

SUBACUTE HISTOPATHOLOGICAL EFFECT OF BUTACHLOR ON MALE ALBINO RATS

MAGED M. RIZK ALLA

Central Agricultural Pesticides Lab., ARC, Dokki, Giza, Egypt.

(Manuscript received 30 June 2010)

Abstract

The present study aimed to investigate subacute histopathological changes induced by male albino rats after orally treatment with 320, 80 ppm butachlor 60% EC. At the end of treatment period samples of liver, kidney and stomach tissues of the two treated groups were taken and microscopally examined, then compared with tissues taken from the control group. The histopathological examination showed that both used doses affected the three examined organs, where more damages were happened in liver and stomach tissues by the low used dose and more damages were observed in kidney tissues by the high dose.

INTRODUCTION

Butachlor is a selective systemic herbicide absorbed primarily by the germinating shoots, and secondarily by the roots, with translocation throughout the plant, giving higher concentrations in vegetative parts than in reproductive ones. In animals, it is poorly absorbed through the skin and approximately 85% of an orally administered dose is eliminated in 48hr. 60% of the excreted material is found in the feces and 40% in urine (Krieger 2001). Previous studies proved that butachlor chronic administration induced macroscopic stomach tumors in rats (Hard et al, 1995). In vitro assay systems it has been reported to be an indirect mutagen (Ky et al, 2005) and carcinogen where Ou et al, (2000) showed that it alters growth and transformation characteristics of mouse liver cells. Its ability to induce apoptosis in some mammalian cells was proved by Panneerselvam et al, (1999). In a study to investigate its clastogenicity using chromosome aberration in Chinese hamster ovary cells, butachlor increased cytotoxicities with no sign of enhancement in clastogenicity (Lin et al, 1987). Daryani et al, (2007) observed a butachlor induced toxic hepatitis in a 60 year-old man.

The present study investigates some subacute histopathological effects of butachlor 60% EC in male albino rats under laboratory conditions.

MATERIALS AND METHODS

Chemical: Butachlor 60% EC (N-butoxymethyl-2-chloro-2',6'-diethylacetanilide) herbicide was obtained from El Helb Co. Egypt and used in this study.

Experimental animals: Adult-8 weeks age and up- male albino rats (*Rattus norvegicus*) weighing 170-190g were used in this study. Animals were housed in metallic cages and allowed to acclimatize for two weeks prior to start administration of pesticide under normal healthy laboratory conditions in the animal house of the Mammalian Toxicology Department, Central Agricultural Pesticides Laboratory. During acclimatization and experimental period, the animals were fed on normal commercial diet (Lana-peter and Pearson, 1971) and allowed free excess of water.

Experimental design: The animals were randomly divided into 3 groups of equal five rats each and the groups were treated as follows:

Group 1: the animals were administered the dose level of 320 mg/kg b.w. (1/5 LD50 determined of the used herbicide) as a high dose level.

Group 2: the animals were administered the dose level of 80 mg/kg b.w. (1/20 LD50 determined of the used herbicide) as a low dose level.

Group 3: the animals were received distilled water only to be used as control.

The rats were treated orally by metallic stomach tube for 28 consecutive days.

Histopathological examination: - At the end of treatment period tissue specimens were taken in 10% formalin solution from the different groups of animals during the post-mortem examination and were fixed in 10% formal saline. The fixed tissues were washed in tap water, dehydrated in a series of alcohol, cleared in xylene then embedded in paraffin. Five microns paraffin sections were obtained and stained with Hematoxylin and Eosin stain as mentioned by Carleton et al (1967) for histopathological examination.

RESULTS AND DISCUSSION

The examination of liver tissues taken from treated rats showed that both used doses produced mononuclear leucocytic inflammatory cells aggregation in the hepatic tissue. The high dose induced diffuse proliferation of the kupffer cells and the portal area showed proliferation of fibroblastic cells as well as mononuclear leucocytic inflammatory cells infiltration, where the low dose produced severe hyperemia in the sinusoids, focal necrotic area infiltrated by mononuclear leucocytic inflammatory cells. The portal area showed severe dilation as well as hyperplasia in the bile duct and kupffer cells were loaded by hemosiderin pigment in diffuse manner all over the

hepatic tissue. Diffuse hepatocellular swelling was observed in rat males administered 1000 ppm and above butachlor in the diet for 90 days (Wilson and Takei 1999).

Examination of the kidney tissues showed more damage by the high dose than the low, where the two doses showed enlargement size with granular eosinophilic cytoplasm in the epithelial cells lining the renal tubules. The high dose produced that the intertubular blood vessels and capillaries were dilated and engorged with blood. Also there were focal fibroblastic cells proliferation associated with mononuclear leucocytic inflammatory cells infiltration in-between the degenerated renal tubules in the corticomedullary junction. In this respect Wilson and Takei (1999) reported dose related changes in the kidney tissue in rats at dietary levels of 2500 ppm and higher.

Stomach tissues examination showed that both used doses produced inflammatory cells infiltration with oedema in the lamina propria of junction between the glandular and nonglandular stomach as well as in the mucosal layer of the glandular one in focal manner only in case of the low dose. Although these results had no relation with the rat stomach and thyroid tumors which reported in chronic studies by some investigators (Hard et al, 1995, Thake et al, 1995) butachlor must be used under intensive control to avoid or minimize its non target organism damage.

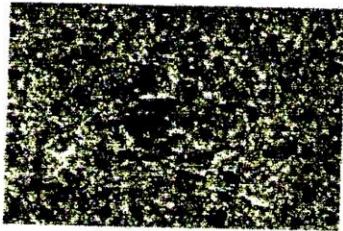


Fig.1- Liver tissue of rat treated with the high dose.
H&E x 160

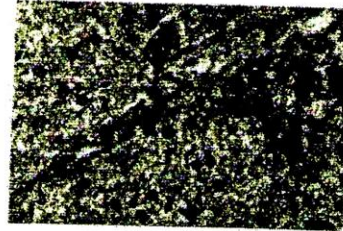


Fig.2- Liver tissue of rat treated with the high dose.
H&E x 160

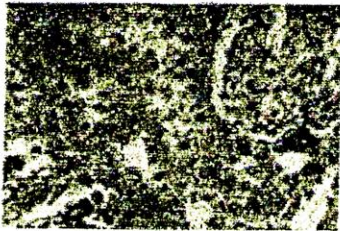


Fig. 3- Kidney tissue of rat treated with the high dose.
H&E x 160

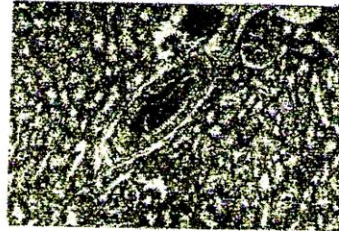


Fig. 4- Kidney tissue of rat treated with the high dose.
H&E x 40

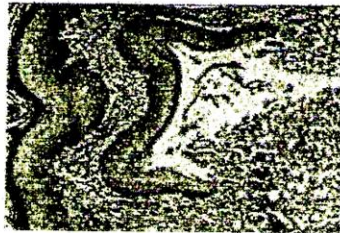


Fig. 5- Stomach tissue of rat treated with the high dose.
H&E x 40

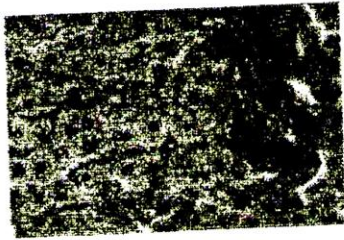


Fig. 6- Liver tissue of rat treated with the low dose.
H&E x 160



Fig. 7- Liver tissue of rat treated with the low dose.
H&E x 40



Fig. 8- Kidney tissue of rat treated with the low dose.
H&E x 160



Fig. 9- Stomach tissue of rat treated with the low dose.
H&E x 40

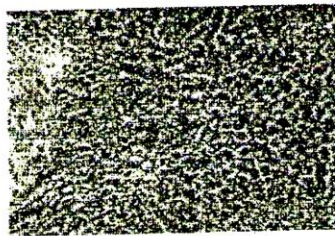


Fig. 10- Stomach tissue of rat treated with the low dose.
H&E x 40

REFERENCES

1. Carleton H.M., R.A.B. Dray and E.A. Willington. 1967. Carleton's Histological Technique 4th Ed. Oxford Univ. Press, N.Y.
2. Daryani N. E., P. hosseini, M. Bashashati, M. Haidarali and A. Sayyah. 2007. Butachlor-induced acute toxic hepatitis, Indian Journal of Gastroenterology, V.26:135-136.
3. Hard G. C., M. J. Latropoulos, D. C. Thake, D. Wheeler, M. Tatematsu, a. Hagiwara, G. m. Williams and a. G. Wilson. 1995. Identity and pathogenesis of stomach tumors in Sprague-dawley rats associated with the dietary administration of butachlor. Exp. Toxicol. Pathol., V.47(2-3):95-105.
4. Krieger, R. 2001. Handbook of Pesticide Toxicology, V.2 2nd Ed., Academic Press, San Diego, California, P.1551.
5. Ky H., L. HG, L. JK, K. WS and O. YH. 2005. Mutagenicity study of butachlor and its metabolites using Salmonella typhimurium. J. Microbiol. Immunol. Infect., V.38 (6), 409-416.
6. Lana-peter W. A. and A. R. C. Pearson. 1971. Dietary requirements In: The Laboratory Animals, Principles and Practice. Academic Press, London and New York, P.142.
7. Lin M. F., C. L. Wa and T. C. Wang. 1987. Pesticide clastogenicity in Chinese hamster ovary cells. Mutat. Res. V.188 (3):241-250.
8. Ou Y. H., P. C. Chung, Y. C. Chang, F. Q. H. Ngo, K. Y. Hsu II and F. D. Chem. 2000. Butachlor, a suspected carcinogen, alters growth and transformation characteristics of mouse liver cells, Chem. Res. Toxicol., V.13 (12):1321-1325.
9. Panneerselvam N., S. Sinha and G. Shanmugam. 1999. butachlor is cytotoxic and clastogenic and induces apoptosis in mammalian cells. Indian J. Exp. Biol., V.37 (9):888-892.
10. Thake D., M. Iatropoulos, G. Hard, K. Hotz, c. Wang, G. Williams and A. Wilson. 1995. A study of the mechanism of butachlor induced carcinogenicity in female Sprague-Dawley rats, Exp. Toxic. Pathol. V.47 P.107.
11. Wilson, A. G. E. and A. S. Takei. 1999. Summary of toxicology studies with butachlor. Unpublished Monsanto Company report.

التأثير الهيستوباثولوجى تحت الحاد لمستحضر البيوتاكلور ٦٠% مركز قابل
للإستحلاب على ذكور الفئران البيضاء

ماجد منصور رزق الله

قسم سمية المبيدات للثدييات والأحياء المائية - المعمل المركزى للمبيدات - مركز البحوث الزراعية
- الدقى - جيزة .

تهدف هذه الدراسة الى معرفة مدى حدوث التغيرات الهيستوباثولوجية تحت الحادة فى ذكور
الفئران البيضاء بعد معاملتها بالتركيزات ٨٠ و ٣٢٠ جزء فى المليون من مستحضر البيوتاكلور ٦٠%
مركز قابل للإستحلاب عن طريق الفم. فى نهاية فترة المعاملة أخذت عينات من أنسجة الكبد والكلى
والمعدة لكلا مجموعتى الحيوانات المعاملة وفحصت ميكروسكوبيا وقورنت بالأنسجة المأخوذة من
مجموعة الكنترول الغير معاملة بالمستحضر. وقد أظهر الفحص الهيستوباثولوجى أن كلا التركيزين
المستخدمين قد أثر على أنسجة الأعضاء الثلاثة المختبرة حيث حدثت أضرار أكثر فى أنسجة الكبد
والمعدة بواسطة التركيز المنخفض المستخدم فى حين ظهرت أضرار أكثر فى أنسجة الكلى بواسطة
التركيز الأعلى المستخدم.