

EFFECT OF STRESS ON EPIDIDYMIS IN ALBINO RAT

SINGH A.K.¹ AND SHARMA R.C.²

¹Department of Anatomy, ²Professor & Head of Physiology, Government Medical College, Haldwani, Nainital, 263139, Uttarakhand, India

*Corresponding author. E-mail: aksuft69@yahoo.com

Received: August 10, 2011; Accepted: September 05, 2011

Abstract- Stress affects people of all ages and in all walks of life. Children at play, students preparing for an examination or workers on the job are all subject to stress. The present study was performed on 20 Adult male albino rats, out of which 10 served as control and 10 were exposed to immobilization stress. After 45 days the histological study showed that the stress has inhibitory effect on the epididymis. The degenerative histological findings are found in form of reduce number of spermatozoa, debris of cell mass & reduce epithelial cells height. These changes may cause infertility. The aim of present study was to establish the fact that stress is one of the causes of infertility.

Key words: Stress, Epididymis., Infertility

Introduction

As stress is increasing in our life day by day. Excessive and long term stress is often responsible for disastrous consequences on the health, quality of life and wide spread cause of disease. Cannon (1990) was postulated that stressful events disrupting the homeostasis and may result in disease [1]. Steinberger (1978), stated that environmental factors, whether chemical, physical or emotional may adversely affect the testicular functions [2]. The immobilization stress has been used by other workers as stress inducer in rats [3,4]. Effect of immobilization stress on the testis of albino rats were studied [5]. After formation in seminiferous tubules the sperm required several days to pass through the 6 meter long tubule of epididymis, the epithelium of epididymis secrete a special nutrient fluid that is ejaculated along with the sperm. This fluid contain hormones (including testosterone and estrogen), enzyme and special nutrients that are essential for sperm maturation. In the present work I have studied the effect of immobilization stress, which acts as physical as well as psychological stressor on the epididymis of albino rats. The aim of present study was to establish the fact that stress is one of the causes of infertility.

Material and methods

The present study was carried out on 20 sexually mature adult male albino rats weighing 150-200 grams. The rats were kept in airy room in steel cages in separate groups. They had constant access to water and food, and the temperature was maintained. Before the experiment 10 rats (group A) were taken as control for normal histological structures and 10 rats (group B) were used for immobilization stress by keeping them into transparent plastic jars with 8 holes for 5 hours per day. The animals of

group A and B were scarified at 45 days of experimentation. After sacrificing the animals epididymis have been removed and processed for histology. Sections, cut at 6 microns, were stained with haematoxylin & eosin.

Observation of control group of rats (group-A)

All the rats of control group showed normal fertility. Gross examination of the epididymis revealed an even contour and good vascularity. Histological study revealed normal histology of the epididymis. The lining epithelium of epididymis is composed of two types of cells- Tall columnar (principal) cells and triangular shaped basal cells. Each cells reach to the basement membrane, thus the epithelium is pseudostratified columnar. The epididymis also contains significant number of the 'light cells'. The nature of the light cells indicates that they are absorptive cells. The columnar cells bear non motile processes (stereocilia) and the cytoplasm of most of the columnar cells contains distinct droplets and granules of various sizes. The nuclei of the cells are elongated and lay some what different levels. The lumens of epididymis are filled with spermatozoa (Fig.01).

Observations of immobilization stress group of rats (group-B)

None the rats of immobilization stress group showed fertility. There are no any clear changes seen in shape & size of epididymis but vascularity is slightly reduced. The epididymis of 45 days treated rats shows slightly degenerative histological changes. The lumen of epididymis show scanty number of spermatozoa & the spermatozoa appears to be clumped and often only a few round cells resembling immature germinal cells. The spermatozoa almost loss there morphological features.

The lumens of epididymis are filled with masses of cells which appear to be that protein material of spermatozoa might have been denatured. Despite this change in luminal content the epithelium remained columnar with slightly reduced cells height. The diameter of epididymis is also decreased. At places epithelium showed the changes in character, as evidenced by reduction in affinity for eosin. Nucleus showed reduced size & morphological deformity at places. The stereo cilia have been also found to be reduced (Fig.02).

Discussion

Immobilization stress caused marked suppression of spermatogenesis [5]. Stress is a potent stimulus which induces suppression of hypothalamus-pituitary- testis axis [6], mediated by activated hypothalamus-pituitary-adrenocortical axis resulting, fall in plasma L.H. and testosterone levels [7]. Testosterone and FSH act directly upon germinal epithelium and are required for spermatogenesis. West 1990, Setchell et al 1965, Vandemark and Free 1970, studied the various kinds of stress on testis and found the similar results [8-10]. After formation in seminiferous tubules the sperm required several days to pass through the tubule of epididymis, the epithelium of epididymis secrete a special nutrient fluid that is ejaculated along with the sperm. This fluid contains hormones (including testosterone and estrogen), enzyme and special nutrients that are essential for sperm maturation. The numbers of spermatozoa were greatly reduced from the lumen of epididymis of the severely affected animals. With change in luminal content of epididymis of the severely affected animals, the columnar epithelium show slightly reduced cells height. The diameter of epididymis is also decreased. At places epithelium showed the changes in character, as evidenced by reduction in affinity for eosin. Nucleus showed reduced size

& morphological deformity at places. The stereo cilia have been also found to be reduced. Possible explanation of changes in character of cells and diameter of epididymis is effect of fall in plasma testosterone levels, which alters metabolic activities of cells (Fig.02) In present study, the lack of spermatozoa seems most likely due to the decreased production by the testis [5] and effect of fall in plasma testosterone levels, which alters metabolic activities of cells of epididymis.

References

- [1] Cannon W.B. (1990) *American Journal of Medical Sciences*.137: 480-87.
- [2] Steinberger E.(1978)*Fertility and sterility* 29:281.
- [3] Bharihoke V. Gupta M. and Gohil H. (2000) *Journal of anatomical society of India*.49(1);49-51.
- [4] Bajko O.V. (1988) *Kosm Biol Aviakosm Med*.22(5);55-59.
- [5] Rai J., Pandey S.N. and Shrivastava R.K. (2003) *Journal of anatomical society of India*.52(1);55-57.
- [6] Norman R.L. and Smith C. J. (1992) *Neuroendocrinology* 55(4);405 -15.
- [7] Knol B.W. (1991) *A review Veterinary Quarterly* 13(2); 104-14.
- [8] West J.B. (1990) *Physiological basis of medical practice 12th Ed*-853.
- [9] Setchell B.P., Waites G.M.H. and Lidner H.R. (1965) *Journal of reproduction and fertility* 9;149-162.
- [10] Vandemark M.L. and Free M.J. (1970) *Temperature effect on the testis New yark acadmic press*.3;205-212.

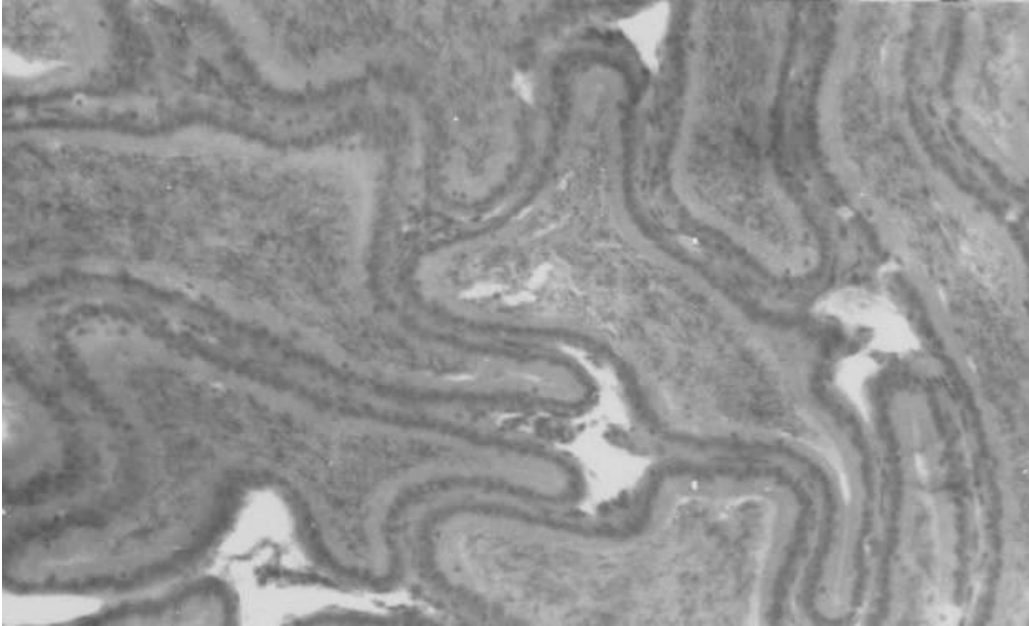


Fig. 1-Photomicrograph of Epididymis of control rat shows, lumen are full of spermatozoa and epithelium is pseudo stratified columnar. H &E. Staining x 400

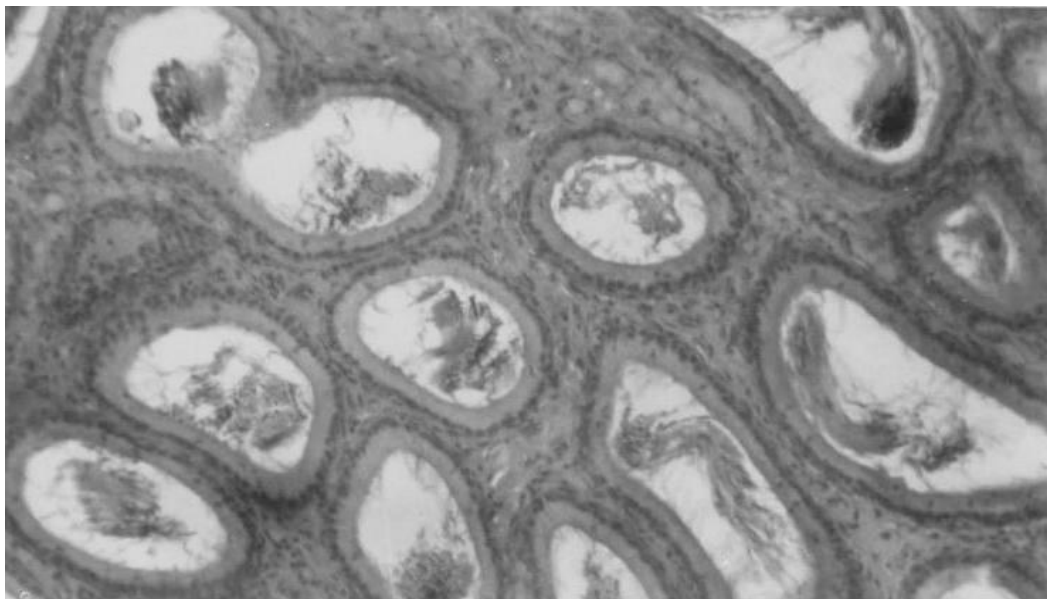


Fig. 2-Photomicrograph of epididymis of 45 days immobilized rat, shows reduce number of spermatozoa and presence of cell debris in the lumen. It also shows slightly reduce in the height of principal cells. H &E. Staining x 400