Medworld –asia International Publishers
Applied Physiology and Anatomy Digest [P ISSN: 2456 – 4095]
March 2018 (2) 04, 12-16

Original article:

Reduced pachytene stage of primary spermatocyte count as effect of immobilisation stress in adult swiss albino mice-histological study

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Abstract:

In modern era of urbanisation stress has became inevitable part of human life. It affects all age groups and both sexes .Stress affects all systems of body including reproductive system. Cannon (1990) was one of the first research workers who postulated that events disrupting homeostasis are stressful and may result in disease. Reproductive failure (infertility) in human newly married couples is becoming an ever rising problem now days. Increased stress because of urbanisation has been pointed out as the causative factor but there is very little documentation on this account. Immobilisation is most commonly used by other workers as stress inducer in (Bajkova 1988 Bharihoke et al 2000) and is less harmful to animals and it is mixed type of stress. So in order to study whether stress of urbanisation is one of the causes affecting process spermatogenesis and to find out structural and functional changes in testis by this stress, we decided to study effect of immobilisation stress on spermatogenesis of mice.

Introduction

In modern era of urbanisation stress has became inevitable part of human life. It affects all age groups and both sexes .Stress affects all systems of body including reproductive system. Cannon (1990) was one of the first research workers who postulated that events disrupting homeostasis are stressful and may result in disease. Reproductive failure (infertility) in human newly married couples is becoming an ever rising problem now days. Increased stress because of urbanisation has been pointed out as the causative factor but there is very little documentation on this account. Immobilisation is most commonly used by other workers as stress inducer in (Bajkova 1988 Bharihoke et al 2000) and is less harmful to animals and it is mixed type of stress. So in order to study whether stress of urbanisation is one of the causes affecting process spermatogenesis and to find out structural and functional changes in testis by this stress, we decided to study effect of immobilisation stress on spermatogenesis of mice.

Materials and Method:

The study was carried out on 40 male Swiss albino mice. The animals were divided into two groups of 20 each Group A: Served as control group B: Mice of this group were immobilized by keeping them into transparent plastic jars with 5holes for 4hrs a day for 60 days as shown in figure 1All the animals were sacrificed after two months. The testes were preserved in 10% Formal saline. Histological processing of tissues was done as described by Drury RA and Wallington EA (1980). H&E staining was done. Morphological, histological and histomorphometric study was carried.

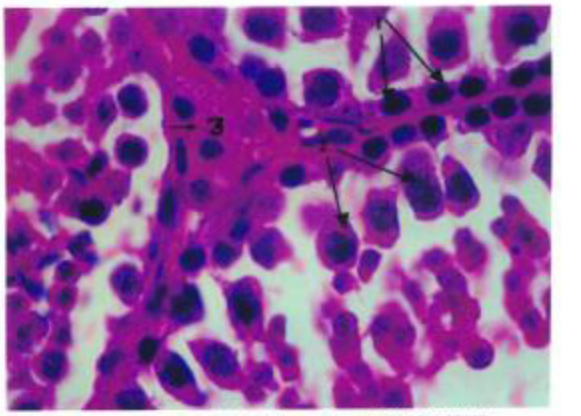
Observations:

Reduced spermatids & spermatozoon in lumen of most of seminiferous tubules compared with control, reduced pachytene stage of primary spermatocytes, reduced height of germinal epithelium of seminiferous tubules

Table 1: showing observed values of Pachytene stage of primary spermatocytes count per unit area testis of control and experimental group of mice.

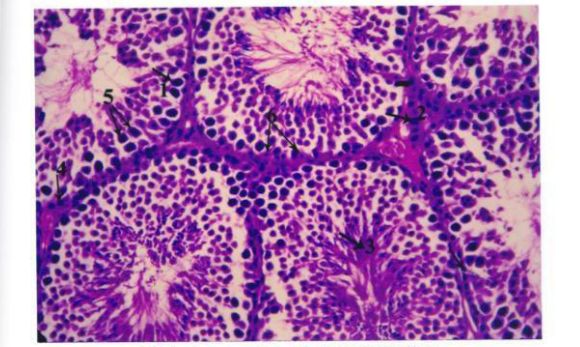
S.NO	CONTROL	EXPERIMENTAL
MEAN	86.55	64.7
S.D	4.5444	4.2907
T VALUE(15.63583) P<0.05		

Photomicrograph No 8 (Experimental H & E 400X)
1) Lumen of seminiferous tubules showing very few spermatozoa 2)Empty spaces between seminiferous tubules 3) Disorgnized germinal epithelium with spaces in between cells 4)Spermatogonia 5)Reduced primary spermatocytes 6) Sertoli cell 7) Few leydig cells



Photomicrograph No.10 (Experimental H&E 1000X)
1) Spermatogonia, 2) Primary spermatocytes 3) Leydig cells

Photograph No. 4 Experimental mice in Immobilisation stress in white transparent box provided with food & water



Photomicrograph No. 3 (Control H & E 400 X)
1) Seminiferous tubules showing germinal epithelium regularly arranged lining inside tubules.
2) Leydig cells with blood capillary, 3) Densly packed spermatozoa in lumen.
4) Spermatogonia 5) Primary spermatocytes 6) Sertoli cells

Discussion:

There were numerous studies showing effect of stress on human health. It also affects reproductive system. We used immobilization as stress inducer in our study. Immobilization is mixed type of stress. It acts as physical and psychological stress. In H & E sections of testes were observed. We found lumen of seminiferous tubules of testes of experimental mice shows reduced density of spermatozoa as compare to control group as shown in figure2,3 On histological observation we found reduction in pachytene spermatocytes in experimental group as compare to control group. After statistical test we found significant difference in pachytene spermatocytes count of experimental group as compare to control group.

Rai J et al (2003) reported that stress causes reduction in size and weight of testes as well as marked suppression of spermatogenesis and spermatogenesis suppression was observed at all the stages of cell division and maturity. They said that reason behind suppression of spermatogenesis is the restraint which is a potent stimulus inducing depression of hypothalamus-pituitary-testis axis as also and this depression of hypothalamus pituitary-testis axis mediated by activated hypothalamus pituitary adrenocortical axis, results in fall in plasma LH and testosterone levels (Norman &Smith, 1992) and we are also of same opinion

Parisa Tavakoli et al (2012) observed deformed seminiferous tubules, reduced cellular concentration, and decreased number of spermatocytes, spermatids and spermatozoa in restrained rats compared to control animals similar to our study.

Knol (1991)) proposed that stressors generally induce depression of hypothalamus-pituitary-testis system, mediated by activated hypothalamic-pituitary-adrenocortical system, resulting in fall in plasma LH and testosterone levels. CRH induces the release of endogenous opioids from hypothalamus, which along with corticosteroids suppresses the secretion of hypothalamic gonadotropin releasing hormone (GNRH). Suppression in secretion of GNRH causes reduced secretion of LH & FSH from pituitary, which in turn causes decrease in testosterone level and spermatogenesis. Such further studies and data collection proves this fact . [11]

Conclusion:

Although we have not studied the hormonal level directly in our study, disorganised germinal epithelium of seminiferous tubule decreased in number of pachytene spermatocytes count, suggest that there is suppression of hypothalamic pituitary testicular system in albino mice if exposed to immobilisation stress, affecting process of spermatogenesis in mice. So from our above observations we concluded that immobilisation stress for 60 days period (4hr/day) caused reduced pachytene stage of primary spermatocyte count in adult Swiss albino mice.

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