



## Case Report on Inverse Presentation of Thyroid Stimulating Hormone in Thyroxine Intoxication

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### ABSTRACT

Levothyroxine (T4) overdose is a rare occurrence that can occur accidentally, most frequently in children, or deliberately in people who have suicidal thoughts, especially psychiatric patients. Suicidal levothyroxine intoxication is uncommon and usually asymptomatic. A 34-year-old woman initially presented with palpitation and giddiness after an overdose of levothyroxine (3mg). Vital signs included a blood pressure of 130/90 mmHg and Pulse rate of 104 beats per minute, immediately stomach wash was given with supportive therapy of Injection Pantoprazole 40 mg (IV), Injection Optineuron 1amp in 100ml of NS and IVF 30NS\20RL\10DNS at 75ml/hour. On reference to the Psychiatry department on fifth day of mental health counselling, the patient was diagnosed with Adjustment disorder. She was prescribed with Tab. Escitalopram 10mg, Tab. Clonazepam 0.5mg. The patient was symptomatically better and was discharged on 5<sup>th</sup> day with no fresh complaints. Levothyroxine overdose should be treated according to the patient's clinical symptoms and signs, the amount consumed and other factors. We think that the basal TSH value of our patient is clearly high and that was a truly inverse presentation from other cases.



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### INTRODUCTION

In contrast to asymptomatic or subclinical hypothyroidism, which has normal levels of thyroxine and tri-iodothyronine and modestly raised levels of serum thyrotropin, hyperthyroidism is characterised by an extensive clinical spectrum including an overt state of myxedema, end organ consequences, and multisystem failure [1]. About 4-5% of people in advanced nations have hypothy-

roidism [2]. About 4-15% of people in advanced nations have subclinical hypothyroidism [2].

The first-line therapy for hypothyroidism is levothyroxine [3]. Levothyroxine is a common alternative therapy for hypothyroidism patients, however, there haven't been many cases of acute overdose documented globally [4]. Levothyroxine (T4) overdose is a rare occurrence that can happen accidentally, most frequently in children, or on deliberately in people who have suicidal thoughts, especially psychiatric patients [5]. Suicidal levothyroxine intoxication is uncommon and frequently asymptomatic [6]. Levothyroxine dosages of 3-4 mg are easily tolerated [7]. Acute consumption of more than 5 mg of levothyroxine or 0.75 mg of tri-iodothyronine is considered a potentially hazardous dosage [8].

Adults exhibit a more severe clinical manifestation of levothyroxine poisoning than do children. The majority of levothyroxine intoxication symptoms that have been documented are mild [9], but follow-

ing large levothyroxine overdose, serious manifestations such as hyperthermia [10], vomiting [11], cardiac arrhythmias [12], seizures [13], coma [14], and thyroid storm [14], have been occurred.

Tetraiodothyronine (T4) transforms to triiodothyronine (T3), which is biologically active and necessary. The conversion typically lasts 48 to 72 hours. Levothyroxine has an average half-life of 7 days [15]. As a result, it is anticipated that the patient using levothyroxine will have an increase in total T4, T3, and free T4 (FT4), T3 and that the amount of serum thyroid stimulating hormone (TSH) will be decreased.

Gastric lavage and activated charcoal are advised in cases of levothyroxine intoxication rather than emetic medications. Propranolol, glucocorticoids, thioamides, iodine compounds, bile acid sequestrants [16], and in some circumstances, plasmapheresis is also chosen [17] along with additional supportive measures in a proven case of thyrotoxic crisis. It is recommended to administer propranolol (10–40 mg, three times daily), dexamethasone (4 mg, once daily orally), sodium iodate, cholestyramine (4 g, once every eight hours orally), propylthiouracil (it can impede T4>T3 transcription), plasmapheresis (extremely uncommon), and hemodialysis (perhaps of limited effect). In the event that a thyroid storm occurs, the patients should receive ICU care [15].

The treatment of levothyroxine poisoning is difficult to comprehend and there are no specific recommendations available, due to the wide range of presentations of levothyroxine overdose and the absence of obvious benefits of various therapeutic techniques. Here, we present a case of levothyroxine overdose in a 34-year-old female with ingestion of 3 mg of levothyroxine.

## CASE STUDY

A female patient of age 34 years with a medical history of hypothyroidism for the past 10 years presented with ingestion of 30 tablets of 100mcg Levothyroxine (3mg) as a suicide attempt at around 10:30 am. She was initially taken to the nearby local government hospital but was immediately referred to our hospital without any primary management. The Patient presented to Emergency room one hour after ingestion of Levothyroxine tablets with complaints of giddiness and palpitation. Vital signs included a blood pressure of 130/90 mmHg and a Pulse rate of 104 beats per minute. She was drowsy but was afebrile and oxygen saturation was good on room air. Her thyroid function test is shown in Table 1. Upon admission, the patient was not

allowed to eat or drink anything orally (NPO) and immediately stomach wash was given with supportive therapy of Injection Pantoprazole 40 mg (IV), Injection Optineuron 1amp in 100ml of NS and IVF 30NS\20RL\10DNS at 75ml/hour. For the next following two days, the patient was not allowed to eat or drink anything orally and was given Injection Pantoprazole 40 mg (IV), IVF 30NS\20RL\10DNS at 75ml/hour and INF 25% Dextrose (IV). On the third day, patient was allowed to take liquid diet orally. During the 5-day follow-up of the patient, TSH, T3, T4 were recorded daily and found TSH levels were elevated, which was quite contradictory and revers presentation compared to many thyroxine toxicity cases.

On reference to the Psychiatry department on fifth day for mental health counselling, the patient was diagnosed with Adjustment disorder. She was prescribed with Tab. Escitalopram10mg, Tab. Clonazepam 0.5mg. The patient was symptomatically better and was discharged on the 5th day with no fresh complaints. The patient was advised to continue Tab. Levothyroxine 100mcg after three days and following discharge medications was given: Tab. Pantoprazole 40mg for 5 days, Tab. Escitalopram10mg for 2days, Tab. Clonazepam 0.5mg for 7 days [Table 1].

## DISCUSSION

Accidental levothyroxine poisoning is more often in [16] children than in adults, when the overdose is more likely to be suicidal provided the concurrent psychiatric condition, however there have been relatively few case reports [18]. Hypothyroidism has also been correlated with mood disorders [19]. Only 10-15% of the levothyroxine is absorbed in the duodenum because the stomach acids do not completely break down it. In the first 24 hours following consumption, both T3 and total T4 levels rise gradually because it is primarily absorbed (>53%) in the jejunum-ileum. Additionally, the conversion of FT4 into active-free T3 delays the onset of symptoms for several days after intake. Even two to four days after consumption, the plasma concentration of thyroxine can reach its peak [4]. Levothyroxine dose and initial serum T4 levels cannot accurately predict the degree of levothyroxine toxicity, but rather the symptoms of T4 altering to T3 can. Levothyroxine T4 is eventually transformed to T3, a physiologically active component of thyroid hormone that causes any adverse implications when found in excess. T4 to T3 conversion typically takes 48–72 hours [15]. Increases in total and free T3, T4, and decreases in TSH are part of the anticipated

**Table 1: Tests done on day basis**

Test (reference range)	Day 1	Day 2	Day 3	Day 4	Day 5
T3(0.8-2ng/ml)	0.585ng/ml	0.659ng/ml	0.673ng/ml	0.682ng/ml	0.69ng/ml
T4(5.1-14.4 μg/dl)	20.91μg/dl	15.60 μg/dl	12.73μg/dl	12.01 μg/dl	11.38 μg/dl
TSH (0.25 to 5μIU/ml)	38.94μIU/ml	24.8μIU/ml	14.6μIU/ml	8.65μIU/ml	6.89 μIU/ml

biochemical profile, which is expected to normalise over the course of a week. Levothyroxine up to 4 mg taken abruptly usually has no symptoms [15]. However, our patient presented with symptoms of palpitation and giddiness on ingestion of 3mg levothyroxine pills. According to several research, not all levothyroxine intoxication cases had high basal TSH levels, although our patient's TSH was fairly high at 38.94 IU/ml. TSH of 48 IU/ML, which is fairly high, was shown in a case report similar to this one by Sahin A T. This study demonstrated that there is no correlation between the dosage of levothyroxine and the intensity of symptoms [15].

Levothyroxine has a prolonged 7.5-day half-life [20], so all cases of levothyroxine toxicity should be extensively observed, preferably with telemetry given the potential for tachyarrhythmias or seizures. Given that they also prevent the peripheral conversion of thyroid hormones, betablockers are a favoured option for treatment [21]. Additionally, it has been demonstrated that propranolol reduces serum T3 levels, particularly at high doses (>160 mg per day) [22]. By taking oral propranolol 0.1–0.5 mg/kg every four–six hours, sinus tachycardia can be addressed. Tachyarrhythmias can be treated with IV Esmolol 0.025-0.1 mg/kg/minute or IV Propranolol 0.01-0.1 mg/kg repeated every two to five minutes until the desired effect is achieved. Levothyroxine overdose cases have been reported, despite multiple infusions of activated charcoal, in which the treatment was futile [15]. In circumstances where substantial levothyroxine toxicity manifests early (e.g., >10,000 g), gastric lavage may be advantageous [23]. However, our patient only received Gastric lavage and received the above-mentioned supportive therapy. However, a case report done by Fang Du et al., [24] patient had palpitation and a heart rate of > 100 beats/min, so propranolol was given to control the heart rate. Fortunately, our patient did not develop any other complications.

Given the rarity of levothyroxine toxicity, this case would aid doctors in understanding more about the potential manifestations and treatment choices of levothyroxine toxicity and assist in the development

of future care guidelines.

## CONCLUSION

Levothyroxine tablets may be deliberately consumed by hypothyroid psychiatric patients who have suicidal thoughts. Levothyroxine overdose should be managed individually based on the amount consumed as well as the patient's clinical symptoms and signs because there are presently no standard guidelines available. In conclusion, we think that the basal TSH value of our patient was evidently high and that was a quite inverse presentation from other cases.

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