



**CASE STUDY**

**A Case Study of Lithium Induced Hypothyroidism**

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**ABSTRACT**

This is a case report focusing on 20 year old male patient who experienced hypothyroidism after administration of Lithium Carbonate. The incidence of hypothyroidism on using Lithium carbonate is found upto 30% and 5 % - 35 % develop increased levels of thyroid stimulating hormone leading to hypothyroidism. In this case the patient was diagnosed with hypothyroidism after 5 months of initiating the use of lithium carbonate. The hypothyroidism occurred in the patient was conformed that the adverse reaction is due to lithium therapy.

**KEYWORDS**

Hypothyroidism, Sub Clinical Hypothyroidism, Drug Induced Hypothyroidism, Lithium Induced Hypothyroidism

**INTRODUCTION**

Lithium is used for mental illnesses, including bipolar disorder, depression, and schizophrenia; for eating disorders, including anorexia and bulimia and for blood disorders, including anemia and low white-cell count (neutropenia). Lithium is more effective in Bipolar disorder (manic-depressive disorder), Likely Effective in Major depression. Possibly Effective for Schizophrenia and related mental disorders. Lithium is usually used in combination with antipsychotic drugs when it is used for these disorders. However, sometimes lithium is given alone. Impulsive aggressive behavior associated with attention-deficit hyperactivity disorder (ADHD). Lacks or insufficient evidence for Alcohol dependence,

Blood cell disorders, other conditions like chronic headaches, cluster headaches<sup>5</sup>. The incidence of side effects varies between men and women who are on lithium therapy and among them 35% to 93 % of patients experience adverse effects of lithium. The incidence and severity of adverse effect varies from patient to patient depending upon the duration of lithium therapy, sex and other related factors.<sup>7</sup> Thyroid abnormalities associated with treatment with lithium have been widely reported in medical literature to date. These include goitre, hypothyroidism, hyperthyroidism and autoimmune thyroiditis<sup>1</sup>. Long-term lithium therapy is associated with a 10% to 20% risk of morphologic renal changes (e.g., glomerular sclerosis, tubular atrophy, and interstitial nephritis). 40 % patients complain of headache, memory impairment, confusion, poor concentration. 50% experience fine hand tremor and 30% with experience muscle weakness and lethargy. About 70% patients develop polydipsia, polyuria, nocturia.<sup>9</sup> The incidence of

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occurrence of Lithium Induced Hypothyroidism is more in women when compared to men.

### **Case Report**

A 20 year old male patient came in hospital with chief complaint of severe headache, loss of recognition for a movement, instability at the time of head ache, lot of sweat, Not able to walk steadily, totally confused state and set after having 3 hrs sleep but headache remains. On advice of neurophysician CT scan of head is performed.

CT - Brain Shows

\*\* A Small Healed granuloma in the left Peritrigonal region of the brain,

\*\*No other significant abnormality.

The patient came with weight 82 kg, B.P was found to be 120/60mmhg. The patient was evaluated for headache and received following medications for seven days:

- TOPIRAMATE 25mg 1-0-1
- Lorazepam 0.5 mg 0-0-1
- Naproxen 275mg 1-1-1

On the 8<sup>th</sup> day patient came and B.P was found to be 110/80mmhg and headache was not reduced but slight decreased, pain in left side chest has been observed with palpitation, presence of numbness in both hands and legs. The patient received following medications for a month:

- TOPIRAMATE 25mg 1-0-1
- Lorazepam 0.5 mg 0-0-1
- Gabapentin 100mg 1-0-1
- Tramadol 37.5mg + paracetamol 325mg 1-0-1
- Domperidone 10mg + omeprazole 20mg 1-0-0

On the following month patient came and B.P was found to be 120/90 mmhg with weight 80 kg and found decreased memory, decreased headache, pain is present in

left side chest . The patient received following medications for a month:

- Lorazepam 0.5 mg 0-0-1
- Gabapentin 100mg 1-0-1
- Tramadol 37.5mg + paracetamol 325mg 1-0-1
- Domperidone 10mg + omeprazole 20mg 1-0-0
- sertraline 50mg 1-0-0

On the following month patient came and B.P was found to be 130/80 mmhg with weight 80 kg and found slightly decreased headache. The patient received following medications for a month:

- Lorazepam 0.5 mg 0-0-1
- Gabapentin 100mg 1-0-1
- sertraline 50mg 1-0-0
- Paracetamol 650mg SOS
- Domperidone 10mg + omeprazole 20mg 1-0-0

On the following month patient came and B.P was found to be 130/80 mmhg with weight 80 kg and found decreased sleep. Physician advised for E.E.G which showed normal study with Myocardium pain positive and patient received following medications for month:

- lithium 150 mg 1-0-1
- Lorazepam 0.5 mg 0-0-1
- Gabapentin 100mg 1-0-1
- sertraline 50mg 1-0-0
- Paracetamol 650mg SOS

On the following month patient came and B.P was found to be 150/90 mmhg and slight decrease in headache and muscular tremor, hands are shaking involuntary with presence of numbness in both hands and legs, chest pain is present. The patient received following medications for three months:

- Lorazepam 0.5 mg 0-0-1

- Gabapentin 100mg 1-0-1
- sertraline 50mg 1-0-0
- Paracetamol 650mg SOS
- Lithium Carbonate 150 mg -0 - 300 mg
- Trihexyphenidyl Hydrochloride 1 mg 1- 0 - 1.

On the following month patient came and B.P was found to be 120/80 mmhg and slight decrease in headache and behavior changes like irritation and angry. The patient received following medications for a month:

- lithium 300 mg 1-0-1
- Gabapentin 100mg 1-0-1
- Amisulpride 50 mg 0 - 0 – 1

On the following month patient came and B.P was found to be 130/80 mmhg with weight 85 kg and found decreased sleep. Physician advised for Thyroid profile which showed tsh levels increased and physician evaluated as drug induced hypothyroidism then patient received following medications for a month:

- lithium 300 mg 1-0-1
- Gabapentin 100mg 1-0-1
- sertraline 50mg 1-0-0
- Lorazepam 0.5 mg 0-0-1

On the following month patient came and B.P was found to be 100/70 mmhg with weight 92kg. The patient received following medications for a month:

- lithium 300 mg 1-0-1
- Gabapentin 100mg 1-0-1
- sertraline 50mg 1-0-0
- Lorazepam 0.5 mg 0-0-1

On the following month patient came and B.P was found to be 130/80 mmhg with weight 105 kg decrease in sleep and sleep altered. Physician advised for Thyroid profile which showed tsh levels increased with increase in lipid profile,

patient received following medications for a 6 months:

- lithium 300 mg 1-0-1
- Gabapentin 100mg 1-0-1
- ramelteon 8mg 0 - 0 – 1
- levo thyroxin 50 micro gm
- rosuvastatin 10 mg

On the following month patient came and B.P was found to be 140/90 mmhg with weight 104 kg left knee pain since 5 days. Physician advised for X-RAY which showed knee joint space reduced, patient received following medications for a month:

- lithium 300 mg 1-0-1
- Gabapentin 100mg 1-0-1
- ramelteon 8mg 0 - 0 – 1
- levo thyroxin 50 micro gm
- rosuvastatin 10 mg
- Tramadol 37.5mg + paracetamol 325mg 1-0-1
- Diclofenac Gel 1-1-1
- Domperidone 10mg + omeprazole 20mg 1 - 0 – 0

On the following month patient came and B.P was found to be 130/90 mmhg with weight 92kg, both knee pains. Physician advised for Rheumatoid factors which were not found, patient received following medications for a month:

- lithium 300 mg 1-0-1
- Gabapentin 100mg 1-0-1
- ramelteon 8mg 0 - 0 – 1
- levo thyroxin 75 micro gm
- rosuvastatin 10 mg
- etoricoxib 60mg 0 - 1 - 0
- Diclofenac Gel 1-1-1

- Domperidone 10mg + omeprazole 20mg 1 - 0 – 0
- Glucoseamine 1500mg 1-0-0
- Calcium 500mg + vitamin D3 1000 IU 0-0-1

The patient was counseled about the non pharmacological treatment totally every month.

## **DISCUSSION**

Lithium works with other elements, drugs, enzymes, hormones, vitamins, and growth factors in the body in many different ways<sup>5</sup>. Lithium affects normal thyroid functioning through multiple mechanisms along the thyroid axis<sup>7</sup>. At the cellular level, it decreases thyroid hormone synthesis and release. It also decreases peripheral deiodination of tetraiodothyronine (T4) or thyroxine by decreasing the activity of type I 5' de-iodinase enzyme. Hypothyroidism and goitre (clinically and/ultrasonographically detected) are the most prevalent thyroid abnormalities among patients on long term lithium therapy. Lithium induced hyperthyroidism is very infrequent. Lithium increases the propensity to thyroid autoimmunity in susceptible individuals due to its effect of augmenting the activity of B lymphocytes and reducing the ratio of circulating suppressor to cytotoxic T cells. Up to 30% of patients on maintenance lithium therapy develop transiently elevated serum concentrations of thyroid-stimulating hormone, and 5% to 35% of patients develop a goiter and/or hypothyroidism, which is dose-related and more likely to occur in women. This is managed by adding levothyroxine to the regimen.<sup>1,2,5</sup> The weight gain which is considered as the main symptom of hypothyroidism or sub-clinical hypothyroidism occurs usually in the first two years of initiation of the therapy of lithium. The prevalence rate of hypothyroidism is more in women (14%) when compared to male patients (4.5%).<sup>6</sup>

Usually whenever an adverse drug reaction occurs, discontinuation of the drug is usually preferred but in case of lithium induced

hypothyroidism or subclinical hypothyroidism, lithium is not discontinued and thyroid replacement therapy is preferred rather than preferring other mood stabilizer in place of lithium to overcome lithium induced hypothyroidism<sup>7</sup>.

## **CONCLUSION**

Lithium being an effective in the management of affective disorders, concomitant thyroid dysfunction occurs. Significant proportions of patients treated with lithium develop clinically or radiologically confirmed goitre and hypothyroidism. Lithium induced hyperthyroidism is infrequent. Baseline and regular assessment of thyroid function tests (TSH, free T4); thyroid size using thyroid ultrasonography and measurement of titres of auto-antibodies against thyroid peroxidase is recommended among patients prior and during lithium therapy along with examining the signs and symptoms of thyroid abnormalities.<sup>1,2,4</sup>

*In vitro* studies shows that lithium inhibits thyrotropin releasing hormone and stimulate DNA synthesis which can also inhibit iodine uptake, thyroid hormone secretion and iodotyrosine coupling. Which may lead to development of hypothyroidism. The circulating anti thyroid peroxidase antibodies plays a vital role in causing hypothyroidism or subclinical hypothyroidism but studies also shows that it may occur in the absence of these antibodies in patients with lithium therapy whereas the exact mechanism is totally unclear.<sup>8</sup>

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