Preface

Obesity is an abnormal or excessive accumulation of body fat, usually 20% or more over an individual's ideal body weight **(**WHO, 2000**).** It is found in both developed and developing countries, affects all ages and social classes (Nascimento *et al.,* 2008). Obesity is a global health problem with numerous risks and consequences, including cardiovascular problems, hypertension, type-II diabetes mellitus, infertility, cancer, gallbladder disease, high cholesterol, atherosclerosis, psychological depression, sleep apnea, renal failure and other complications. Fundamentally, obesity and overweight are due to energy imbalance, wherein the energy consumed exceeds the energy expended. Contemporary lifestyles and the accompanying pressures are implicated as the basic cause of this global phenomenan (Cabler *et al.,* 2010). Obesity is associated with a diverse set of metabolic disorders and has reproductive consequences that are complex and not well understood. Food availability regulates reproduction in mammals. Obesity in pregnancy significantly increases the risk of the offspring developing obesity after birth. The mechanisms that determine normal body weight regulation are not fully understood but are thought to involve hypothalamic neuronal systems responsive to peripheral signals of nutritional status. Leptin is a well characterized satiety signal derived from adipose tissue, which acts on hypothalamic neurons, particularly those in the arcuate nucleus (Schwartz *et al.,* 1996; Mizuno *et al.,* 1999).

Regarding reproductive effects of obesity, human studies revealed adverse effects on testicular development during fetal life (Ramlau-Hansen *et al.,* 2007), poor semen quality (Magnusdottir *et al.,* 2005) and increased oxidative stress (Vincent *et al*., 2007). In obese women, prolonged duration of labor (Garbaciak *et al.,* 1985;

Edwards *et al*. 1996; Weiss *et al*. 2004), early pregnancy loss (Wang *et.al*., 2002), increased risk of miscarriage (Millis, 1992; Metwally *et al.,* 2008), still birth (Chu *et al.*, 2007) and irregular menstrual cycles (Douchi *et al.,* 2002; Castillo-Martinez *et al.*, 2003) have been observed. Higher level of leptin plays a role in earlier onset of puberty in obese children (Shalitin and Phillip, 2003). Likewise, decrease in sperm counts, sperm motility and percentage of defective sperms (Fernandez *et al*., 2011; Duale *et al.,* 2014), increase in sperm DNA damage (Ghanayem *et al*., 2010; Bakos *et al*., 2011), increase in the testes and the epididymis weight, hyperlipidemia and reduced levels of testosterone, FSH, LH and the elevated leptin (Alhashem *et al.,* 2014) and reduction in testosterone levels (Millis, 1992; Metwally *et al.,* 2008; Bakos *et al.,* 2011; Vigueras-Villasenor *et al.,* 2011) have been observed in obese male rodents. In female rodents, obesity results in extended estrus cycle (Akamine *et al*., 2010), enlarged ovaries and undeveloped uteri (Bivens and Olster, 1997), anovulation and reduction in fertilization rate (Gouveia and Franci, 2004) and increase in number of primordial follicles (Tsoulis, 2014).

However, earlier studies have not focused on impact of obesity during the pre-natal (impact of mother's obesity) and pre-pubertal development. Since gonads develop, differentiate and mature during these periods, there is a dire need to understand this aspect. Studies on these lines gain importance due to fact that prevalence of childhood obesity is increasing globally. In view of these facts, the present study was undertaken to find out the effect of obesogenic environment during *in-utero* development and pre-pubertal period on gametogenetic and steroidogenic activities of gonads and reproductive performance of offspring born to induced obese females.

The thesis consists of a single chapter and is divided into different sections, *viz.* introduction, materials and methods, results, discussion, summary and references. Need for the investigation has been highlighted by critical survey of earlier literature under the section 'Introduction'. The description in the introduction finally leads to identifying the gaps and statement of objectives. The experimental protocol and methodology to achieve the proposed objectives have been described under "Materials and methods". The results of the experiments have been presented under the section "Results" supported by tables, photographs and graphical representations. The results are interpreted and the significance of the results of the present study is highlighted under the section "Discussion". At the end a "Summary" of the work describing briefly results and conclusions has been provided. The research papers and reviews referred in the text have been listed under "References" with all the bibliographic information.