

The reproductive toxicity of the organophosphate pesticide O, O-dimethyl O-4-nitrophenyl phosphorothioate (methyl parathion) in the male rat

Abstract

Methyl parathion (MP) is a pesticide widely used to protect crops but also illegally used in many countries for spraying homes and businesses to contain insects. The present study was planned to investigate the effects of MP on the male reproductive organs in the rat. Male Wistar rats (13-14 weeks old) were treated with MP and sacrificed as follows. Experiment 1: 0 (water vehicle), 1.75, 3.5 or 7 mg/kg (i.p.) for 5 days and sacrificed on day 14; experiment 2: 0, 0.5 or 1 mg/kg (i.p.) for 12 days and sacrificed on day 130; experiment 3: 0, 0.5 or 1 mg/kg (i.p.) for 12 days and sacrificed on day 77; experiment 4: 0, 0.75 or 1.5 mg/kg (i.p.) for 25 days and sacrificed on day 17; experiment 5: 0 or 3.5 mg/kg (p.o) for 25 days and sacrificed on day 17 after the last exposure. The reproductive organs were removed, weighed and processed for histopathological analysis. Structural changes, for example the morphology of the epithelium and the lumina of the organs, were observed in all animals. Biochemical estimates of acid phosphatase (ACP), cholesterol, total protein, uric acid, and vitamin C were conducted in the epididymes. The weight of the epididymes increased in experiment 2 in a dose-dependent pattern ($p < 0.01$) and decreased in experiments 4 and 5 ($p < 0.01$). The weight of the ductus deferens decreased in experiment 3 at 1 mg/kg dose level ($p < 0.001$) and increased in experiment 5 ($p < 0.05$). The weight of the seminal vesicle decreased in experiment 3 at both 0.5 mg/kg and 1 mg/kg dose levels ($p < 0.001$), and increased in experiment 5 ($p < 0.01$). The weight of the prostate decreased in experiments 4 (in a dose-dependent pattern) and 5 ($p < 0.001$). ACP levels decreased in experiment 4 ($p < 0.001$) with a greater effect at 0.5 mg/kg than at 1 mg/kg. In experiment 5 ($p < 0.01$) cholesterol levels decreased to less than 50% of the control level for this experiment ($p < 0.01$) and protein levels also decreased ($p < 0.01$). Vitamin C levels decreased in a dose-dependent pattern in experiments 4 ($p < 0.001$) and 5 ($p < 0.01$). There were no effects on uric acid level. Sperm density was decreased in the

epididymes of the rats treated and the epithelium of the epididymis and ductus deferens showed cellular necrosis, brush-border disruption and nuclear pyknosis. Nuclei were haloed, except in experiment 2 and the 0.5 mg/kg group of experiment 3. Methyl parathion did not induce significant changes in the structure of the seminal vesicle and prostate, except that epithelial folding was shorter than in the control. In conclusion, MP is a reproductive toxicant in the male rat and causes deterioration in the structural integrity of the reproductive organs and also the biochemical parameters in the epididymis.