



# Managing Coexisting Anemia and Hypothyroidism: A Case Report Highlighting Drug Interactions

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## KEYWORDS

Hypothyroidism,  
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Heartburn .

## ABSTRACT:

**Introduction:** Hypothyroidism arises from the diminished levels of thyroid hormone, exhibiting a diverse range of underlying causes and clinical presentations. If left untreated, hypothyroidism rise to heightened rates of morbidity and mortality . Globally, the foremost cause of this condition stems from dietary iodine deficiency. This case study investigates a 44-year-old woman who was hospitalised in the general medicine department presenting symptoms such as dizziness, tiredness, acid reflux, and headache which was eventually diagnosed as hypothyroidism and anaemia.

**Objectives:** The main aim is to assess the pharmacological interactions in the therapeutic management of hypothyroidism.

**Methods:** The methodology involves selecting a patient with hypothyroidism and anaemia, reviewing their medical history, performing necessary lab tests, and adjusting medication timing to minimize drug interactions. The patient receives personalized treatment, regular follow-ups, and counselling on medication adherence and lifestyle modifications to monitor progress and improve quality of life.

**Results:** The case study demonstrates the significance of diagnosing and treating hypothyroidism, especially in their showcasing the potential complexities and challenges in management. In this patient concomitant administration of pantoprazole and Levothyroxine in the morning has been shown to suppress intra gastric pH level which results in heartburn.

**Conclusions:** The prevalent interaction among the Proton Pump Inhibitor(PPI) was identified with levothyroxine on co-administration with incorrect interval between the drugs. Rigorous screening recommendations, pharmacist interventions with extensive patient counselling strategies including lifestyle modifications and drug related guidelines provides comprehensive knowledge for improving the quality of life in hypothyroid patients.

## 1. Introduction

Hypothyroidism arises from diminished levels of thyroid hormone, exhibiting a diverse range of underlying

causes and clinical presentations<sup>1</sup>. Left untreated, hypothyroidism gives rise to heightened rates of morbidity and mortality. Notably, within the United States, autoimmune thyroid disease, specifically Hashimoto thyroiditis, stands as the predominant etiological factor leading to hypothyroidism. Globally,

the foremost cause of this condition stems from dietary iodine deficiency.

Hypothyroidism is typically categorised into two primary forms: primary and secondary (central) hypothyroidism. Primary hypothyroidism is characterised by an inadequacy in thyroid hormone production, primarily attributed to the thyroid gland's inability to generate sufficient quantities of thyroid hormone.



Other prevalent causes of hypothyroidism encompass:

- Medications, including but not limited to amiodarone, oral tyrosine kinase inhibitors (such as sunitinib and imatinib), stavudine, bexarotene, perchlorate, ethionamide, interferon, thalidomide, phenobarbital, phenytoin, carbamazepine, rifampicin, interleukin-2, and lithium<sup>2</sup>.
- Thyroid radioactive iodine therapy.
- Thyroid surgery.
- Radiotherapy administered to the region such as the neck or head.
- Central hypothyroidism, stemming from neoplastic, infiltrative, inflammatory, genetic, or iatrogenic disorders affecting the pituitary or hypothalamus<sup>3</sup>.

People with an elevated susceptibility to hypothyroidism encompass women, individuals aged 60 and above, and those with a history of the subsequent conditions:

1. Thyroid issues
2. Thyroid surgical procedures
3. Radiation therapy involving the thyroid, chest, or neck
4. A familial background of thyroid ailments
5. Recent pregnancy within the last 6 months
6. Turner syndrome
7. Pernicious anaemia
8. Sjögren's syndrome
9. Type 1 diabetes
10. Rheumatoid arthritis
11. Lupus<sup>4</sup>

In most cases, TSH levels are used as the main screening tool to detect primary hypothyroidism. In overt hypothyroidism, TSH levels exhibit elevation, while free

thyroxine (T4) levels are reduced. In cases of subclinical hypothyroidism, TSH levels are elevated, but free T4 levels stay normal<sup>5</sup>.

Central hypothyroidism, originating from dysfunction in the pituitary or hypothalamus, presents a unique diagnostic challenge. TSH produced in such cases may be biologically inactive, impacting the measurement of biologically active TSH. Therefore, the diagnosis of central hypothyroidism should rely on assessing free T4 levels rather than TSH levels<sup>6</sup>.

Treatment of anaemia with hypothyroidism typically involves thyroid replacement medications, iron supplements, or a diet rich in iron. Boosting iron absorption can be achieved with vitamins like C, B6, B12, and other supplements<sup>7</sup>.

**2.Objectives** The main objective is to evaluate the pharmacological interactions in the treatment of hypothyroidism and assess the impact of medication timing on its management effectiveness. Additionally, the study aims to investigate the clinical presentation and progression of hypothyroidism when co-administered with other medications. It highlights the importance of patient education and adherence to medication regimens in improving treatment outcomes. Finally, the study seeks to provide recommendations for best practices in managing hypothyroidism and related conditions.

**3.Methodology:** The patient was selected with hypothyroidism and anaemia, reviewed the medical history, lab reports. The patient reviewed for regular follow-ups, and counselling on medication adherence and lifestyle modifications was rendered.

### 3.1. Case Report :

A 44-year-old woman was hospitalised in the general medicine department, reporting dizziness persisting for approximately one month as her main concern. The patient was apparently normal before one month after which she developed giddiness which was suddenly in onset. She was presented with the clinical history of easy fatigability, headache, body pain, palpitation and anxious feeling. She had no history of diabetes mellitus and hypertension. She had no family history of severe illness.



#### 4. Results :

**4.1 Table 1: Vitals signs of the patient**

Vital signs	Day 1	Day 2	Day 3	Day 4
Pulse rate	67 bpm	64 bpm	93 bpm	86 bpm
Blood pressure	110/60 mmHg	100/60 mmHg	110/50 mmHg	110/60 mmHg
Temperature	98.7	97.9	98.7	98.9
spo2	90%	90%	94%	97%

The investigation of the patient revealed haemoglobin level of 6.6 g/dl with microcytic hypochromic anaemia on peripheral blood smear study. Microcytic, hypochromic anaemia refers to a condition where the red blood cells in circulation are smaller than normal (microcytic) and have reduced red coloration (hypochromic). Her blood sugar level was normal. Her liver function test and renal function test were apparently normal. Her menstrual history was normal with regular cycles. Her ultrasonography results showed that she is presented with a bulky uterus with adenomyotic changes and right exophytic ovarian cyst/hydrosalpinx.

**Table 2: Screening for thyroid levels in the patient**

TEST	VALUE	BIOLOGICAL REF
TSH	5.40 MIU/ml	(0.35-4.50)
T3	2.67 pg/ml	(2.60-5.39)
T4	0.85 ng/dl	(0.83-1.51)

Here the values of the patient's thyroid function test was compared with normal values. From the above table 2 variations in TSH level was seen. Subclinical hypothyroidism indicated by the raised levels of Thyroid stimulating hormone (TSH) alongside usual levels of thyroxine (T4) and triiodothyronine (T3).

**Table 3: Evaluation of Complete blood count (CBC)**

TEST	VALUE	BIOLOGICAL REFERENCE
HAEMOGLOBIN	6.6 g/dl	(12-16g/dl)
MCV	63.3 fL	(80-98)
MCH	18.2 Pg	(26-34)
EOSINOPHILS	6.1%	(2-6)
RBS	74.1 mg/dl	(80-120)

The haematology report of the patient's blood cell counts compared with the standard normal ranges resulted that the patient's haemoglobin level was low which showed evidence of the patient's anaemic condition.

#### 3.1 Treatment :

The treatment includes injection rexite plus (methylcobalamin, niacinamide, pyridoxine) 500mcg + 50mg + 50mg intravenously once a day in the morning. Injection pantoprazole 40 mg intravenously once a day in the morning.

Tablet livogen XT (ferrous ascorbate folic acid zinc sulphide) 100 mg + 1500 mcg + 22.5 mg orally BD, injection iron sucrose 100 mg intravenously once a day in the morning.

The medications which were administered to the patient on her first day of admission. followed by the step down therapy was followed which included tablet rexite plus (methylcobalamin, folic acid, pyridoxine hydrochloride, vitamin D3) 1500mcg + 1.5 mg + 3mg + 1000 IU orally once a day in the morning.

Tablet paracetamol (acetaminophen) 650 mg orally BD was prescribed to relieve her body pain. Syrup Ascoril, an expectorant (Levosulbutamol sulphate, Ambroxol Hcl, Guaifenesin) 5ml orally QID as the patient complained that she has the feeling of having phlegm in the chest

**Table 4: Prescribed of drug therapy**

S. NO	BRAND NAME	GENERIC NAME	DOSE & frequency
01.	INJ.REXITE PLUS	(methylcobalamin, niacinamide, pyridoxine	500mcg + 50mg +50mg (IV) 1-0-0
02.	INJ. PAN	pantoprazole	40 mg IV 1-0-0
03.	TAB LIVOG EN XT	Ferrous ascorbate folic acid zinc sulphide	100 mg + 1500 mcg + 22.5 mg BD
04	INJ VENOFEER	iron sucrose	100 mg 1-0-0
05	TAB REXITE PLUS	methylcobalamin, folic acid, pyridoxine hydrochloride, vitamin D3	1500mcg + 1.5 mg + 3mg + 1000 IU 1-0-0
06	TAB. PARA	acetaminophen	650mg BD
07	SYRUP .ASCORIL	Levosulbutamol, ambroxol hydrochloride, guaiphenesin	5ml QID

After getting the reports of TFT a physician prescribed tablet Thyronorm ( levothyroxine ) 2.5mg orally once a day in the morning for treating

hypothyroidism. she is also prescribed with pan(pantoprazole) 40 mg orally in the morning before food. After administration of Pantoprazole and levothyroxine without proper dosing interval she experienced heartburn

#### 4. Discussion:

Thyroid hormones have a crucial role in regulating the body's metabolism, while thyroid disorders are commonly linked to abnormalities in red blood cells. Subclinical hypothyroidism, which is often overlooked, can lead to iron-deficiency anaemia and other blood-related issues. Subclinical hypothyroidism (SCH) is characterised by an elevated serum thyroid-stimulating hormone (TSH) level, even though the levels of serum free thyroxine remain within the normal range. Among patients with subclinical hypothyroidism (SCH), 80% show a serum TSH level under 10 mIU/L. The vital ramifications of SCH is the significant probability of advancing to clinical hypothyroidism. Prevalence rates rise with age and are more pronounced among women<sup>8</sup>.

Screening for hypothyroidism involves evaluating thyroid function in individuals who are either at high risk for thyroid disease or exhibit mild, nonspecific symptoms such as fatigue. This screening usually includes measuring serum TSH levels. However, there are differing opinions on whether this screening should be conducted<sup>9</sup>.

As of now, the normal practice includes recommending routine levothyroxine treatment for people with a steady serum TSH level surpassing 10.0 mIU/L, while those with a TSH level lower than 10.0 mIU/L get personalised treatment<sup>10</sup>. Here the patient is also prescribed with levothyroxine.

Levothyroxine (LT4) and proton pump inhibitors (PPIs) are commonly prescribed medications, especially among the elderly population. Since they are often taken together, understanding their combined impact on LT4 absorption is crucial due to its narrow therapeutic range. LT4 dissolution before absorption in the intestine requires an acidic gastric pH, which some in vitro studies have shown can be hindered by elevated gastric pH levels. PPIs effectively block gastric acid secretion by irreversibly binding to and inhibiting the hydrogen-potassium ATPase pump thus affecting LT4 absorption, as highlighted in gastrointestinal absorption factors<sup>11</sup>.



Interaction between levothyroxine and Pantoprazole causes heartburn and also suppresses the effectiveness of levothyroxine which may progress from SCH to clinical hypothyroidism.

#### 4.1 Pharmacist Intervention :

The prevalent interaction among PPIs was identified with levothyroxine. Nevertheless, managing this interaction is feasible by ensuring patients take levothyroxine one hour prior to PPIs. Given the paramount importance of potential drug interactions in pharmacy practice, it's crucial to factor in concurrent medical conditions and all routinely prescribed medications during the assessment of PPI-containing prescriptions<sup>12</sup>.

#### 4.2 Patient counselling :

##### (A) Disease Related Counselling <sup>13</sup>

- Try to get at least 7-8 hrs of sleep every night and stick to a sleep schedule.
- Instead of muscle training it is better to get uniform and sustained workouts that is aerobic in nature like walking etc.
- Using a Heating pad or rice bag on your stomach may help relieve tenderness (ovarian cyst).
- Increase dietary iodine intake .
- Eat high soluble fibre food to prevent constipation.
- Avoid vigorous activity and extreme activity might cause ovarian torsion.
- Monitor thyroid function test frequently.
- Regularly consult with your doctor to know about the disease progression.

##### (B) Drug related counselling <sup>14</sup>:

- Take the medications as directed by the medical practitioner.
- If you feel dizzy/ sleepy while using rixite plus, avoid driving and operating machinery until you feel good.
- Take pantoprazole tablet 30 mins before food.
- Avoid taking foods like tea, coffee, milk, dairy products and soybean products when administration of livogen xt.

- Consult with your doctor if you experience serious side effects of iron sucrose administration like rashes, swelling, dizziness, breathlessness etc.
- Do not use more than recommended dose of cetirizine tablet. Do not drive after taking this medication if you feel sleepy.
- Take thyronorm tablet in the morning 30 mins before taking breakfast or caffeine containing drinks.

#### 4.3 Lifestyle modification:<sup>15</sup>

- Take iron rich foods like carrots, beetroot, grapes, pomegranate, dates etc,
- Consume more vitamin b12, C and E containing diets.
- Avoid taking nicotine, caffeine, carbonated liquids and processed foods.
- Do not consume excess milk products for at least 3-4 months until hypothyroidism is restored.
- Avoid soda, chocolate, high insoluble fibres, hot and spicy foods.
- Drink plenty of water.
- Avoid antacids which reduce thyroxine absorption.
- Take cold baths twice daily.
- Use moisturiser for dry skin.
- Avoid high fatty foods.
- Include lentils and whole grain cereals in your diet.

#### 5. Conclusion:

The case report highlighted the symptoms of hypothyroidism and underscored the importance of a comprehensive evaluation. The patient reported experiencing heartburn following treatment, it was due to side effect associated with the concurrent administration of Pantoprazole and Levothyroxine. The concurrent use of medications and their potential interactions necessitate precise dosing intervals and careful consideration in therapeutic approaches. Overall, this case emphasizes the necessity of vigilant monitoring, prompt diagnosis, and individualized management to enhance patient well-being.





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