

## Opium addiction decreases T3 uptake amount

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### Abstract

**Background:** Although it is thought that the opium abuse causes changes in thyroid function, the exact mechanism is not still well defined. Therefore, the aim of this study was to investigate the impact of opium addiction on thyroid function by measuring T3, T4, TSH, and T3 uptake. **Materials and Methods:** This study was conducted as a case-control study on 106 opium addicts and 106 healthy individuals in Tehran. 50 ml urine sample were obtained for opium testing and 10 ml blood sample for measurement of T3, T4, TSH, and T3 uptake. **Results:** T3 was significantly increased in the case group compared to the control group ( $P < 0.005$ ). In contrast, T3 uptake was significantly decreased in the addicts compared to the healthy individuals ( $P < 0.001$ ). **Discussion:** The Results of this study showed that the opium addiction can affect thyroid function by increasing T3 and decreasing T3 uptake.

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**Keywords:** Opium addiction, Thyroid, T3, T4, TSH, T3 uptake.

### 1. Introduction

Thyroid hormones as important factors in the metabolism of sugar, fat, and protein have a significant impact on health. Taking certain medications, especially the permanent ones, may have an effect on thyroid function. It is thought that the opium and its derivatives may cause thyroid dysfunction, due to the effect on the intestinal motility and the interference with the iodine uptake, the liver function and the interference with the metabolism or a direct effect on the thyroid and pituitary glands. For example, common symptoms such as weight loss and muscle weakness are seen in the addicts and some patients with thyroid dysfunction (1-5). Thus, it is necessary that physicians in dealing with opium addicts pay more attention to the complications of thyroid dysfunction. It is also essential that physicians consider this issue in prescribing of the thyroid drugs (6).

Although it is believed that the opium addiction causes changes in thyroid function, the exact mechanism is not still been clearly identified. Therefore, this research in the Tehran Laboratory Sciences Research Center was designed as a case-control study to evaluate the effect of opium addiction on thyroid function, particularly the impact of opium abuse on the amount of T3, T4, TSH, and T3 uptake.

### 2. Materials and Methods

#### 2.1. Patients and Controls

This study was conducted in Tehran on 212 people, including 106 addicts and 106 healthy individuals. Addicts were selected from the individuals referred to opium division of the Tehran Laboratory Sciences Research Center, whose addiction were confirmed. In data form, characteristics of the addictions such as age, marital status, smoking, alcohol consumption, type of opium abuse, duration of opium abuse, drugs use, history of thyroid diseases and thyroid medications, were recorded in the format of question and answer.

Simultaneously, among other individuals who had been referred to the Tehran Laboratory Sciences Research Center for marriage test with no opium addiction and thyroid problems, 106 subjects were selected as control group and their characteristics were recorded in data form. Meanwhile, individuals of the control group were matched with the individuals of the case group. All samples were collected with the written consent of participants of addict and healthy in this study. The study was reviewed and approved by the ethics committee of the Tehran University of Medical Sciences.

#### 2.2. Screening and confirmatory addiction tests

For this purpose, the first 50 ml urine sample was obtained from the individuals of the case and the control groups. Screening test, to determine of morphine in urine at a concentration of approximately 300 ng per ml, was performed using a chromatographic immunoassay rapid test. Then, thin layer chromatography (TLC), a convenient and

accurate method in detection of opium alkaloids, was used to confirm screening test.

### 2.3. Measurements of T3, T4, TSH, and T3 uptake

10 ml blood sample was obtained from individuals of the case and the control groups, the serum of which was used to measure T3, T4, TSH and T3 uptake. T3 and T4 were measured by competitive RIA using Immuno Tech kits, but TSH was measured by non-competitive RIA method using Kavoshyar kit. T3 uptake test was also performed by RIA method using Radim kit.

### 2.4. Statistical analysis

Statistical analysis of the data was performed using SPSS 16 software. To establish the statistical significance between these groups, data were analysed using a Student's t-test with 95% Confidence Interval. P values less than 0.05 were considered to be associated with statistically significant differences.

## 3. Results

Addiction tests confirmed positive results in addicts and negative results in healthy individuals. As represented in Table 1, mean±SD of T3 was significantly higher in case group compared to control group (2.83±0.46 in the case group vs 2.09±0.39 in the control group, P<0.005). In contrast, mean±SD of T3 uptake was significantly lower in the addicts compared to the healthy individuals (25.21±1.91 in the case group vs 29.22±2.66 in the control group, P<0.001). There was no significant difference in the mean±SD of T4, TSH, and T3/T4 ratio between the case and the control groups.

**Table 1. Comparison of mean±SD of T3, T4, TSH, T3 uptake and T3/T4 ratio in the case and the control groups.**

	Mean	Standard deviation
<b>Case group</b>		
T3	<b>2.83*</b>	<b>0.46</b>
T4	9.83	2.98
TSH	1.05	0.89
T3 uptake	<b>25.21*</b>	<b>1.91</b>
T3/T4	0.27	6.72
<b>Control group</b>		
T3	<b>2.09</b>	<b>0.39</b>
T4	9.37	2.81
TSH	1.36	0.74
T3 uptake	<b>29.22</b>	<b>2.66</b>
T3/T4	0.27	9.65

\* Significant difference between the case and the control groups (P<0.05)

## 4. Discussion

The results of this study showed that T3 significantly increases in the addicts compared to the healthy individuals (P<0.005). Also, this results indicated that T3 uptake significantly decreases in the case group compared to the control group (P<0.001).

The most common test used to evaluate TBG is T3 uptake test in which T3 labeled with radioactive material due to the higher degree of trust is used instead of T4 labeled. In this test, a small amount of the T3 labeled with radioactive material, is added to a tube containing serum. This T3 competes with the serum T3 for binding to TBG. Then residual labeled T3 that is not connected to TBG will be removed by the resin. Hence the T3 uptake test shows the contrary TBG. In other words, there is an inverse relationship between T3 uptake and TBG, and T3 uptake measurement is used to assess 1/TBG (7).

Overall, this study showed that in the addicts, although T4 amount is normal but T3 and T3 uptake amounts increased and decreased, respectively. These results were consistent with the findings of two research groups of Young et al (8) and Bhoir et al (9) in 2009. Also, according to the decreased T3 uptake in the addictions and inverse association of T3 uptake with TBG, it can be concluded that opium abuse increases TBG.

Finally, a protein made in the liver, TBG can increase in the addicts. On the other hand, opium abuse can increase the concentrations of serum amylase, SGOT, and SGPT due to spasm of the oddi sphincter and increase concentrations of the liver lactate dehydrogenase by increasing the intrabiliary pressure (10, 11). Therefore, further studies can be done in the future on the liver and its secreted proteins in addicts. Also, TBG direct measurement can help to achieve more desirable and more complete results in the future researches.

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