Abstract— Thyroid function is influenced by several types of psychomotor stimulants. The purpose of this study was to investigate the effects of Shisheh (methamphetamine) on serum levels of T3 and T4 in male rats. In this study male Wistar rats were randomly divided to control, saline receiving and 6mg/kg/body weight of Shisheh receiving groups of 5 rats in each. Shisheh or saline was injected intraperitoneally once a week for 6 weeks. Blood samples were obtained by cardiac puncture method and serum T3 and T4 were measured using ELFA method. Data were analyzed and compared between groups using ANOVA. Our findings indicated that T3 and T4 was significantly increased in Shisheh receiving animals compared with the control group (P<0.05). The results of this study show that amphetamine injection can increase the activity of the thyroid gland.

Index Terms— Shisheh, T3, T4, Rat.

I. INTRODUCTION

THYROID hormones have important effects on the function of vascular endothelial cells, endocrine systems, heart - lung, reproductive, bone, vascular, and muscle. These hormones have also important roles in regulating body metabolism, temperature control and fat consumption [1, 2, 3, 4]. Hypothalamus TRH and pituitary TSH are responsible for regulating sections of thyroid hormones [5, 6]. Methamphetamine is a stimulant and addictive substance that its main combination is amphetamines (C9H13N) [7]. Due to its devastating effects this study was exerted to investigate the effects of Shisheh (a type of methamphetamine which is used in Iran) on serum levels of T3 and T4 in male rats.

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 °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. Food was withheld for 12-14h before death. This study was performed according to ethical guidelines relating to working with laboratory animals [11].

B. Protocol of Study

Male Wistar rats were randomly divided into control, saline receiving and 6mg/kg/body [12] weight of Shisheh receiving groups of 5 rats in each. Shisheh was intraperitoneally injected. After six weeks, blood samples were collected in appropriate tubes by cardiac puncture technique 24h after the last treatment. After collection, the blood samples left to clot at room temperature for 15 minutes and then centrifuged at 2500 r.p.m for 10 minutes [13]. The serum layer was then separated and aliquoted into small test tubes and stored at -20 °C until T3 and T4 measurement.

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 1 indicates the serum levels of T3 and T4 in control, saline receiving and Shisheh receiving male Wistar rats.

<table>
<thead>
<tr>
<th>Groups</th>
<th>T3 (nmol/L)</th>
<th>P</th>
<th>T4 (µmol/L)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>2.08±0.26</td>
<td>-</td>
<td>8.62±0.29</td>
<td>-</td>
</tr>
<tr>
<td>Saline</td>
<td>1.98±0.3</td>
<td>N.S</td>
<td>7.84±0.5</td>
<td>N.S</td>
</tr>
<tr>
<td>Sh(6mg/kg)</td>
<td>3±0.17</td>
<td>&lt;0.05</td>
<td>13.88±0.31</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

Values represent MEAN ± SEM of 5 male Wistar rats in each group. Values of P (obtained by one-way ANOVA) were compared with the control group. N.S indicates no significant difference compared with the control group. Sh indicates Shisheh.

The results indicate that serum levels of T3 and T4 was not significantly changed in saline receiving group compared...
with control group. Serum levels of T3 and T4 in 6 mg/kg of Shisheh receiving rats were significantly increased compared with control animals (P<0.001).

IV. DISCUSSION

According to our finding the injection of 6 mg/kg/body weight of Shisheh resulted in increased serum levels of T3 and T4. This finding is in accordance with the results of previous studies indicating the stimulatory effects of ecstasy pills on thyroid gland [9]. Increased serum levels of T3 and T4 may come from the direct impact of methamphetamine on pituitary - thyroid axis leading to increased TSH level [14] which is followed by enhancement of thyroid gland function and increased T3 and T4 secretion [6]. On the other hand, studies show that increasing of testosterone following amphetamine injection [15] is still another mechanism of action that may influence thyroid gland function. Findings report that increased serum testosterone can influence secretion of TSH [16], by which brings about enhanced thyroid gland function [6].

V. CONCLUSION

Shisheh injection results in increased serum level of T3 and T4. This finding indicates that thyroid hyperactivity is a major adverse effect of amphetamine injection which can bring about other pathophysiological changes in normal body functions.

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