Abstract: Pesticides hold a unique position among environmental contaminants. Their toxic effects involving testicular and postspermatogenic processes that are essential for reproductive success have been reported. Testis of albino rats were taken for light microscopic studies, following 60 days of oral administration of carbaryl. Light microscopic observations were made on haematoxylin-eosin stained 5mm thick paraffin sections. The tissue examined showed distorted shape of seminiferous tubules, disturbed spermatogenesis, accumulation of cellular mass in the lumen of tubules, oedema of the interstitial spaces and loss of sperms of varying degrees.

Key Words: Carbaryl, testis, seminiferous tubules, Leydig cells.

Introduction: Concern about the susceptibility of the male reproductive system to drugs or environmental agents has assumed increasing dimensions. Epidemiological studies postulated that in the last 50 years the sperm number and sperm quality in human had been decreased (Bendvold et al. 1991 and Carlsen et al. 1992). Sexual development during the prenatal and neonatal period is under hormonal control and is therefore sensitive to exogenous substances. Keeping in mind the pivotal role of testis in reproduction this experimental work was undertaken. Carbaryl is 1-naphthyl –N-methylcarbamate and was first synthesized in 1953 and introduced in 1958 as a broad-spectrum contact insecticide with systemic properties.

Material and methods: 30 male albino rats weighing 50-80 g were used for the present experiment. They were fed on the standard pellet diet and tap water ad libitum. After acclimatisation for two weeks in laboratory conditions rats were divided into 3 groups of 10 rats each. Group-1 served as control. Group 2 & 3 received 100 mg and 200 mg Carbaryl/Kg body weight respectively in 0.2 ml of groundnut oil orally, 6 days/week for 60 days. All treated rats along with their controls were anaesthetized by intraperitoneal administration of Nembutol (30 mg/Kg body weight). Fixation of testis was achieved by in-vivo perfusion with Bouin’s fixative. Processing of tissues was done for making paraffin blocks. 5mm thick sections were cut with a rotary microtome. Staining was done with haematoxylin and eosin.

Observations and Results: Light microscopy of testis of control rats exhibited seminiferous tubules cut in various planes of section. The seminiferous tubules were lined by a stratified epithelium which consisted of two distinct population of cells-

1. Cells in various stages of spermatogenesis, collectively referred to as cells of spermatogenic series. Next to basement membrane lie the spermatogonia, having spherical nuclei. (Fig.1).
2. Non-spermatogenic cells, called Sertoli cells which support and nourish the developing spermatozoa were seen. In the intertubular spaces, Leydig cells and connective tissue cells were present.

Testis of Carbaryl treated animals revealed distorted seminiferous tubules (Fig.2), disturbed spermatogenesis, loss of sperms and detachment of germ cells from the basement membrane (Fig.3), accumulation of cellular mass in the lumen of tubules (Fig.4) and oedema of the interstitial spaces with degenerated Leydig cells (Fig.5). All these findings were much significant with the high dose of Carbaryl.

Discussion: There was marked histopathological changes as seen in photomicrographs. Degenerative changes in the cells of seminiferous tubular germinal layers were present, more marked in high dose group. Same finding was also reported by Rybakova (1966), Vashakidze (1975), Pant et al. (1995&1996). But Dikshith et al. (1976), Degraeve et al. (1976), Martin (1982) and Osterloh (1983) reported no histopathological changes in the testis. The exact mechanism for these changes are still not clear. The spermatogenesis was also depressed which is well supported by the similar findings by Kitagawa (1977), who reported reduced number of spermatogonia in the experimental group.

The above changes may be attributed to the malfunctioning of liver (Lox, 1984) and Kidney (Kiran et al.1985) which causes general systemic toxicity due to some toxic factors in peripheral circulation which influence testicular functions.

Fig.1 Testis of a control rat showing spermatogonia (small arrow) and interstitial space (large arrow) H/E stain x 400

Fig.2 Arrow pointing the distorted seminiferous tubules. H/E stain x 100

Fig.3 Depressed spermatogenesis, loss of sperms (small arrow) and detachment of germ cells from the basement membrane (large arrow). H/E stain x 400

Fig.4 Arrow showing accumulation of cellular mass in the lumen of seminiferous tubules. H/E stain x 400

Fig.5 Arrow showing interstitial oedema with degenerated Leydig cells. H/E stain x 400
histopathology in the present study may be due to the degenerated Leydig cells which leads to depressed testosterone level. So with the present study it may be speculated that Carbaryl adversely affects the fertility of human beings by affecting spermatogenesis.

References:
13. Vashakidze V I. Effects of small doses of sevin (NMC) on gonad function following its repeated effect on white rats. Sb-Tr NII Gisieny Truda Profzabolevani Gruz SSR. 1975; 14: 253-266.