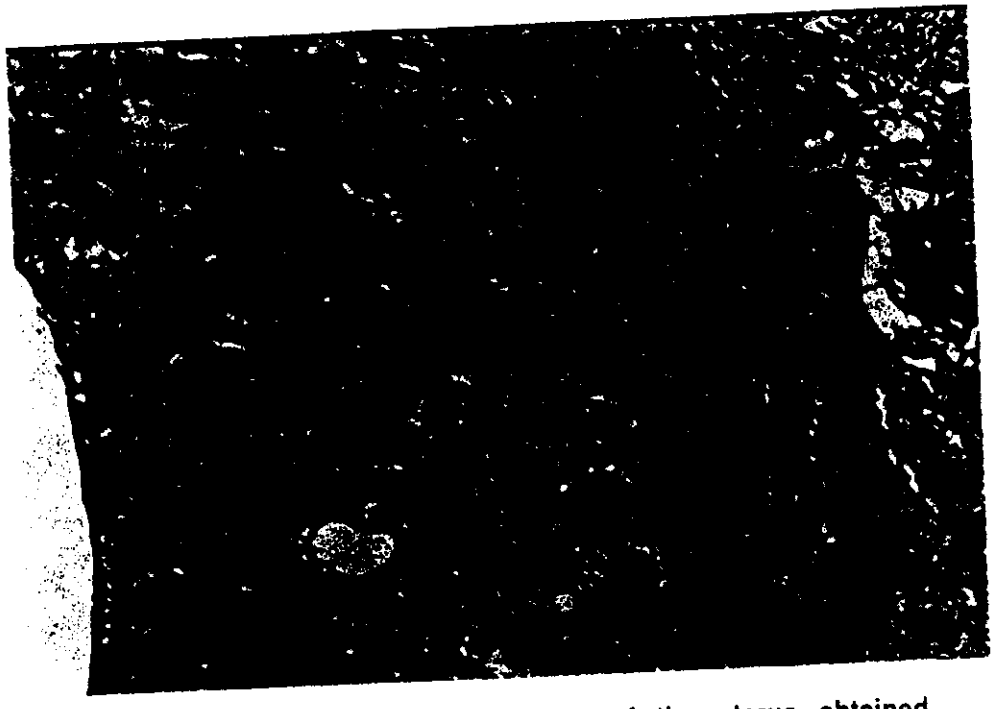

Fig (10) A photomicrograph of a section of the uterus obtained from a control animal demonstrating the regular distribution of the collagenic fibres in the stroma and rarely around the glands (GL), (Masson's trichrome stain, X 100).

PAS reaction:

It was intense in the cytoplasm of the endometrial lining cells and moderate in both the connective tissue stroma and the glandular epithelium (Fig. 11).

Methyl green pyronin stain:

It showed an intense pyroninophilic reaction in the myometrial layers and in the functional endometrial layer, while the epithelial cells showed a moderate reaction (Fig. 12).

Feulgen reaction:

It was moderately distributed in the glandular and lining epithelium and stroma (Fig. 13).

Group (2):

H & E stain:

It showed different structural changes than the control. After feeding of cabbage seeds for 15 days, the endometrial lining epithelium illustrated large dark basal nuclei and darkly stained cytoplasm than the control. The endometrium was generally thin, although the arteries were prominent and highly coiled. It was noticed that the glandular epithelium showed traces of secretion at the apical borders. Nearly similar features were detected at 10 and 5 days (Fig. 14).

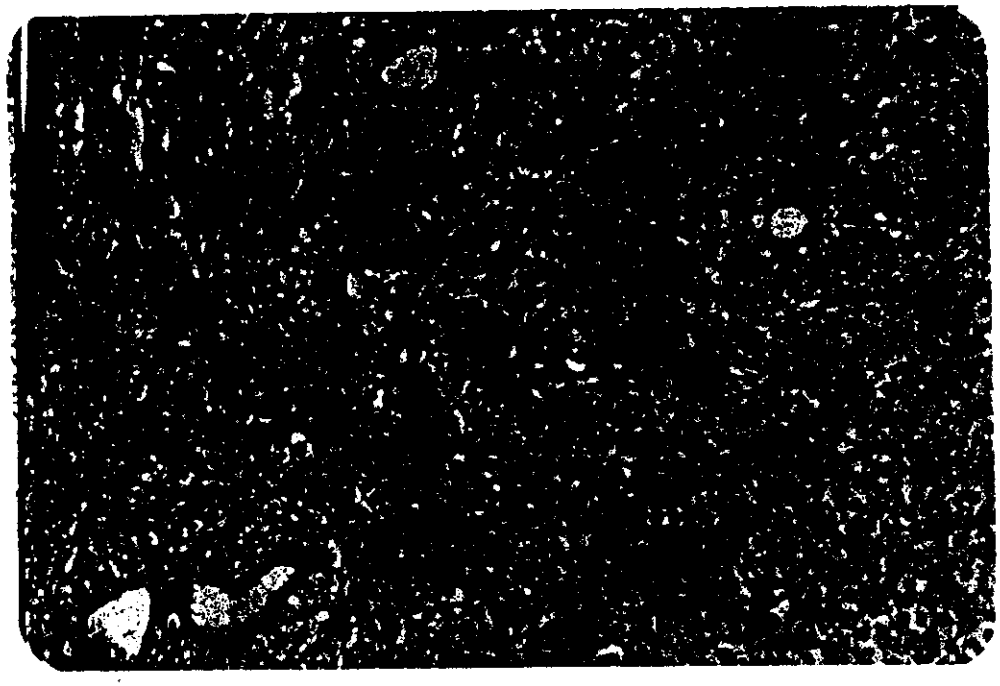

Fig (11) A photomicrograph of a section of the uterus obtained from a control animal demonstrating the PAS-positive material in the stromal cells and the glands (GL) of the endometrium, (Periodic Acid Schiff reaction, X 250).

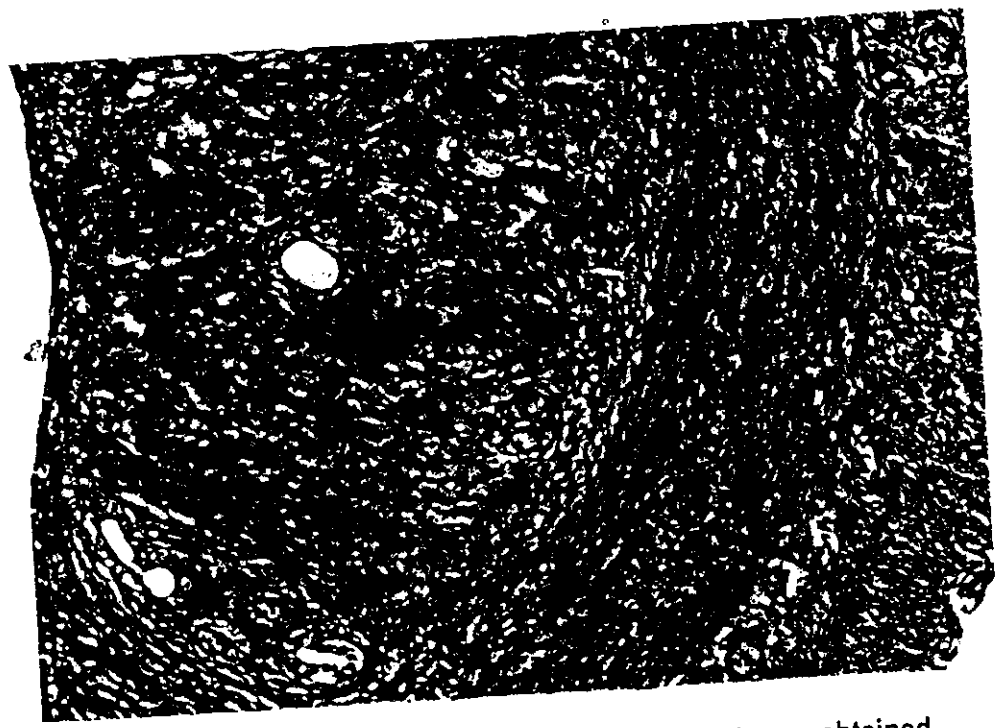

Fig (12) A photomicrograph of a section of the uterus obtained from a control animal demonstrating an intense pyronin reaction in the different layers of the uterus with less proliferation in the subendometrial layer, (Methyl green pyronin reaction, X 100).

Fig (13) A photomicrograph of a section of the uterus obtained from a control animal demonstrating moderate Feulgen reaction in both endometrial (EN) and glandular (GL) epithelial nuclei, (Feulgen reaction, X 400).

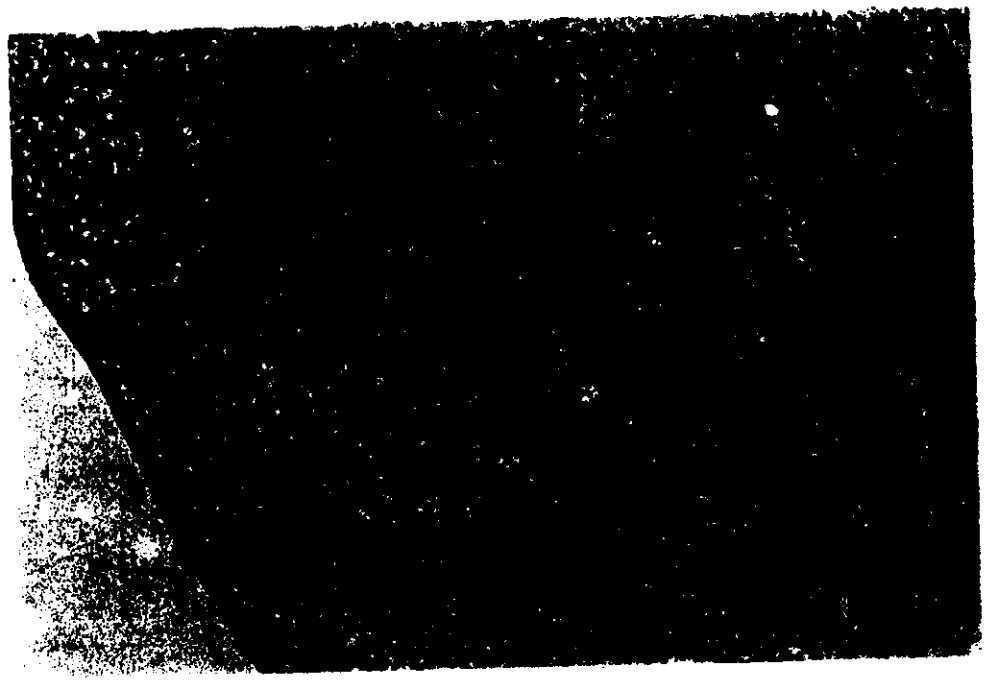

Fig (14) A photomicrograph of a section from a uterus obtained from group (2) after 10 days of cabbage seed administration demonstrating numerous stromal glands (GL), (H & E stain, X 100).

Masson's tricrhrome stain:

It demonstrated irregularly distributed collagenic fibres in the lamina proporia at 15 days. They were slightly increased in the endometrial stroma than the control. As well, after 10 and 5 days, the fibres were increased especially in the functional layer but decreased towards the myometrium.

Periodic acid Schiff reaction:

At 15 days, it was detected in the apical border of the epithelial lining of the endometrium as an intense reaction and in the glandular epithelium lumen, (Fig. 15). The myometrium showed a moderate reaction. After 10 and 5 days, the lamina proporia indicated an intense reaction that was increased gradually from the endometrium towards the myometrium.

Methyl green pyronin stain:

It showed that, at all periods, there was an intense reaction of cytoplasmic RNA in both the endometrial and the glandular epithelium and a moderate one in the myometrium.

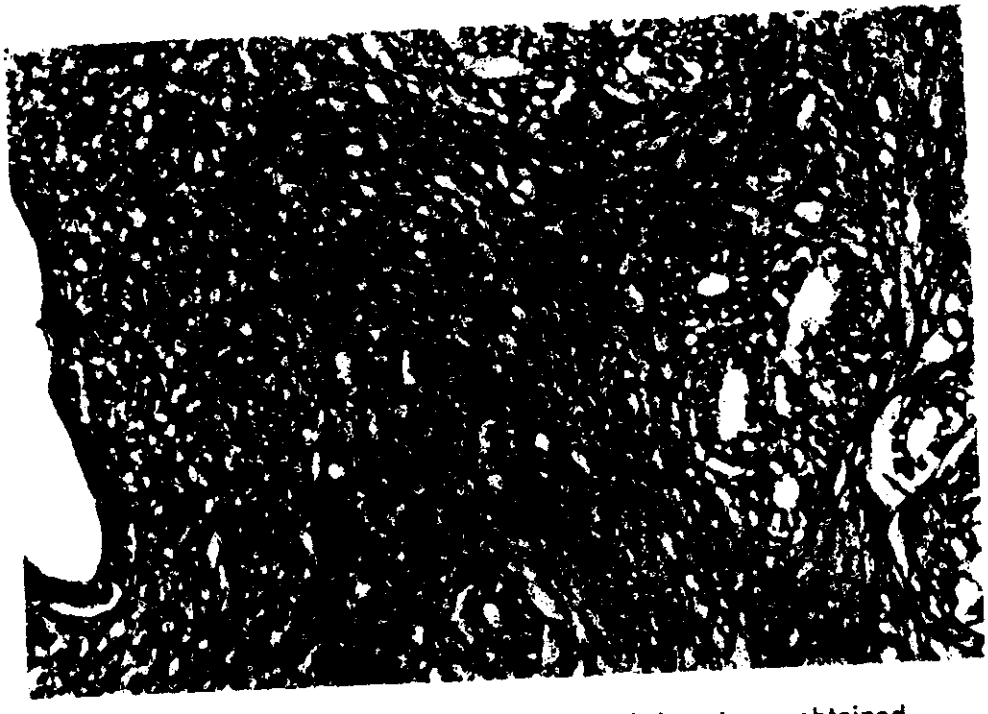

Fig (15) A photomicrograph of a section of the uterus obtained from an animal fed 4 g of cabbage seeds for 15 days showing the PAS-positive material in the apical border of both glandular (GL) and endometrial (EN) epithelium and stroma, (Periodic Acid Schiff reaction, X 250).

Feulgen reaction:

It indicated that the DNA was increased in the nuclei of all uterine structures. This was more marked especially in the functional layer of the endometrium at 15 days. However, it decreased gradually from 10 days to 5 days.

Group (3):

H & E stain:

There was an increase in the number and the coiling of the endometrial glands than the control. Both the glandular epithelium cells and the endometrial ones were thick and had darkly stained prominent nuclei, however, less marked than in group (2) (Fig. 16).

Masson's trichrome stain:

Collagenic fibers distributed throughout the endometrial stroma and increased from myometrium to endometrium. The stromal cells were more condensed than in the control.

PAS reaction:

There was a moderate increase in the reaction in the glandular epithelium. However, it was strong in the epithelium of the endometrium.

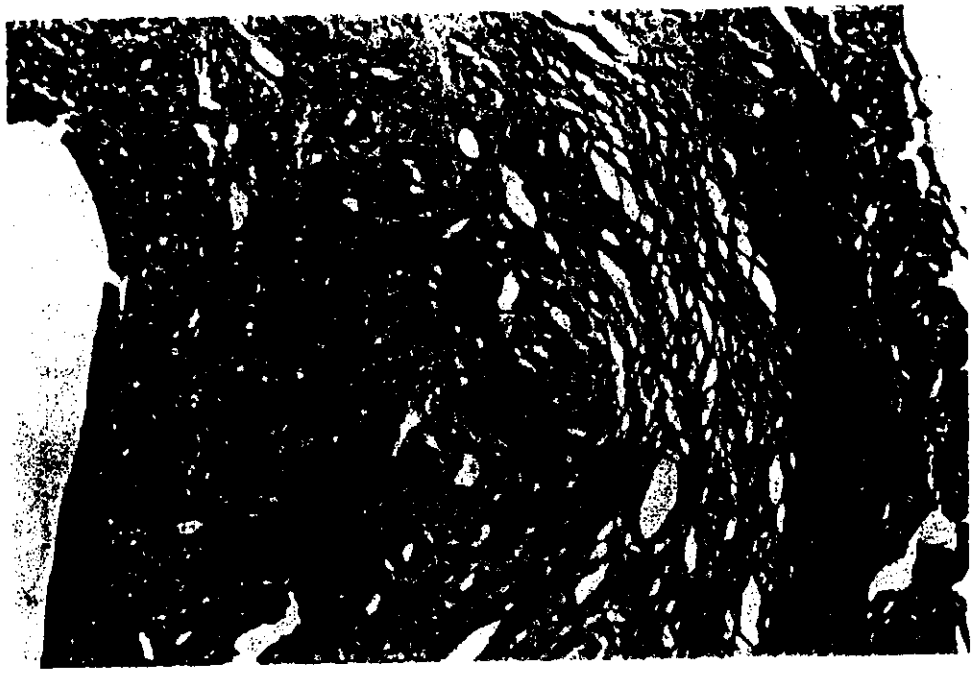

Fig (16) A photomicrograph of a section of a uterus obtained from an animal fed 2 g of cabbage seeds for 15 days showing numerous glands (GL), (H & E stain, X 100).

Methyl green pyronin stain:

It showed that there was an intense cytoplasmic RNA in both the glandular and endometrial epithelium and uterine stroma of 15 days, (Fig. 17). The reaction increased in the functional layer and decreased gradually towards the myometrium. After 10 and 5 days, it was less intense than 15 days.

Feulgen reaction:

It indicated that the DNA was intense in the nuclei in all the uterine structures at the different periods, especially in the functional (subendometrial) layer (Fig. 18). The nuclei appeared more proliferated in this layer.

Group (4):

H and E stain :

It showed that the uterine wall became thicker than the control. The endometrium appeared with numerous glands and some contained secretions in their lumens specially after 15 days. The myometrium was well vascularized as compared with the control (Fig. 19).

Masson's trichrome:

It denoted that the collagenic fibers of the lamina proporia appeared condensed in some areas in all treatments.

Fig. (17) A photomicrograph of a section of a uterus from group (3) after 10 days of cabbage seeds administration showing distribution of a moderate pyroninophilic reaction in the endometrial (EN) and glandular (GL) epithelium, (Methyl green pyronin stain, X 100).

Fig. (18) A photomicrograph of a section of a uterus from group (3) after 15 days of cabbage seeds administration showing and intense DNA in the nuclei of both endometrial (EN) and glandular (GL) epithelium, (Feulgen reaction, X 400).

Fig (19) A photomicrograph of a section obtained from a uterus of group (3) after 15 days feeding on 2 g of cabbage seeds illustrating numerous glands (GL), (H & E stain, X 100).

PAS reaction :

It was strong beneath the endometrial epithelium (Fig. 20).

Methyl green pyronin stain:

After 15 days, the endometrial layer showed a moderate regularly distributed reaction of cytoplasmic RNA. The myometrium showed a moderate stain than the control after 10 and 5 days.

Feulgen reaction:

The nuclear DNA in endometrial epithelium was increased by the increasing days. The reaction showed a moderate amount in the glandular epithelium

Group (5):

H & E stain:

The structure was nearly similar to that of the previous groups.

Masson's trichrome stain:

It showed more collagen fibers in the lamina proporia (Fig. 21) as compared to the control especially after 15 days. Its stainability was irregularly distributed in the stoma.

Fig (20) A photomicrograph of a section of the uterus of group (4) after 15 days of administration of cabbage seeds demonstrating the subepithelial glycogen deposits, (PAS-reaction, X 250).

Fig (21) A photomicrograph of a section of the uterus from group (5) after 15 days of administration of cabbage seeds showing more collagenic fibres irregularly distributed in the stroma (Masson's trichrome stain, X 125).

PAS reaction:

It showed that all the structures seemed to be, somewhat, more stained than the control.

Methyl green pyronin stain:

It showed slight changes than the control after the different periods of treatment.

Feulgen reaction:

It was still increased than the control throughout the different periods.

THE LIVER

Control:

H & E stain:

It showed that the liver was surrounded by a thin connective capsule that connected with fine septa more prominent in the portal areas dividing the liver lobes into lobules. There was an abundant connective tissue surrounding the main hepatic vessels and decreased gradually along their tributaries.

The parenchyma was composed of hepatic cells radially arranged in branching and anastomosing plates around central veins, (Fig. 22). The hepatocytes were polygonal in shape with acidophilic cytoplasm and contained one or two nuclei. The nuclei had fine chromatin with distinctive nucleoli. Irregular sinusoids were found in between the hepatic plates which opened in the central vein. Endothelial cells with elongated nuclei and macorphages (von Kupffer) with slightly condensed nuclei, were observed lining the hepatic sinusoids. In the portal areas, there were veins, arteries and bile ducts. The latter were lined with cuboidal epithelium.

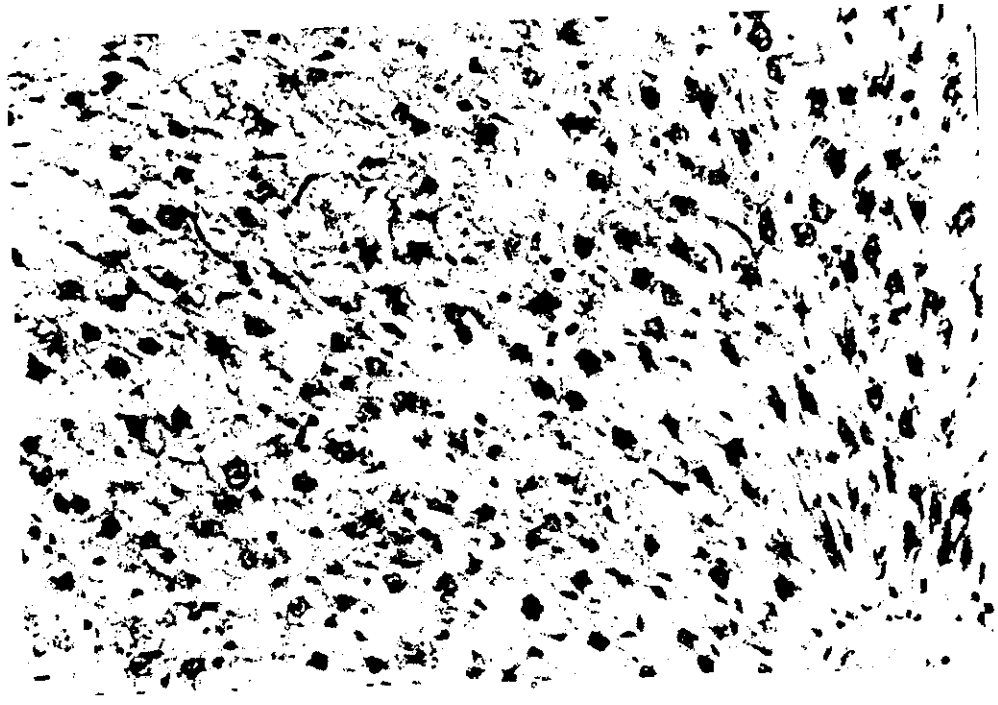

Fig (22) A photomicrograph of a section in a control liver showing the radially arranged normal hepatocytes (H) around a central vein, (H & E stain, X 250).

Masson's trichrome stained sections:

Showed collagenic fibres surrounding the main hepatic vessels mainly in the portal areas and interlobular connective tissue. They decreased gradually along the vascular tributaries (Fig. 23).

PAS reaction:

It was moderate in the epithelium of the bile ducts, the walls of the hepatic vessels, the hepatocytes and the lining of blood sinusoids. It was weaker in the peripheral areas.

Methyl green pyronin:

Showed an intense RNA reaction throughout the hepatic cells and weak in the portal system (Fig. 24).

Feulgen reaction:

Showed prominent hepatic nuclei (Fig.25).

1 gm:

H & E stain:

Demonstrated some changes in the structural components of the liver. The hepatocytes appeared smaller in size with the nuclei more densely stained than observed in the control. Some nuclei were picknotic. This was more clear in the liver sections after 15 days of feeding. The

Fig (23) A photomicrograph of a section in a control liver showing the distribution of collagenic fibres around the central vein (CV) and the sinusoids (S) (Masson's trichrome stain, X 250).

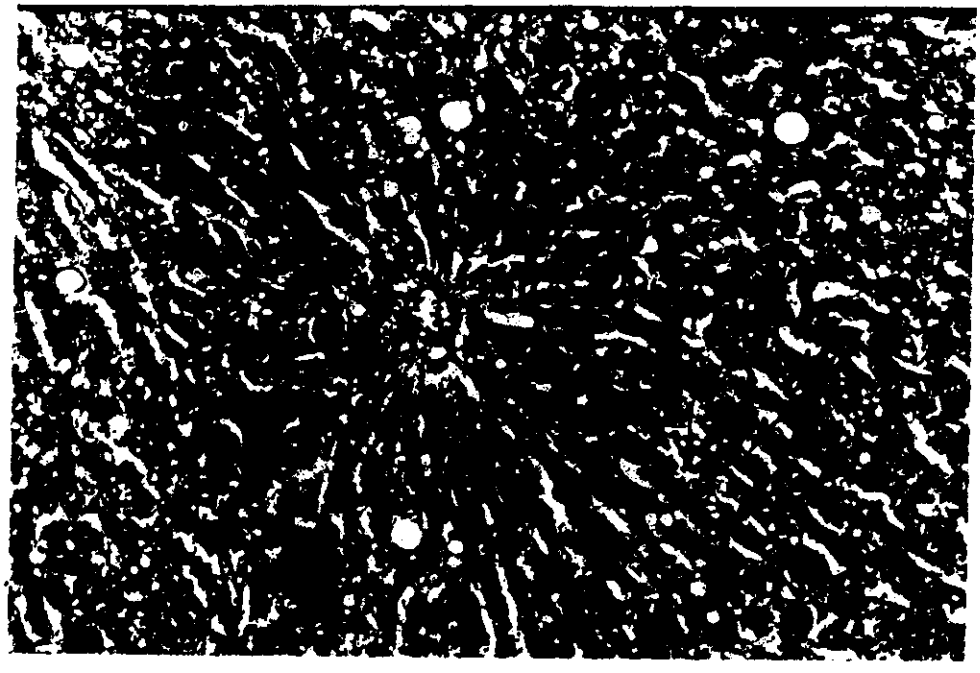

Fig (24) A photomicrograph of a section in the liver of the control group illustrating an intense pyroninophilic reaction throughout the hepatocytes (H), central veins (CV), and sinusoids (S), (Methyl green pyronin reaction, X 200).

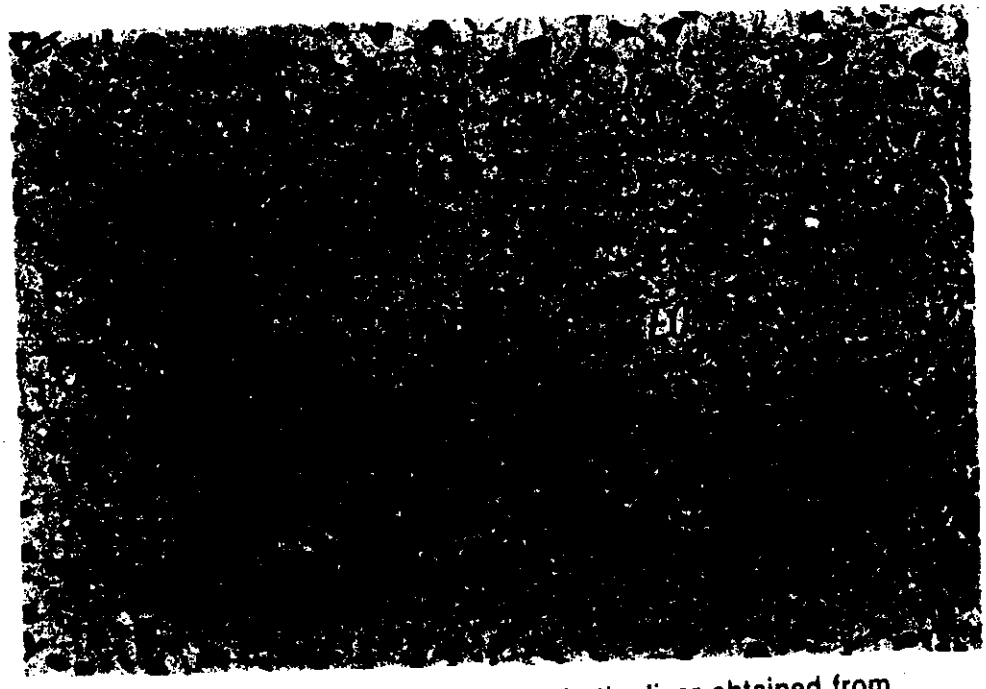

Fig (25) A photomicrograph of a section in the liver obtained from the control group demonstrating normal nuclear DNA of the hepatocytes (H) and endothelial cells (EC), (Feulgen reaction, X 250).

lining endothelial cells of the blood sinusoids and the von Kupffer cells were more numerous than in the control.

Masson's trichrome stain:

Showed that the collagenic fibres surrounding the central veins were more than in the control. This was more marked at 15 day and decreased gradually at 10 days and 5 days.

PAS reaction:

Was more prominent in the peripheral cells of the liver and decreased gradually towards the central vein. The lining epithelium of the bile ducts was moderately reacted.

Methyl green pyronin:

Stained sections illustrated that after feeding on 1 gm of cabbage seeds, the pyroninophilic reaction was intense and distributed all over the cytoplasm of the liver cells. It was moderately demonstrated in the bile ducts, the wall of the blood vessels and lining epithelium.

Feulgen reaction:

All the subgroups (a, b and c) showed proliferation of hepatocytes specially after 15 days (Fig. 26).

Fig (26) A photomicrograph of a section in the liver obtained from an animal fed 1 g of the cabbage seeds for 10 days showing a proliferated nuclei of the hepatocytes (H), (Feulgen reaction, X 250).

0.5 gm:

H & E:

As the above mentioned group.

Masson's trichrome stain:

Showed less collagenic fibres than in the previous group around the central vein and decreased gradually within the lobules.

PAS - reaction:

In the hepatocytes cytoplasm was moderate and weak in the other stuctures.

Methyl green pyronin:

Stained sections showed homogeneous distribuion of RNA throughout the hepatocytes. Some cells were intense than others. This reaction was weak in the hepatic vessels and bile ducts.

Feulgen reaction:

Illustrated more proliferation than the control (Fig. 27).

Fig (27) A photomicrograph of a section in the liver obtained from an animal fed 0.5 g of the cabbage seeds for 15 days showing a proliferated nuclei of the hepatocytes (H), (Feulgen reaction, X 250).

Masson's trichrome stain:

It showed an increase in the collagenic fibres in the stroma and around the blood vessels specially after 15 days, (Fig. 6).

PAS reaction:

It was more intense than in the control, especially in the atretic follicles, moderate in the stromal cells and liquor folliculi and weak in the connective tissue stroma.

Methyl green pyronin staining:

It was regularly distributed throughout the cytoplasm of the follicular cells, (Fig. 7). It was moderate in the follicular cells and weak in the stromal ones.

Feulgen reaction:

It was intensely observed in the follicular cells and the stroma (Fig. 8).