Effect of the Insecticide Cygent 100EC (Pyrothriod) in the Male Rats of the Small Intestine Histopathological

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Abstract: Cygent 100EC is a synthetic pyrothroid (10%cypermthrin) and widely available in pest control programs in K.S.A. Aerosolized agents can enter human or animals systems either directly or as an environmental pollutions and incidence some acute or chronic Digestive system damage. Forty five adult wister rats were divided into four groups, Group A served as a control group composed of 15 rats, group B, C and D consisted of 10 rats for each group and treated with 1/10 LD50 insecticide daily for 3,6, and 12 weeks respectively, the control animals given distaled water in the same manner. Samples from the Small intestine were taken for histological techniques,fixed in buffered formalin processed for sectioning and stained with H&E was done to demonstrate mast cells. Samples from small intestem were taken for histological techniques, fixed in buffered formalin and processed for sectioning and stained with H&E was done to demonstrate mast cells. The results showed the experimental difference gradual changes by treatment time When Age 3 weeks lost mucous layer organization class of cells and appeared necrosis in cells and hemorrhage within the core Villi and fibrosis glands cells and cytoplasm baht and the death of nuclei and the remaining part and analyze Lovejoy cells pant. And flayed cells and necrosis absorbent and mucous cells and goblet cells decompose. The white blood cells multiply. At 6 weeks of age. Lost class organization and cell necrosis and atrophy and rush interior Villies of the basement membrane and has a sharp area and the proliferation of cystic glands and severe bleeding in the blood vessels'. The a above findings revealed the pulmonary toxic effects of commonly used formulated cypermethin (cygent 100EC) preparation by using rat model and oral administration as route of treatment.

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1. Introduction:

Agriculture has made rapid progress in recent years in the kingdom of Saudi Arabia. Parathion, Malathion and Cypermethrin are used extensive locally as insecticides, with increased use of these agents accidental poisoning is likely to be increased.

The extensive use of insecticides to control agricultural pests and also in health care programmes has caused great concern because of the possible effects of those compounds on human being's as well as on wild and domestic animals.

Pollution with chemical pesticides is considered as one of the most important environmental problems. Thousands of newer chemical formulations are synthesized and introduced widely in pest control programs (Matsumura et al.1979). Although the benefits associated with pest control and chemical use are much chemical contamination persistence in air, water, soil, and food stuffs present serious health hazard (Mc Eween and Stephenson, 1979).

Synthetic pyrethroids occupy an important position among commonly applied pesticides. These are modified derivatives of pyrethrins, i.e. natural substances obtained from the flowers *pyrethrum cinerariaefolian and pyrethrum carneum* (Luty et al, 2000).

Pyrethroids are effective as contact insecticides as seen in a course of studies on modification of the chemical structure as a certain number of synthetic pyrethroids were obtained of improved physical, chemical properties and increased biological activity (Luty et al, 2000).

Good solubility of pyrethriods in fat facilitates their absorption and spread in an organism to be penetrated to the nervous tissue. Pyrethriod insecticide show neurtoxic effect which is manifested by an increased excitatory effect of the central and peripheral nervous systems (Daniel and Moser, 1993, Crafton et al 1995).

Cypermethrin is a synthetic pyrethroid that belongs to a group of insecticides with low mammalin toxicity but high insecticidal activity (El-Tawil and Abdel Rahman, 1997).

Acute toxic effect in humans and animals is relatively small. Low toxicity for mammals is explainded by their swift biotransformation and discharge form the organism in the form of non-active metabolites, mostly in the urine (Lukowicz - Rutajczak and kerehniak, 1991, Luty et al, 1998).

Respect to chemical structure synthetic pyrethroide are esters of specific acids.e.g. 2-(4-chlorophenyl, 3-methylbutyric acid and phenoxy

benzyl alcohol. Cypermethrin, both-cis and trans isomers are metabolized to phenoxy benzoic acid and cyclopropane carboxylic acid (Luty et al 2000).

Losses of the insecticide during the aerial sprayings have been estimated as 50-75 % owing to drift, evaporation, and volatilization. Respirable 2.0µm sized droplets of an aqueous formulation can drift some 35 km as confirmed by the detection of cypermethrin residues in the air water and aquatic life forms (Coulombe and Cote 1986).

2. Materials and Methods

A total of 45 male wister rats *Rattus norvegicus* weighing on the average of 155-170 gm and 5 weeks old were included for this study.The animals were kept under good ventilation and fed with standard diet with watered and libitum.

The study coverd four groups of animals, group A served as a control group and composed of 15 rats and three experimental groups B, C and D each group consisted of 10 rats.

The insecticide was used as synthetic pyrothroid CYGNET 100EC (10% cypermethrin) alpha – cypermethrin, (R, S)–alpha cyano-phenoxy benzyl-(1R, S)-cis, trans -3(2.2-dichlorovinyl-2.2–dimethyl cyclopropane carboxylate.) as commercial formulated form of a concentrated suspension produced by Astra chem. K S A, and dissolved in distated water.

The dose 1/10 LD50 (64 mg / kg / day) WHO (1989) & (Worthing and Hance1991) was administered orally via stomach tube to the treated group B,C,and D dialy for 3,6, and 12 weeks respecctivly. Rat serving as controls group (A) received 64 mg /kg/day of distaled water in the same manner.

During treatment the animals were observed for any signs of toxicity and body weight were measured at weekly intervals to permit correction of dose with changing weight and to be assessd.

After 3,6 and 12 weeks of experiment the animals were sacrificed and the Small intestine were removed then fixed in 10% neutral buffered formalin, embedded in paraffin,sections of 1-3 µ were stained with haematoxylin and eosin for histological examination (Bancroft and stevens, 1996)

3. Results

Morphological changes:

Most animals of groups B,C and D showed hyperexcitability, tremors,bloody tears and prostration. Treated rats have partial anorexic occurred after two weeks of the experermintal period.

Most affected rats were usually dyspneic and ofen have diarrhea.About 10% of the rats in groups B,C and D post 5 days up to three weeks were dead. 30% of the animals in groups C and D were dead post 5 weeks of experiment as age advanced the mortality percent was increased to 60% after 7 weeks up to 12 weeks of experimental period, Table(1).

Table (1): The percentage mortality after insecticide treatment in male rats

Exp. groups	No. of animals	period of exp				
		0	3 weeks	6 weeks	12weeks	%
A(control)	15	-	-	-	-	-
B(Treated)	10	-	1	-	-	10
C(Treated)	10	-	1	2		30
D(Treated)	10	-	1	3	2	60

Most rats that died have an agonal period lasting 10 to 24 hours with dyspneic, progressive weakness and recumbency. After dissection of the Small intestine it appeared pale colour in the group B and hypertrophied with pale in group C and D as compared to the control group(A).

Body weight:

On the first day of the experiment the body weight of animals ranged from 155-170 gm and during the first weeks of treatment with cygent 100EC it decreased by 3-10gm.During the following weeks of experiment a slow increase in the body weight observed up to the initial level on the 3rd,6th and 12th weeks, the body weight of rats of the groups B,C, and D ranged from 200-220gm,250-255gm and 350-446gm respectively the body weight in control group A ranged from 233-240gm at 3rd week of the experiment,260-275gm at 6th week of the experiment and 354-410gm in 12th week of the experiment.

Histological: Intestine:

Is part of the gastrointestinal tract is located between the stomach and large intestine. Consists of the following three parts Twelve - and jejunum and ileal and these parts which are similar in structure. Feature t. Villies. And words for the emergence of St. mucous layer. It covers Villas. Thin layer called the cover of the intestinal surface and contain mucous and protein enzyme Almaltaz and enzyme lactase and helps Villies. To increase absorption surface is long in the duodenum and jejunum but short and wide in the ileum.

Histological changes:

A - Control group

Histological examination of Rats Small intestine in group A (control group) showed normal picture during all the experimental intervals

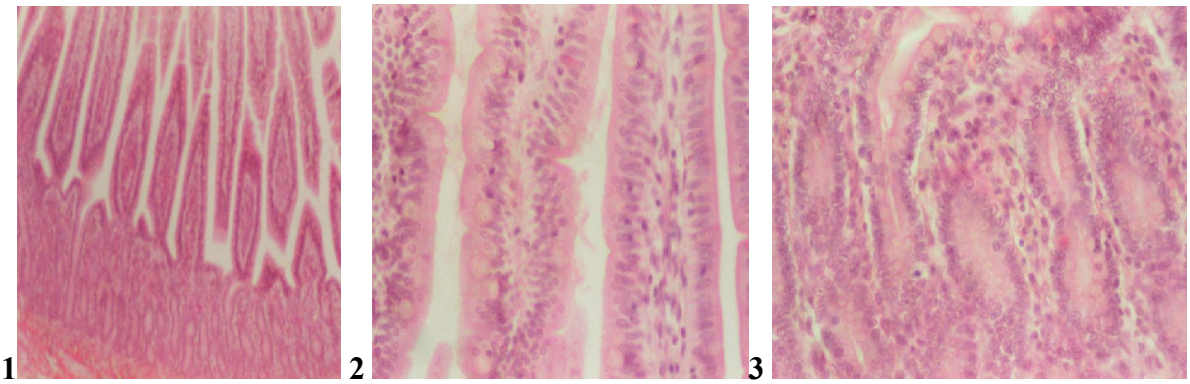


Fig.1- 3 Cross section in the small intestine shows the installation of control group.

1) Shows the installation sector intestines, the main classes.

Consists of the following four classes:

1-Mucous layer 2Sub mucosal layer, 3-The muscle layer 4-Serous layer.

Mucous layer: line the small intestine epithelium Emadi simple abound where absorbent - cells) the Amadiyah surface cells free scheme, (H&E)×40

2) lining intestinal goblet cells growing number large bowel Beltjah. Punctuated glands Mahbhlbbgh. The basic plate consists in the small intestine of the reticular connective tissue dotted with elastic fibers and special white blood cells and lymphocytes acid cells.(H&E)×100

3) abound single muscle fiber and the veins and lymph nodules where lymphocytes accumulate to be what is known as the stained Bayer At Villies. Center there milky bowl a bowl lymphocytic one terminal Msdodbenma opens other to subcutaneous mucous.(H&E) ×100

B (treated group 3 weeks)

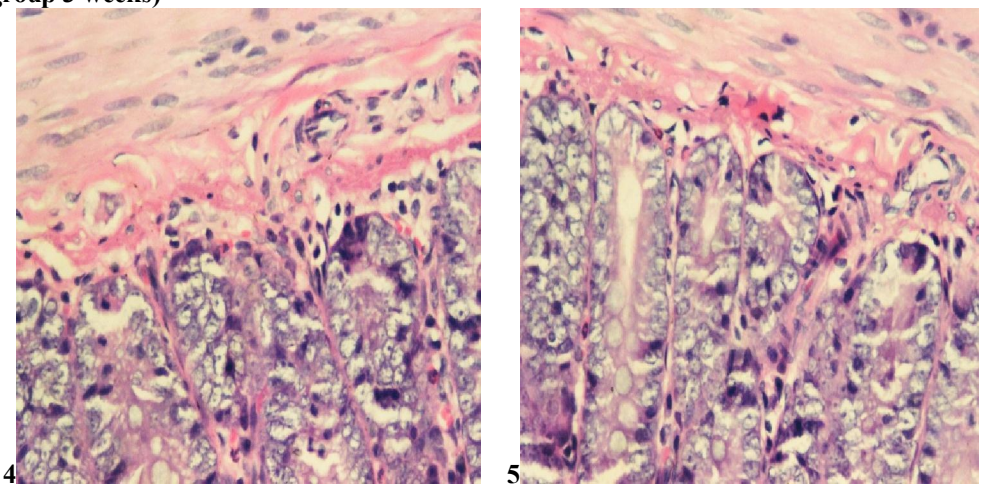
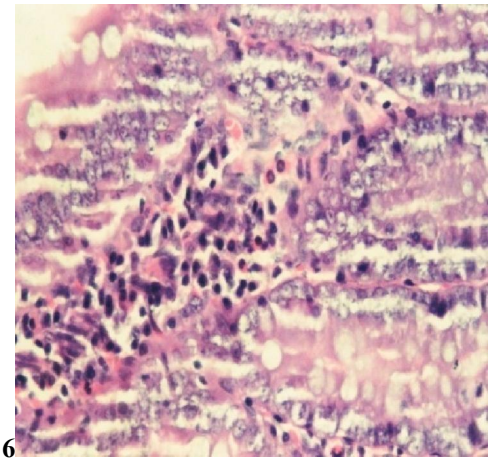


Fig.4, 5

4) Cross section in the small intestine of the group to the age of 3 weeks treatment with pesticide Signet 100 **(H & E) x1000**

5) The mucous layer lost natural regulation and appeared cellular decomposition - degradable core and the most damage in the nucleus and the occurrence of necrosis and cell death **(H & E) x1000**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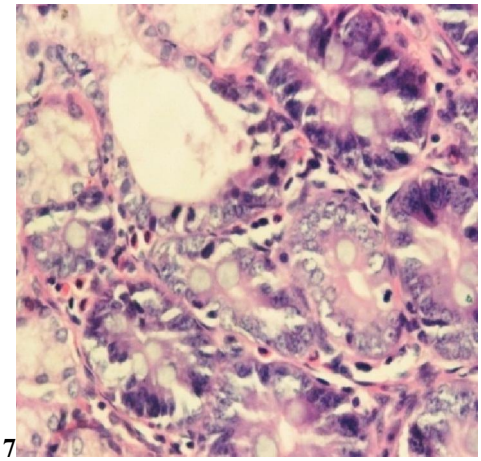
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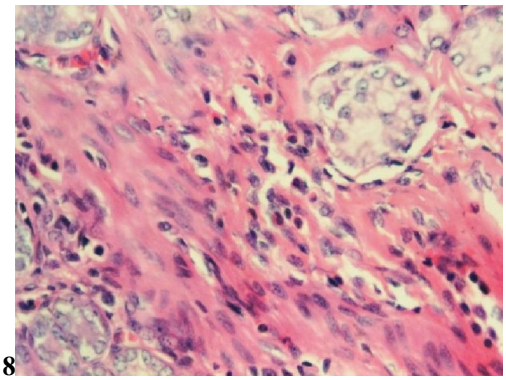
Fig.6,7

6) Cirrhosis and change the cells and analyze the cytoplasm becomes pale and death nuclei and hemorrhage and analyze goblet cell.**(H & E) x1000**

7) Decomposition Lovejoy cells are the cells secrete anti protect internally bowel and necrosis nucleus. **(H & E) x1000**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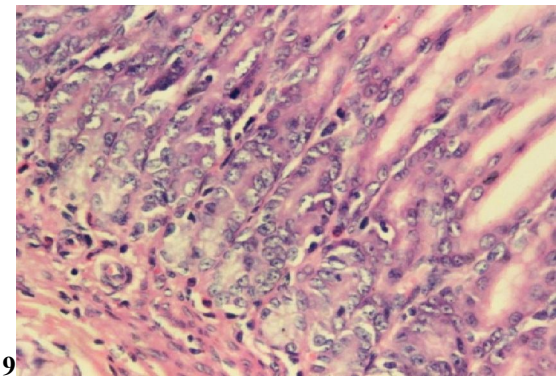
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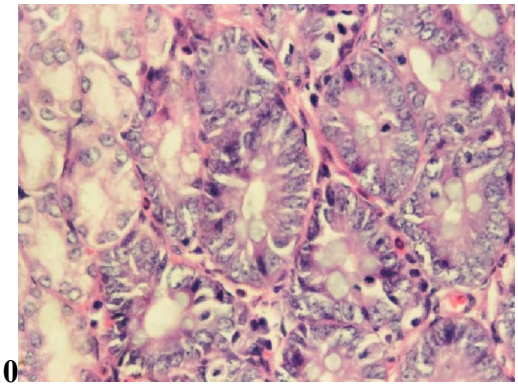
Fig. 8,9

8) The emergence of necrosis of the cells. Emergence of white blood cells to the presence of inflammation in the tissue and goblet cells and clear empty or become cell group in the middle and Villies strongly driven inward. **(H & E) 1000 x**.

9) The emergence of necrosis in the cells. Emergence of white blood cells to the presence of inflammation in the tissue and goblet cells and clear empty or become cell group in the middle and Villies strongly driven inward **(H & E) 1000**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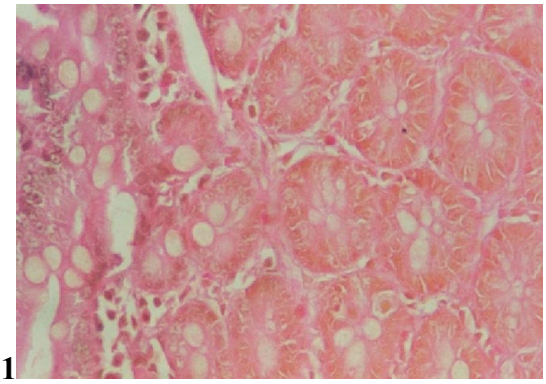
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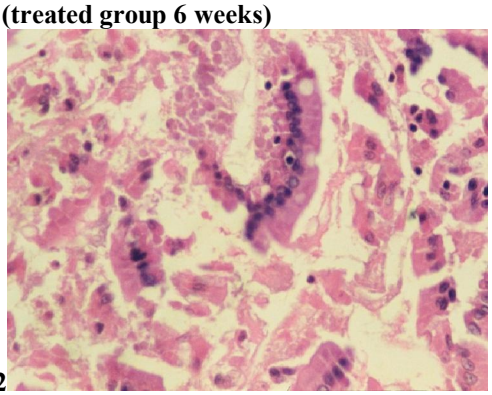
Fig. 10,11

10) The disintegration of the glands of the basement membrane and hemorrhage inflammation evident in cells TB goblet (**H & E) 1000 x**

11) Bleeding and blood clot formation and fiber atrophy sharp area and the spread of cystic glands. (**H & E) 1000 x**

Group C (treated group 6 weeks)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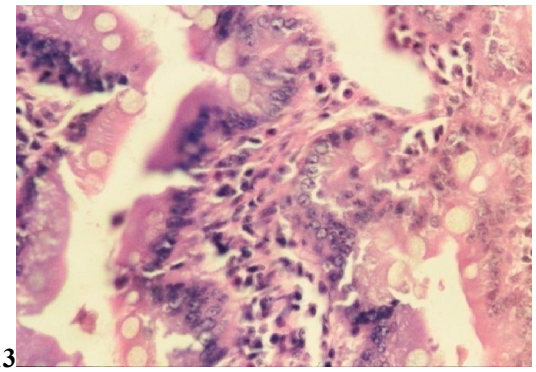
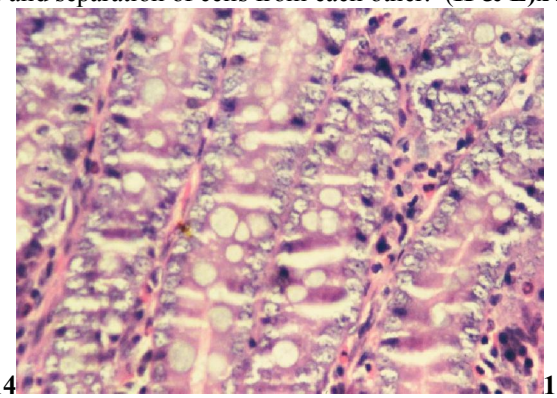

13

Fig.12,13

12) Decaying nuclei and necrosis and decomposition Lovejoy Anslah and warp and the large number of inflammatory cells in the cell. **(H & E) 40x.**

13) enlarged image shows the nucleus and infections and necrosis clear fibrous and vascular congestion and analyzes and separation of cells from each other. **(H & E)x40**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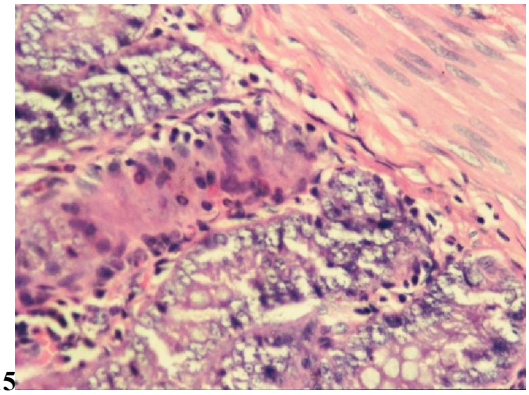
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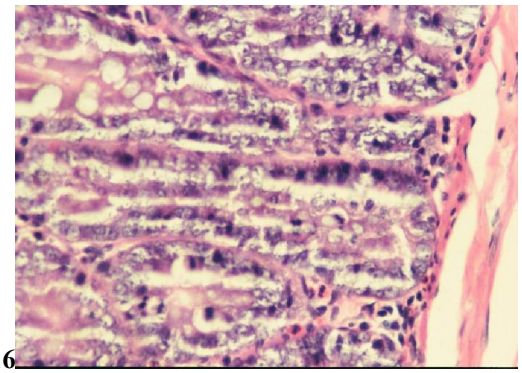
Fig. 14, 15

14) Cells and decomposition cells and pant sharp sales deformity in cells and erratic and severe inflammation and rupture, hemorrhage and death **(H & E) 400 x**

Necrosis clear fibrous and vascular congestion and analyzes and separation of cells from each other and clear inflammation and fibrosis in Villies

15) Bleeding and blood clot formation and fiber atrophy sharp area and the spread of cystic glands hemorrhage and the invasion of inflammatory and vascular congestion disintegration glands of the basement membrane**(H & E) 400 x**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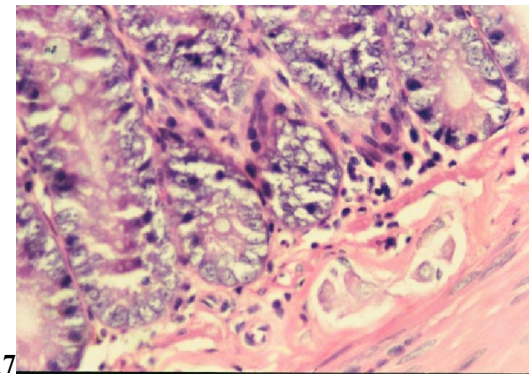
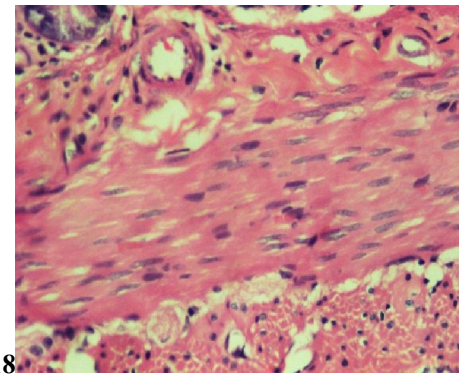

17

Fig. 16,17

16) The appearance of inflammatory cells and atrophy of glands and muscle layer separation and lack of mucous cells and hemorrhage. (H&E**) 1000 x**

17) The separation of the muscle layer in the circular muscle and the emergence of white blood cells and necrosis of the muscle cells. **H & E) 400 x**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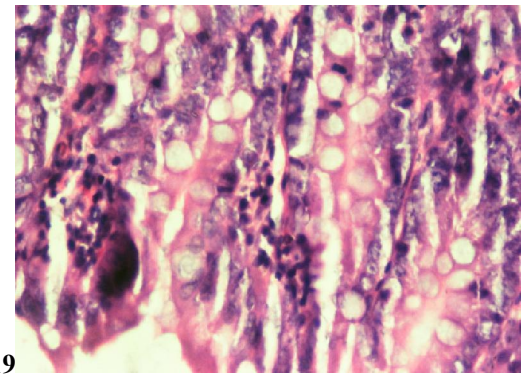
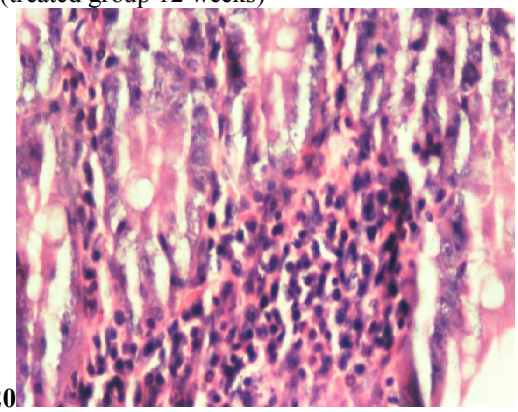

19

Fig. 18, 19

18) Lost tissue class organization and necrosis and atrophy and rush Villies and separation inside. **H & E) 1000 x**
19) deformation class in general and acute inflammation in goblet cells and epithelial cells absorbent asymmetry cells and the separation of class and more acute.. **H & E) 1000 x**.

Group D (treated group 12 weeks)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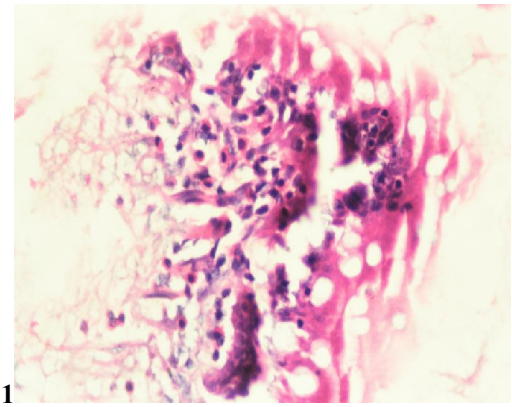
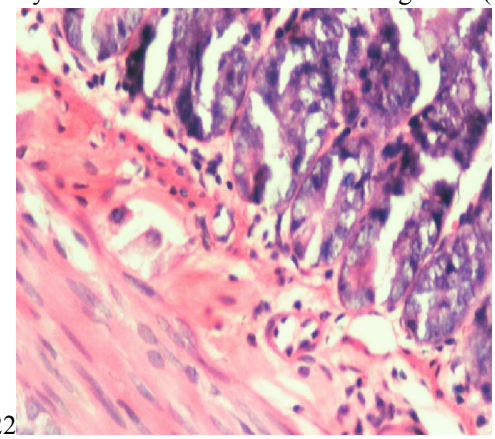

21

Fig.20,21

20) Bleeding and blood clot formation and fiber atrophy sharp area and the proliferation of cystic glands (H&E**) 400 x**
21) Nuclei decomposed and necrosis and decomposition Lovejoy and flayed, maim and the large number of inflammatory cells in the cell and vascular congestion (.(H&E**) 400 x**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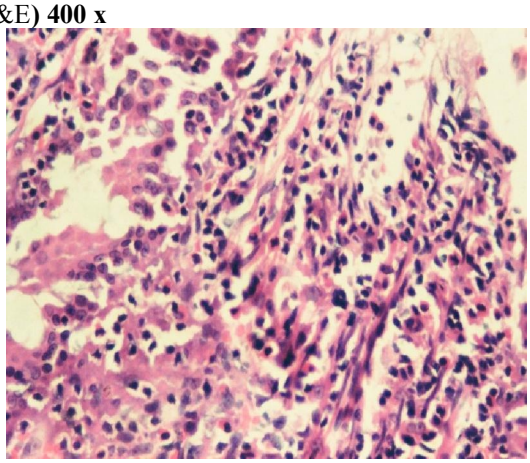
23

Fig. 22,23

22) Appear absorptive epithelial cells and muscle layer separation and lack of mucous cells and hemorrhage and necrosis cells and fully biodegradable for Villie and vascular congestion (**H & E) 400 x**
23) nuclei decomposed and necrosis and decomposition of Lovejoy and Anslah and deformation and the large number of inflammatory cells in the cell and cirrhosis clear separation of layers for each (**H & E) 400 x**

4. Discussion

Small intestine toxicity is very important in the study of pyrethroids (cypermethrin) because these compounds are mainly used as the active ingredients of aerosols and mosquito coils for household insect control. On the other hand few dates are available on the impact of these insecticides on mammalin organs. Previous published data have already shown several toxic effect of pure active substance of cypermethrin on humans and animals.

However none of the previous papers have shown the effects of market available formulation preparation of cypermethrin on histology of mammalian, small intestine

Inspection of rats small intestine sections in this study histopathological consequences are in three forms,

1-Necrosis glands and nucleated cells analyzed Cellular decomposition - degradable core and the most damage in the nucleus - crashed in a cell Mitochondrial + ribosomes retina - biodegradable -

2- Disorgmistatiom of mucosa Lost regulation natural mucous layer and the occurrence of necrosis and cell deathNecroses mucosa cellAnd hemorrhage within the core Villies. the tissue and Juliet cells cells and clear empty or become cell group in the middle.

3- Severe deformation and irregular cells and acute inflammation and rupture, hemorrhage and death-core and necrosis clear fibrous and vascular congestion and analyzes and separation of cells from each other necrosis - the death of absorptive epithelial cells.

Decaying nuclei and necrosis and analyze oral Anslah and warp and the large number of inflammatory cells in the cell and vascular congestion

Miyamoto (1976), Luty et al. (2000) report that the oral pyrethroids toxicity changes to a certain degree depending on route and vehicle solvent. And the absorption of cypermethrin from the digestive tract and its excretion takes a quic course.

In the present investigation showing increased the body weight in group (D) than that in control rats this may due to odematous fliud and haemorrhage the lung tissues. Macrophages cells are increased either due to phagocytosis or due to inducted of antigen antibody response or hypersensitivity reaction and also due to the presence of dead cells. Monocytes or macrophages usually eliminate the necrotic debris by phagocytosis. Congestion of blood vessels is mostly results of increased in the vasodilator substance produced by inflammation such as histamine which released from mast cells. Fox and Lakshmanam (1994) and Mariana (1996) showed the mast cells act as an antigen presenting cells.

This study revealed that the cytoplasm of some alveolar cells were very weakly stained and their numerous vacuoles. The results by (Luty et al, 1998, 2000) indicated that the presence of cytoplasmic vacuolation of liver and kidney cells due to dilated and vesiculated of rugh endoplasmic reticulum in some cases, also the overgrowth of smooth endoplasmic reticulum was noted. Swollen mitochondria with brightenden matrix and clear widening of the Golgi apparatus were observed in rat received pure cypermethrin in dose ½ LD50.

Many small foci of interstitial fibrogenesis activity were observed in group (D) this indicating clear collgen deposition in necrotic cells areas, and the hayalinzation of alveolar walls shown to be the result of insufficient surfactant production by type II pneumocytes (Steven et al, 2002).

Conclusion

No special mention was made in this paper of formulated pyrethroids. The purpose was to review some issues related to human health in relation to pesticides in the third world.Toxic compounds should not be used were and when safer alternatives exist, or until safe use can be ensured and maintained. Pesticides are needed, but dangerous no one will deny the benefites accurable to their use in terms of food production and disease prevention, but the quest for safer compounds and methods allied with the instilling of the proper knowledge and the promotion of safe practices.

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References

1. Bancroft, J.D and A.Stevens (1996): Theory and practice of histological techniques Longman Inc. Newyork 4th. Ed. pp 286.
2. Coulombe, P.A and L.S.Cote (1986): Pulmonary toxicity of the insecticide fenitrothoin in the rat following a single field exposure.J, Appl. Txicol: 6 (5): 317-323.
3. Crafton, K.M; Kehn, L.S and M.E; Gilbert. (1995): Vehicle and route dependent effects of a pyrethroid insecticide, deltamethrin on moter function in the rat. Neurotoxicol Teratol. (17): 489-495.
4. Daniel, M.C. and C.Moser (1993): Utility of a neurobehavioral screening battery for differentiating the effects of two pyrethroids

permethrin and cypermethrin. Neurotoxicol Teratol. (15): 71 -83.
5. El-Tawil, O.S and M.S.Abdel Rahman (1997): Effect of cypermethrin on isolated male and female rat hepatocytes. J. Toxicol. Environ. Health. 52 (5) 461- 474.
6. Fox, C. Cand R.R. Lakshmanam (1994): Rat mast cells express accessory molecules for antigen presentation. J. Faseb. A (2): 498-501.
7. Lukowicz-Rutajczak, J and J.Kerehniak (1991): Effect of deltamethrin on serum proteins and IgM concentration in mice. Acta. Poloniae, toxicol. (3): 21-26.
8. Luty, S; Latuszynska, J; Tochman, A; Obuchowska, D; Przylepa, E snd E, Korcazk (1998): Toxicity of dermally applied alphacypermethrin in rats, Ann. Agric. Environ. Med. 5 (2): 109-116.
9. Luty, S; Latuszynska, J; Obuchowska, P.D: Tokarska, M and M. A: Haratym (2000): subacute toxicity of orally applied alpha-cypermethrin in swiss mice. Ann. Agric. Environ. Med. 7 (1); 33-41.
10. Luty, S; Prezebirowska, D; Latuszynska, J, and M. Tokarska (2001): Histological and Ultrastructural studies of rats exposed to carbaryl. Ann.Agric.Environ. Med.8 (1):137-144.
11. Stevens, A; Lowe, J.S. and Y.Barbara. (2002): Basic histopathology. A colour atlas and text Churchill Loving stone. 4th. Ed. pp122.

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