

Effect of Noise Stress on Adrenal Glands of Albino Rats

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Abstract: *The main aim of the work is to study the effect of noise stress on adrenal changes and its morphometry. Experimental animals were subjected to noise stress for 4 weeks and euthanized by sodium pentobarbitol. Adrenal and pituitary were removed and subjected to routine Haematoxylin & Eosin staining procedure. Morphology and Morphometrical readings were noted and tabulated. There was a drastic reduction in the size of pituitary and adrenal were noticed.*

Keywords: Noise stress – pituitary – adrenal gland – albino rats

1. Introduction

Stress is thought to be a major contributor to disease and dysfunction. It implies an overloading of system that will break down if sufficient strain is exerted on them. A threat to the physical integrity of the body from the environment stressor. Different types of stress like maternal deprivation, isolation, immobilization, light stress noise stress overcrowding etc., brings temporary or permanent changes in the whole or part of a body.

Environmental noise is known to be a stress factor which alters some physiological and behavioural changes in human. The main aim of the present work is to study the effect of noise stress on adrenal activity and morphometrical changes in adrenal gland.

2. Materials & Methods

Adult male wistar albino rats weighing about 150 – 170 gms were used for this study. The animals were divided into two groups – control & experimental. Both the groups were maintained at standard room temperature and provided with food and water ad libitum. During the entire period of study the animals were fed with diet as per the recommendation of the National Institute of Nutrition, Hyderabad, India). The experimental groups of animals were subjected to band noise for 4 weeks. Then they were euthanized and sacrificed as per the norms of animal ethical committee. To avoid variations due to circadian rhythm, the sacrificial time was kept constant between 9.30 am – 10.30 am. Noise stress was induced as per the authors article (Article & Namasivayam 2000). The animals were placed in a noise stress chamber. Broad band noise was produced by a noise generator and amplified by an amplifier which was connected to a height of about 300cm above the rat cage. The animals were subjected to noise at 100dB intensity. The intensity of the sound was measured by a sound level meter. Prior to noise stress, the experimental animals neither received any signals nor been conditioned, in order to avoid the habituation. The animals were relieved from stress for brief duration at varying intervals but the total duration of exposure to stress was 9 hrs/day. The experiment was performed as per the schedule given in Table.1

At the end of the experimental period of 4 weeks, both control and experimental animals were sacrificed, tissues – adrenal and pituitary were dissected out. Both the tissues were weighed and preserved in formalin. Then both the tissues were processed and stained by routine Haematoxylin and Eosin stain.

3. Results

Body weight of the experimental group found to be decreased when compared to control group. Table.2 The weight of the pituitary gland showed significant reduction in experimental group. There was a significant increase in the weight of the adrenal gland in experimental group when compared with control group. The medulla of the adrenal gland showed three distinct regions – zona glomerulosa, zona fasciculata and zona reticularis. When zona glomerulosa and zona reticularis did not show much difference in thickness in experimental group, zona fasciculata showed significant raise in thickness. All the readings were measured and tabulated and compared.

4. Discussion and Conclusion

In general, any level of stress which is caused by a stimulus, definitely triggers ACTH level, i.e. hypothalamo-hypophysio-adrenocortical axis is affected. Zona fasciculata secretes corticosterone and it is a known fact that corticosterone increases in response to stress. It may be due to hypertrophy or hyperplasia of the cells of zona fasciculata.

In the present study, due to noise stress, a notable decrease in body weight was found. That may be due to decreased GH level which in turn is due to increase in ACTH. Stress has affected the body weight of the experimental animals. There was a reduction in weight of pituitary gland of the rats which were exposed to noise stress and increase in adrenal weight. The stress has played a major role in altering the pituitary – adrenal axis proving that noise pollution is definitely a stress to which if exposed chronically will produce alteration in pituitary-adrenal system thereby affecting the various physiological and anatomical features of the individual.

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Table 1

Period in Weeks	Duration of Exposure	Intensity
I	8	100dB
II	8	100dB
III	8	100dB
IV	8	100dB

Exposure of Noise Stress

Table 2

S.No	Control	Experimental
I	189.8	173.8
II	183.2	174.1
III	191.2	178.2
IV	182.8	168.5

Effect of Noise Stress n Body Weight (Expressed in gms)