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LETTER TO THE EDITOR

ETHANOL INTOXICATION – DOSE DEPENDENT EFFECT ON CIRCULATING TESTOSTERONE LEVEL IN WISTAR RATS

Sir,

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Ethanol is a known testicular toxin and is known to impair reproductive performance in experimental animals and humans. Our previous study with Wistar rats demonstrated the deleterious effects of ethanol in testes including testicular atrophy, germ cell apoptosis, oxidative stress and reduced steroidogenesis (1, 2). We had also reported alcohol abuse in men resulted in duration dependent decrease in circulating testosterone and impaired hypothalamic-pitutary-gonadal axis (3), however the dose dependent effects of ethanol was not conclusive. The present study was designed to address this issue.

Male Albino rats of Wistar strain (10–12 weeks of age), weighing 100–120 g were housed in plastic cages of size 14"×9"×8" (3 rats in each cage) in a well-ventilated room at 22±2°C with a 12 hr L: D cycle. All rats had free access to a standard diet and water. The experimental protocol was approved by the Institutional Animal Ethics Committee, Manipal University, Manipal. The animals were divided into six groups of six rats each. Ethanol (Merck Ltd. India) was diluted with double distilled water to get the desired concentration. Animals were treated orally by gastric intubation.

Group I (control): 1 g double distilled water/kg, b.wt/day for 4 weeks.

Group II : 0.4 g ethanol/kg, b.wt/day for 4 weeks.

Group III: 0.8 g ethanol/kg, b.wt/day for 4 weeks.

Group IV : 1.2 g ethanol/kg, b.wt/day for 4 weeks.

Group V : 1.6 g ethanol/kg, b.wt/day for 4 weeks.

Group VI : 2 g ethanol/kg, b.wt/day for 4 weeks.

After 4 weeks of treatment, blood was collected by decapitation and immediately processed for hormonal assay. Serum testosterone and estradiol were estimated by ELISA using commercially available kits (Merck).

Serum testosterone was decreased in all groups except 1.2 g ethanol treated animals where there was 23% increase. In contrary, serum estradiol increased 38 and 86% with 0.4 and 1.2 g ethanol treatment, while 0.8 and 1.6 g ethanol treatments resulted in 29 and 66% decrease, respectively. The changes in serum testosterone level could be either due to alteration in its synthesis or clearance. It is well demonstrated that chronic ethanol intoxication induces oxidative challenge in the testes (1) which is reported to have deleterious effects on

testosterone metabolism (1, 2, 4, 5). Direct effects of ethanol and/or its metabolites on testosterone metabolism could be another possible reason. Our previous study had demonstrated reduction in 3β-HSD and 17β-HSD with 1.6 g ethanol/kg, b.wt/day in Wistar rats. Ethanol induced increase in plasma testosterone level has been reported earlier. Injection of 2 g alcohol/kg, b.wt into abdominal cavities of rats resulted in 3 fold increase in plasma testosterone, 30 min after alcohol administration (6). The study raises the possibility that episodes of alcohol consumption may also at least temporarily increase testosterone level, with the direction of response likely to be dependent upon a variety of factors, including the dosage.

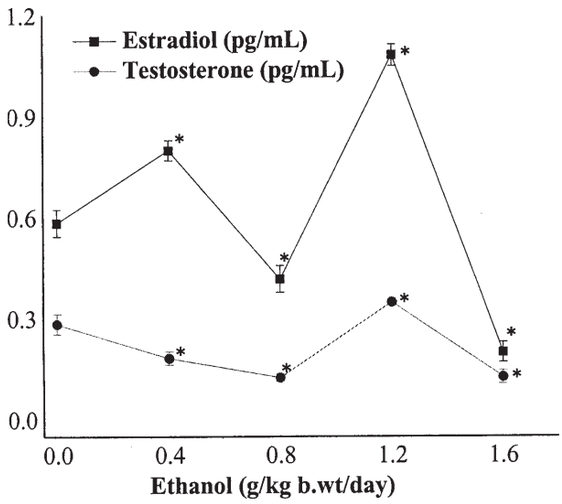

Fig. 1 : Effect of ethanol on serum hormonal levels : Serum testosterone and estradiol in ethanol treated rats. *P<0.05 in comparison to untreated rats. Results are expressed as mean±SD of 3 independent experiments with blood samples from 6 animals.

It appears from the study that there is a complex underlying physiology behind the effect of alcohol consumption on plasma testosterone levels and reproductive function. Further studies are needed to understand the biochemical and cellular basis of the same.

ANIL P. KUNNATH[a], SATHEESHA NAYAK[b] AND M. MANEESH[c]*

Departments of [a]Medical Laboratory Technology, [b]Anatomy and [c]Biochemistry, [a]Manipal College of Allied Health Sciences, [b,c]Melaka Manipal Medical College, Manipal – 576 104

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*Corresponding Author