

Nephrotoxic and Hepatotoxic Effects of Citrinin in Mice (*Mus musculus*)

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Oral administration of citrinin to young weaning albino Swiss mice (*Mus musculus*) caused significant histopathological changes in liver and kidney. Enlargement of Bowman's capsule, degeneration of glomeruli and degeneration of ureniferous tubules were observed. Proliferative and degenerative changes in liver were recorded.

Key Words: Citrinin, *Mus musculus*, Nephrotoxicity, Hepatotoxicity

Introduction

Citrinin, the toxic dehydroisocoumarin metabolite of *Penicillium citrinum* Thom. has been found to be a natural contaminant of rice, corn, wheat, barley, oat and decaying tomato fruits (Saito et al. 1971, Scott et al. 1972, Nishijima 1984, Betina 1984). It reportedly causes an increase in total lipid, total & free cholesterol, triglyceride & phospholipid in liver and kidney (Gupta et al. 1987), (Bilgrami et al. 1987) an increase in blood urea level and changes the histology of blood and causes hyperglycemia Bilgrams et al. 1987. Though the exact mechanism of the action of this toxin is not well known, it seems that this toxin, like other mycotoxins, may affect the histology as well as physiology of liver and kidney - two most common targets of the ill-effects of xenobiotics. The present paper is a report on the nephrotoxic and hepatotoxic effects of citrinin in mice.

Materials and Methods

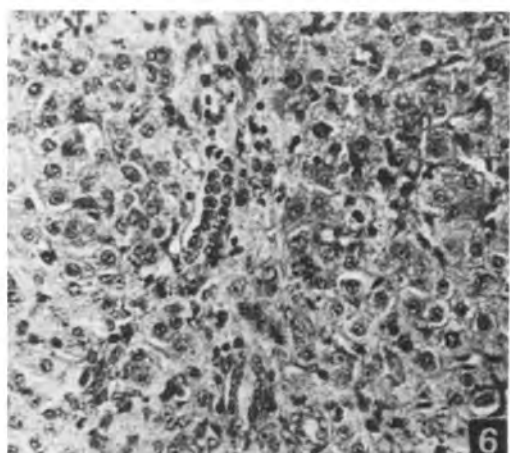
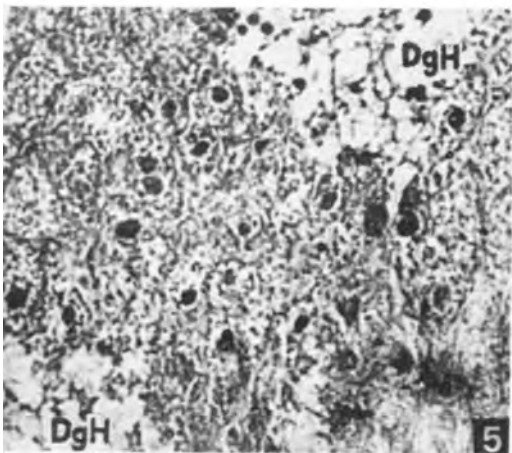
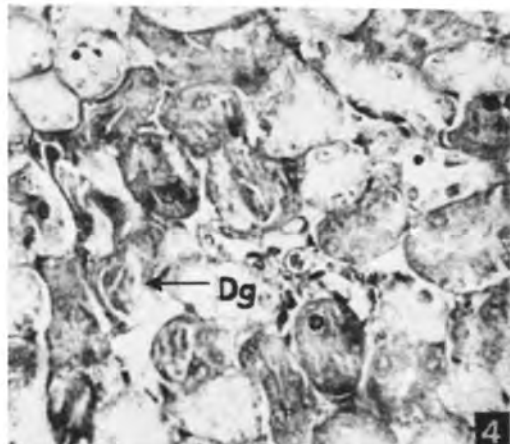
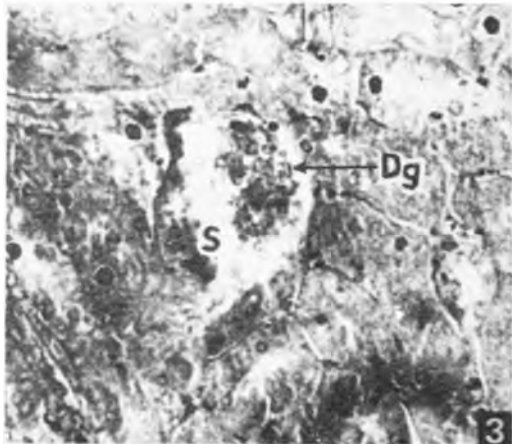
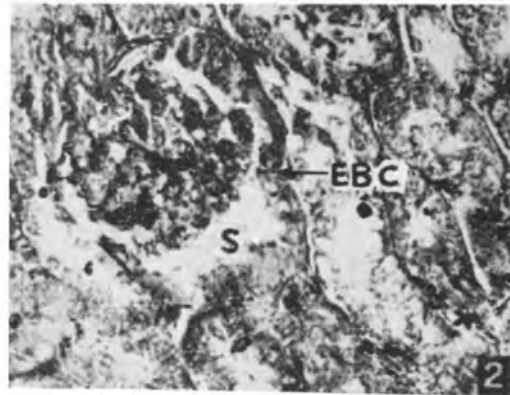
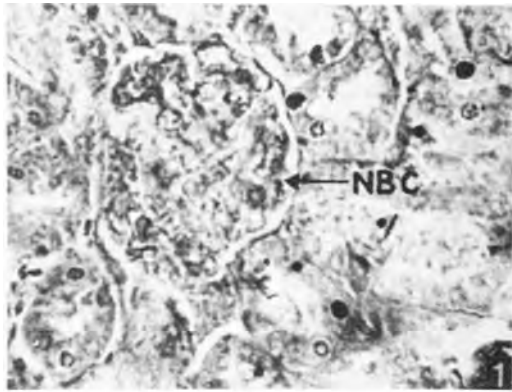
Six-week old 36 albino Swiss mice (*Mus musculus*) weighing 25-30 g, were categorised into three groups, (each comprising 6 males + 6 females). The first group was administered 0.25 ml of 50 ppm citrinin solution (per animal per day) by incubation an hour before the regular meal supplied to them. The second group was given the same amount of toxin but by mixing it with their standard sterilized food ("Gold Mohur" mice feed, Hindustan Liver). The third received no toxin and served as the control. Appropriate care and hygienic conditions were maintained in order to keep them healthy and free from

any apparent infections. After 120 days of treatment the animals were sacrificed by instant cervical dislocation. Livers and kidneys were removed quickly and transferred to separate vials containing Bouin's fixative. Paraffin blocks were made and sections were cut at 6 μ and stained with haematoxylin-eosin.

Results and Discussion

The kidneys of the treated mice were swollen and turned gray-white to pale yellowbrown in colour. The main histological alterations were the enlargement of Bowman's capsule and presence of a wide space between the glomerules and the capsule wall (figures 2, 3). This may be due to atrophy of the capsule wall or atrophy of the glomerulus itself. Degeneration of glomeruli was frequent. Degeneration and dilatation of ureniferous tubules (figure 4) and necrosis of the renal tubular epithelium were also noticed. The present findings suggest that mice are sensitive to citrinin and that kidney is the main target of action of this mycotoxin.

Apart from renal damage, liver injury was also recorded. The main histopathological changes observed in the liver of treated mice were degeneration of hepatocytes (figure 5). Edematous fibrosis and irregularity in size and architecture of liver cells were also observed (figure 6). Proliferation of central veins was frequently observed. Direct administration of citrinin produced more severe effects than the one administered along with the food. It is desirable to caution the mass against the harmful effects of this toxin (Scott 1977, Smith & Moss 1985).



Figures 1–6 1, T.S. of kidney showing normal Bowman's Capsule (NBC) and glomerulus ($\times 160$); 2, T.S. of kidney showing enlarged Bowman's Capsule (EBC) and presence of a very wide space (S) between glomerulus and capsule wall ($\times 160$); 3, T.S. of kidney showing degenerating glomerulus ($\times 160$); 4, T.S. of kidney showing degeneration of ureniferous tubules ($\times 160$); 5, T.S. of liver showing degeneration of hepatocytes (DgH) ($\times 160$); 6, T.S. of liver showing irregularity in size and architecture of liver cells ($\times 100$)

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