The Effects of Noise Pollution on Serum Levels of Testosterone in Male Rats

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***Abstract*—**Reproductive system development and function are influenced by environmental factors. The main aim of this study was to determine the effects of noise pollution on serum levels of testosterone in male rats. In our study male Wistar rats were randomly divided into control and groups exposed to traffic noise for 1, 3 or 6h/day of 5 rats in each group. After 8 weeks, blood samples were obtained using cardiac puncture method. Following serum preparation, level of testosterone was measured using radioimmunoassay method. Data were statistically analyzed and compared between groups using ANOVA. The results indicated that serum level of testosterone was increased in rats exposed to noise pollution for 3 or 6h/day compared to control rats (P<0.001 and P<0.01, respectively). Our findings show that noise pollution has excitatory effects on male reproductive system function leading to increased serum levels of testosterone, according to which, may put at risk the normal function of body**.**

***Keywords*—** Noise Pollution, Testosterone, Male Rat**.**

I. Introduction

OF all types of environmental pollutants, noise is the most prevalent and insidious natural pollutant which causes deleterious physiological and structural effects. Noise is also partially responsible for reduced reproductivity [1]. Detrimental effect of noise exposure are well documented as being harmful [2]. Abnormalities in reproduction system were also reported [3]. Most of the studies documented revealed the alterations in the levels of cortical hormone, adrenocorticosterone and nor-epinephrine hormone levels which are primarily considered as stress hormones and also on testosterone, follicular stimulating hormone and lutinizing hormone levels [4], [5]. It is believed that the noise stress may have negative influences on male reproductive system [6] and other systems [7]. The pituitary-gonadal response to stress (including noise stress) would be a more sensitive index of abnormalities induced by testosterone [8], [9]. Many types of stresses may influence male reproductive activity [10], [11]. Studies show that noise stress alongside with other stresses such as water stress, immobilization stress and nutritional stress can affect on sex hormones and in turn produce changes in the reproductive organs and glands [12]. The pituitary gonadal response to stress is primarily observed when animals are exposed to stress [13].

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II. Material And Methods

A. Animals

Adult Wistar rats weighting 200±30g were purchased and raised in our colony from an original stock of Pasteur institute (Tehran, Iran).The temperature was at 23±-2 ^{0}C and animals kept under a schedule of 12h light:12h darkness (light on at: 08: 00 a.m.) with free access to water and standard laboratory chow. This study was performed according to ethical guidelines relating to working with laboratory animals [8].

B. Protocol of Study

Male Wistar rats were randomly divided into control and groups exposed to traffic noise for 1, 3 or 6h/day of 5 rats in each group. The traffic noise was recorded from environment from crowded areas of city and the animals were exposed to the traffic noise in situation very similar to what humans are exposed to such noise. After 8 weeks, blood samples were obtained using cardiac puncture method. Following serum preparation, level of testosterone was measured using radioimmunoassay method.

C. Statistical Analysis

All values are presented as mean ± S.E.M. Statistical significance was evaluated by one-way analysis of variance (ANOVA) using SPSS 19. Differences with P<0.05 were considered significant.

III. Results

Table I and Figure I show the serum levels of testosterone in male rats. The results indicated that serum level of testosterone increased in rats exposed to noise pollution for 3 or 6h/day compared to control rats (P<0.001 and P<0.01, respectively).

Table I. Serum level of testosterone in control animals and rats exposed to noise pollution for 1, 3 and 6h/day. P values are versus control group. NS indicates nonsignificant difference compared to control group.

TABLE I
THE SERUM LEVELS OF TESTOSTERONE IN MALE RATS

Group	Progesterone (ng/dl)	P
Control	3.56±0.59	-
1h/day	4.32±1.00	NS
3h/day	9.41±1.22	<0.001
6h/day	8.14±1.14	<0.01

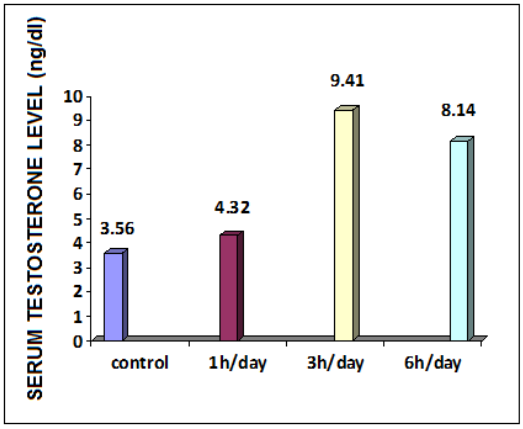

Fig 1. Serum level of testosterone in control animals and rats exposed to noise pollution for 1, 3 and 6h/day**.**

IV. Discussion

Our study indicated that noise pollution results in increased the serum levels of testosterone. In line with this finding there are reports indicating that exposure of adult rats to noise stress may enhance male sex hormones in particular testosterone level [5], in turn produces changes in the reproductive organs and glands [14]. However, contrast to our finding, there are studies showing that exposure to stress causes decreased sperm count and motility and increased pre-implantation mortality and decreased embryo size and weight [14] ,[15].

It seems that noise pollution as same as other stressful conditions can affect on gonadotropin secretion [16], resulting in incerased serum levels of sex steroids including testosterone in males. In this respect, it has been shown that pituitary gonadal response to stress is primarily observed when animals are exposed to stress [13].

V. Conclusion

We have shown that long term exposure to noise pollution has excitatory effects on male reproductive system function leading to increased serum levels of testosterone, according to which, may put at risk the normal function of body.

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