

5. Summary:

Effects of exposure to obesogenic environment during *in-utero* and pre-pubertal periods on gametogenic activity and reproductive performance of offspring born to obese dams were studied. Adult female rats (F₀) fed with high calorie diet (HCD, 10 g/rat/day) every day for 4 or 8 weeks developed obese condition as determined by biometric and biochemical parameters compared to ND fed controls. These obese females after 8 weeks HCD feeding were mated with normal lean male rat and received HCD during gestation and lactation. The control (ND) females were mated with normal males. Though there was 100% fertility, reduction in litter size and weight and increase in pup mortality were observed in obese rats. The male and female offspring (F₁) born to obese females (F₀) also showed obesity at birth due to exposure to maternal obesogenic environment and during pre-pubertal period because of HCD feeding.

The results for the first time show that obese condition in pre-pubertal male rats (offspring of obese female) does not affect the age dependent appearance of germ cells according to developmental hierarchy whereas it does interfere with spermatid formation resulting in reduced sperm count which may be due to deficiency of testosterone mediated by hyperleptinemia. Further, decreased sperm count coupled with increase in percentage of defective spermatozoa indicates a poor semen quality in obese rats.

The observations on female offspring of obese rat first time reveal that pre-natal and post-natal exposure to HCD results in recruitment of more number of follicles for growth and atresia. It is suggested this phenomenon might cause early

exhaustion of ovarian follicles and lead to early cessation of reproductive life of females.

The obese offspring, though showed 100% fertility as adults, exhibited poor reproductive outcome as shown by decrease in litter size and litter weight and increased mortality of their pups. The effects were more severe in offspring (F_1) than mother rats as decrease in litter size and weight and increase in pup mortality were markedly higher in F_1 than those of F_0 rats.

To conclude, the study reveals that obesity though induces contrasting effects in male and female offspring, i.e. decrease in sperm count and increase in ovarian follicular recruitment, both result in poor reproductive performance.