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Effect of marginal or severe dietary zinc deficiency on testicular development and functions of the rat.

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Abstract

The effects of marginal (MZD) and severe (SZD) zinc-deficient diets on testicular function and development were studied in rats maintained on dietary treatment for 6 weeks after weaning. SZD produced variable degrees of histological changes as compared with pair-fed controls, including a significant decrease in the diameter of seminiferous tubules ($p < .05$) with variable degree of maturation arrest in different stages of spermatogenesis. No significant histological changes were obtained in testes of MZD rats. MZD rats-exhibited significant decreases in serum levels of testosterone (62.6%, $p < .001$) and progesterone (18.2%, $p < .05$) with no changes in that of FSH or LH. SZD rats showed marked decreases in serum levels of testosterone (17.8-fold, $p < .001$) and progesterone (28.8%, $p < .001$), whereas FSH showed an increase (34.4%, $p < .05$) as compared with respective controls. In vitro acute stimulation by hCG on testicular tissue preparation obtained from MZD rats resulted in much less androgen production (sum of androstenedione, testosterone, and androstanediol) (72.4%, $p < .001$) as compared with controls. Testicular androgen contents (sum of androstenedione, testosterone, and androstanediol) decreased significantly in MZD and SZD rats, with the latter showing the greatest decrease. SZD rats were asospermic, whereas MZD rats exhibited marked decrease in sperm counts (by 22.9%, $p < .05$) as compared with respective controls. The results reflect a direct action of zinc deficiency on testicular steroidogenesis and strongly support the idea that hypogonadism of zinc deficiency results mainly from changes in testicular steroidogenesis or indirectly from Leydig cell failure