Effects of Shisheh on Testis Tissue in Male Rats


Abstract—Shisheh (methamphetamine) is one of the common stimulant drugs misused by young people in different countries. The aim of this study was to investigate the effects of Shisheh on testis tissue in male rats. Male and female Wistar rats were randomly divided into control, normal saline receiving, Shisheh (2, 4 or 6 mg/kg) receiving animals of 5 in each group. Shisheh was injected weekly intraperitoneally. After 6 weeks, testes tissues were examined microscopically. Data were statistically analyzed and compared between groups using "one way- ANOVA". The results indicated that Shisheh injection (4 and 6 mg/kg/week) caused to increased deformed seminiferous tubules and reduced cellular concentration, reduced spermatogonia and spermatocytes numbers compared to control group (P<0.01). Our findings show that Shisheh has inhibitory effects on testis tissue which in turn can bring about male failure.

Keyword— Shisheh, Testis, Rat.

I. INTRODUCTION

METHAMPHETAMINE is a synthetic central nervous system stimulant which releases high levels of dopamine, thereby enhancing mood [1], [2]. Methamphetamine exists in two stereoisomers, i.e., l- and d-, forms. L-methamphetamine has peripheral alpha-adrenergic activity and has been used in the past as a nasal decongestant. D-methamphetamine is a powerful stimulant with 3–5 times the CNS activity as the l-isomer and a half-life of 10–12 hours [3]. Studies have shown that stimulant drugs influence many physiological functions such as hormone secretion, neurotransmitters release and autonomic nervous system activity [4]. According to reports, stimulant drugs increase dopamine release from dopaminergic neurons of the brain, this increase in activity can lead to dependency [5]. Methamphetamine use can cause mild side effects such as heart palpitations, nausea and vomiting, shortness of breath, teeth grinding, hyperactivity, chat, insomnia, anorexia, dry mouth and nose, dilated pupils and elevated blood pressure [6], [7]. Also, studies suggest that stimulant drugs not only influence nervous system, they also affect on male reproductive system [8]. According to conflicting data relating to effects of injection of stimulant drugs on male reproductive system, this study was performed to determine the effects of injection of Shisheh (as a potent stimulant drugs) on testes tissue in rats.

II. MATERIAL AND METHODS

A. Animals

Adult Wistar rats weighting 200 ± 30 g were purchased and raised in our colony from an original stock of Pasteur Institute (Tehran, Iran). They were housed in plexy glass solid bottom cages with wood shavings for bedding. The temperature was at 23 ±2°C and animals kept under a schedule of 12h light: 12h darkness (lights on at 08:00 a.m.) with free access to water and standard laboratory chow (obtained from Pars Company, Tehran, Iran).

B. Protocol of Study

Male Wistar rats were randomly divided into control, normal saline receiving, 2, 4 and 6 mg/kg Shisheh receiving animals of 5 in each group. At the end of the experimental period, the animals were anaesthetized and testes were removed and after fixation in Bouin’s solution, testis tissue was transferred into 70% ethanol before being processed for 17.5 h in an automated Shandon processor and embedded in paraffin wax. Sections of 5 μm thickness were cut, floated onto slides coated with 2% 3-aminopropyltriethoxy-silane and dried at 50°C overnight before being used for cell quantification studies. All animal experiments were carried out in accordance with the guidelines of Institutional Animal Ethics Committee.

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. Significance was measured using Fisher’s least significant for the exact P values and significant differences are noted in the results. Differences with P<0.05 were considered significant

III. RESULTS

Table I represents mean number of spermatogonia and spermatocyte cells in seminiferous tubules in different experimental groups.
Our results show that there was lower number of spermatogonia and spermatocyte cells in seminiferous tubules of 4 and 6 mg/kg of Shisheh receiving animals compared to control rats (P<0.01). Seminiferous tubules were also morphologically deformed in Shisheh receiving rats compared to control group (figure 1).

<table>
<thead>
<tr>
<th>Group</th>
<th>Number of spermatogonia in seminiferous tunnel (mean ± SEM)</th>
<th>P</th>
<th>Number of spermatocytes in seminiferous tunnel (mean ± SEM)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>97.4±12.7</td>
<td></td>
<td>98.2±5.4</td>
<td></td>
</tr>
<tr>
<td>Shisheh (2mg/kg receiving)</td>
<td>97.8±6.1</td>
<td>N.S.</td>
<td>85±15.04</td>
<td>N.S</td>
</tr>
<tr>
<td>Shisheh (4mg/kg receiving)</td>
<td>53.6±7.9</td>
<td>&lt;0.01</td>
<td>48.3±8.6</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Shisheh (6mg/kg receiving)</td>
<td>63±4.9</td>
<td>&lt;0.01</td>
<td>52.8±6.7</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>

The data are indicated as mean ± SEM. P values are expressed in comparison with control group. N.S. represents non significant difference.

IV. DISCUSSION

In our study, 4 and 6 mg/kg Shisheh injection caused to deformed seminiferous tubules and reduced cellular concentration of spermatogonia and spermatocytes in tubules. In accordance with our study there are other reports indicating that administration of methamphetamines, especially at higher doses, may cause a decrease in cellular proliferation, induce apoptosis and change the proliferation ratio in testis. [12]. According to reports, methamphetamine has impairing effects on CNS [13] by which can bring about disturbances in neurochemistry of brain and impose dysfunction of body systems relating to nervous system [14]. Such drug abuse can make several pathophysiological effects on the endocrine system, cardiovascular system, liver, kidneys and reproductive system [15]. In line with our findings there are also other studies which indicate that methamphetamines and opioid narcotics can negatively influence male fertility, and impose adverse effects on the hypothalamic-pituitary-testicular axis, sperm function, and testicular structure [16]. The findings of investigators also indicate that opioid antagonists have a part in local regulation of testicular response to acute stress in adult rats [17].

V. CONCLUSION

We have shown that Shisheh injection has inhibitory effects on testicular tissue which in turn may have a pivotal role in male failure.

ACKNOWLEDGMENT

This research has been done with the support of Prof. Dr. Behrooz Khakpour, Department of Physiology and Cell and Molecular Research Center, Faculty of Medicine, Guilan University of Medical Sciences, Rasht, Iran. We appreciate all who helped us to exert the present study.

REFERENCES
