

SUMMARY

Organophosphate pesticides are widely used in agriculture and public health. They are among the most commonly used insecticides. The use and abuse of pesticides has been increased tremendously in the last few decades as a result of the need to feed the ever-increasing human and animal population. This leads to food pollution which has been associated with adverse health and environmental consequences.

The present study was carried out to evaluate the histological and ultrastructural alterations induced by chlorpyrifos (organophosphorous insecticide) exposure for different durations on the testes of the adult male albino rat and the possible protective role of vitamin C.

The present study was carried out on forty adult male albino rats. They were divided into four groups, group I (control group) (n=5): received no medications, group II (sham control) (n=5): received 0.5 ml/day corn oil orally for six weeks, group III (chlorpyrifos treated group) : consisted of 15 rats, divided into three subgroups: subgroup III-A (chlorpyrifos treated group for 2 weeks): received daily 17.5 mg/kg b.w chlorpyrifos orally via gastric gavage for two weeks, subgroup III-B (chlorpyrifos treated group for 4 weeks): received daily 17.5 mg/kg b.w chlorpyrifos orally via gastric gavage for four weeks, subgroup III-C (chlorpyrifos treated group for 6 weeks): received daily 17.5 mg/kg b.w chlorpyrifos orally via gastric gavage for six weeks, group IV (chlorpyrifos and vitamin C treated group): consisted of 15 rats, divided into three subgroups: subgroup IV-A (chlorpyrifos and vitamin C treated group for 2

weeks): received daily 17.5 mg/kg b.w chlorpyrifos orally via gastric gavage with concomitant administration of vitamin C in a dose of 200 mg/kg daily for two weeks, subgroup IV-B (chlorpyrifos and vitamin C treated group for 4 weeks): received daily 17.5 mg/kg b.w chlorpyrifos orally via gastric gavage with concomitant administration of vitamin C in a dose of 200 mg/kg daily for four weeks, subgroup IV-C (chlorpyrifos and vitamin C treated group for 6 weeks): received daily 17.5 mg/kg b.w chlorpyrifos orally via gastric gavage with concomitant administration of vitamin C in a dose of 200 mg/kg daily for six weeks.

At the end of the experimental period of each group, the animals were sacrificed by cervical dislocation and the testes were removed, trimmed and then each testis was prepared for light and electron microscopic study.

The present study revealed that in chlorpyrifos treated group III there were mild to severe obvious degenerative changes of the seminiferous tubules according to the duration of exposure in the form of shrinkage of the seminiferous tubules with subsequent widening of the interstitial spaces. The tubules showed separation of the spermatogenic cells from the basement membrane and loss of spermatozoa. The seminiferous tubules of subgroups III-B and III-C were surrounded by thickened basement membrane. There was minimal increase in the interstitial fibrous tissue and congested dilated blood vessels with markedly thickened wall.

Electron microscopic results confirmed light microscopic findings and showed degenerated spermatogenic cells with rarified cytoplasm, degenerated mitochondria and spermatid abnormalities.

In the present study, light microscopic examination of testicular sections from group IV-A (chlorpyrifos and vitamin C treated rats for two weeks) showed seminiferous tubules with relatively normal morphology similar to the control group. Besides, light microscopic examination of testicular sections from group IV-B and IV-C (chlorpyrifos and vitamin C treated rats for four and six weeks) revealed seminiferous tubules with separation of the spermatogenic epithelium from the basement membrane with pyknotic nuclei, azospermia and interstitial exudates with congested blood vessels. However, there was mild improvement in some tubules which were lined by high spermatogenic epithelium and their lumina contained partially fragmented spermatozoa. Minimal amount of the interstitial fibrous tissue was present between the tubules.

Electron microscopic examination of group IV-B and IV-C revealed spermatogonia with normal nuclei but cytoplasm was rarified and fragmented, primary spermatocytes with shrunken nuclei and fragmented cytoplasm were observed. On the other hand, there was mild improvement of some spermatogenic cells.

Conclusion

From the present study, it could be concluded that exposure to Chlorpyrifos caused histological and ultrastructural pathological changes in the testes of the adult male albino rats and the severity of these changes were duration dependent. Administration of vitamin C with Chlorpyrifos exhibited partial protection short term exposure. However, in long term exposure vitamin C couldn't induce any protection.

Recommendation

According to the present study, it is recommended that:

Reversibility of chlorpyrifos–induced testicular toxicity needs further studies.