EFFECT OF HYPERLIPIDAEMIA ON REPRODUCTIVE ORGANS IN MALE ALBINO RABBITS: A HISTOLOGICAL APPROACH

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ABSTRACT: The present study was aimed to study the effects of hyperlipidaemia on the histology of various reproductive organs. The chronic oral administration of cholesterol diet (400 mg/kg bodyweight/day for 60 day) induced hyperlipidaemia in male rabbits. It showed severe degeneration in germinal epithelium. Few spermatocytes could be seen, but the number was decreased. The seminiferous tubules were wavy and shrunken. As the tubule had large number of primary spermatocytes, it seems that the meiotic divisions were inhibited. Leydig cells nuclei were shrunken and the distribution of Leydig cells was abnormal. The histoarchitecture of cauda epididymis showed lesser number of spermatozoa in lumen and shrinkage was observed in epithelial cell line.

Key Words: Hyperlipidaemia, Seminiferous tubules, Leydig cells, Spermatogenesis.

INTRODUCTION

According to WHO, coronary heart disease is a modern epidemic with worldwide distribution. The incidence is high among the industrialized countries, claiming 25-50% of deaths. There is a close association between ischaemic cardiovascular disease and hyperlipidaemia. Various forms of hyperlipidaemia such as pure hypertriglyceridaemia, pure hypercholesterolemia and combined hyperlipidaemia are frequently found in patients with ischaemic heart disease. Considerable work has been done on hyperlipidaemia in relation to metabolism but the effects of hyperlipidaemia on reproductive organs remain unexplored. The present study was undertaken with the object of detailed investigation into the effect of feeding hyperlipidaemic diet on reproductive organs in albino rabbits.

MATERIALS AND METHODS

Adult male albino rabbits aged between 3 to 5 months were selected. Animals were divided into two groups and were housed in cages that provided ample space for movement under controlled environmental condition with provision of 12 hours darkness. The animals were given hyperlipidaemic diet and water was provided ad libitum. The hyperlipidaemic diet was prepared using cholesterol powder at the dose of 400 mg/kg body wt, mixed with coconut oil and vegetable oil in equal proportions. The two groups were:-

Group I - Control - The rabbits of this group received distilled water.

Group II - Treated - The rabbits of this group were given hyperlipidaemic diet.
(cholesterol powder mixed with coconut oil and vegetable oil).

Hyperlipidaemic cholesterol diet was administered orally, regularly for 60 days. After 60 days, the animals were sacrificed using light ether anaesthesia. Testes and accessory sex organs (epididymis, seminal vesicle and ventral prostate) were dissected out, freed of fat and connective tissue and were fixed in Bouni’s fluid for histological preparations. The tissues were washed in running water to remove excess of Bouni’s fluid and then dehydrated in alcohol series. The embedding was done in paraffin wax. The paraffin embedding was followed by section cutting at 5 microns. The sections were stained with haematoxylin and eosin.

RESULTS AND DISCUSSION

Seminiferous tubules from the testes of the animals fed on cholesterol for 60 days were wavy in outline and shrunken. As a result, the interstitium was enlarged. The Leydig cell nuclei were shrunken. Spermatogenesis was arrested at primary spermatocyte stage. However, a few secondary spermatocytes with karyolytic nuclei were seen. As the tubules had a large number of primary spermatocytes, it seems that the meiotic divisions were inhibited when compared with control (fig. 1 and 2). Cauda epididymis showed enlarged lumen without spermatozoa. Epithelial cells were necrotic, when compared with control. The Caput epididymis showed fewer numbers of spermatozoa. Few changes were noticed in vas deferens. The epithelium was normal and lumen was shrunken. The ventral prostate showed reduced glandular lumen. The epithelium of seminal vesicle was atrophied. Secretions were less in amount.

It is evident from present study that cholesterol effectively suppresses the process of spermatogenesis in adult albino rabbits. Disturbed spermatogenesis could be due to the disturbed pituitary gonadotropin secretion 5-7 or the cholesterol diet might have impaired Leydig cell function as evidenced by their reduced size resulting in decreased androgen production. The process of spermatogenesis is androgen dependent.8 The high concentration of cholesterol might have caused blockage of receptor sites of Leydig cells, which in turn cause inhibition of testosterone synthesis. As a result, the arrest of spermatogenesis took place. Thus, from the above studies, it is conclusive that hyperlipidaemia is adversely affecting and causing the arrest of spermatogenesis.

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Figure 1: Control Testis (HE X 200): Control Testis showing normal seminiferous tubules.

Figure 2: Treated Testis (Cholesterol diet - 400 mg/kg body weight) (HEX200): Treated Testis showing the degenerating spermatogenic cells and reduced seminiferous tubule diameter.