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# Lithium Toxicity Effects on Human

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**ABSTRACT:** Lithium toxicity is another term for a lithium overdose. It occurs when you take too much lithium, a mood-stabilizing medication used to treat bipolar disorder and major depressive disorder. Lithium helps reduce episodes of mania and lowers the risk of suicide in people with these conditions. The right dosage of lithium varies from person to person, but most people are prescribed between 900 milligrams (mg) to 1,200 mg per day, in divided doses. Some people take more than 1,200 mg per day, especially during acute episodes. Others may be more sensitive to lower doses. A safe blood level of lithium is 0.6 and 1.2 milliequivalents per liter (mEq/L). Lithium toxicity can happen when this level reaches 1.5 mEq/L or higher. Severe lithium toxicity happens at a level of 2.0 mEq/L and above, which can be life-threatening in rare cases. Levels of 3.0 mEq/L and higher are considered a medical emergency.

**KEYWORDS:** lithium, toxicity, medical, bipolar, medical, emergency, human, effects

## I. INTRODUCTION

People taking lithium need to carefully monitor how much they take it and when. It's easy to accidentally overdose on lithium by taking an extra pill, mixing it with other medications, or not drinking enough water. In 2014, for example, there were 6,850 reported cases of lithium toxicity in the United States.[1,2]

Symptoms of mild to moderate lithium toxicity include:

- diarrhea
- vomiting
- stomach pains
- fatigue
- tremors
- uncontrollable movements
- muscle weakness
- drowsiness
- weakness

Serum levels of lithium above 2.0 mEq/L can cause severe toxicity and additional symptoms, including:

- heightened reflexes
- seizures
- agitation
- slurred speech

- kidney failure
- rapid heartbeat
- hyperthermia
- uncontrollable eye movements
- low blood pressure
- confusion
- coma
- delirium
- Death[3,4]

Keep in mind that lithium can also cause side effects when taken in lower doses. Tell your doctor if you take lithium and notice any of the following side effects:

- frequent urination
- thirst
- hand tremors
- dry mouth
- weight gain or loss
- gas or indigestion
- restlessness
- constipation
- rash
- muscle weakness

These side effects can happen with low doses of lithium and don't mean you have lithium toxicity. However, they may be a sign that you need to adjust your dosage or need more frequent monitoring.[5,6]

Lithium toxicity is usually caused by taking more than your prescribed dose of lithium, either at once or slowly over a long period of time.

There are three main types of lithium toxicity, each with different causes:

- Acute toxicity. This happens when you take too much lithium at once, either accidentally or on purpose.
- Chronic toxicity. This happens when you take a little too much lithium daily over a long period of time. Dehydration, other medications, and other conditions including kidney problems, can affect how your body handles lithium. Over time, these factors can cause lithium to slowly build up in your body.
- Acute-on-chronic toxicity. This can happen if you take lithium every day for a long period of time, but then suddenly take an extra pill one day, either accidentally or on purpose.[7,8]

Some people are more sensitive to lithium and may experience symptoms of lithium toxicity at lower levels than others. This is especially true in people who are older or dehydrated. It's also more likely in people with cardiovascular and kidney problems.

Certain foods or drinks may also affect lithium concentrations in the body. It's best to not adjust the following unless monitored by a doctor:

Insert Long List Format:

- Salt intake. Less salt can make your lithium levels rise, while increasing your salt intake can cause it to fall.
- Caffeine intake. Caffeine found in coffee, tea, and soft drinks may have an effect on lithium levels. Less caffeine can cause your lithium levels to rise, while more can cause it to lower.
- Avoid alcohol. Alcoholic beverages can have a negative effect on many medications.[9,10]

In addition, taking lithium with other medications can also increase your risk of lithium toxicity. If you take lithium, make sure you talk to your doctor before using:

- nonsteroidal anti-inflammatory drugs (NSAIDs), such as ibuprofen (Motrin, Advil) or naproxen (Aleve)
- indomethacin
- selective cyclooxygenase-2 (COX-2) inhibitors, such as celecoxib (Celebrex)
- acetaminophen (Tylenol)
- metronidazole
- calcium channel blockers such as amlodipine (Norvasc), verapamil (Verelan), and nifedipine (Adalat CC, Procardia XL)
- angiotensin-converting enzyme (ACE) inhibitors, such as enalapril (Vasotec) or benazepril (Lotensin)
- diuretics[11,12]

## **II. DISCUSSION**

Mild lithium toxicity is often difficult to diagnose because its symptoms are similar to those of many other conditions. Your doctor will likely start by asking you some questions about how much lithium you take, as well as how often you take it. Be sure to tell your doctor about all of your symptoms, any recent illnesses, and whether you're taking any other medications, including vitamins, supplements, and even teas.

They may also use one or a combination of the following tests:

- an electrocardiogram to test for an abnormal heartbeat
- a blood chemistry test to look at your metabolism and electrolyte levels
- a blood or urine test to determine your serum lithium levels
- a blood test to check your kidney function

Moderate to severe lithium toxicity usually requires additional treatment, such as:

- Stomach pumping. This procedure may be an option if you've taken lithium within the last hour.
- Whole bowel irrigation. You'll swallow a solution or be given one through a tube to help flush the extra lithium out of your intestines.[13]
- IV fluids. You may need these to restore your electrolyte balance.
- Hemodialysis. This procedure uses an artificial kidney, called a hemodialyzer, to remove waste from your blood.
- Medication. If you start to have seizures, your doctor might prescribe an anticonvulsant medication.
- Vital sign monitoring. Your doctor may choose to keep you under supervision while they monitor your vital signs, including your blood pressure and heart rate, for any unusual signs.

Lithium toxicity can have lasting effects, so it's important to seek medical attention immediately if you think you may have it. Avoid home remedies, such as activated charcoal, which doesn't bind to lithium.

When caught early, lithium toxicity is often treatable with extra hydration and reducing your dosage. However, moderate to severe lithium toxicity is a medical emergency and might require additional treatment, such as stomach pumping.

### **III. RESULTS**

Lithium is a powerful medication that has antimanic properties. Though lithium has been approved as a treatment, its effects on the brain aren't completely understood. Researchers believe lithium makes the brain less responsive to stimulation that causes manic episodes. It's also thought to reduce the responsiveness to neurotransmitters. Lithium can become dangerous when it's taken in excess. When excessive amounts are taken intentionally or accidentally, it can cause acute or acute-on-chronic overdose symptoms.

#### **Types of Lithium Poisoning**

There are three types of lithium toxicity. They range from mild and uncomfortable to severe and dangerous if left untreated.

**Acute lithium toxicity.** Symptoms commonly include feeling weak, having a worsening tremor, feeling unbalanced or uncoordinated, poor concentration, diarrhea.

**Acute-on-chronic lithium toxicity.** With this level of poisoning, you could experience gastrointestinal (GI) problems. You may also experience neurological problems.

**Chronic lithium toxicity.** At this level, you will mostly experience neurological symptoms. Severity will depend on the levels of lithium in your body.

Lithium toxicity mostly affects your kidneys and central nervous system. In acute lithium toxicity, your GI tract will be affected too. In more severe cases, you may experience neurological or cardiovascular problems. In early lithium toxicity, you may have mild confusion. As the toxicity worsens, you may feel delirious or even have seizures or go into a coma. In very rare cases, lithium toxicity may cause diabetes insipidus. This condition leads to large amounts of urine in your body, regardless of how much fluid you drink. You'll also experience a significant amount of thirst. If you're experiencing any of these symptoms or side effects, you should seek immediate medical attention.[14] Left untreated, lithium toxicity can progress and worsen. Lithium poisoning can be life-threatening and should be monitored and treated promptly. By noticing the early signs of lithium toxicity, you can get the help you need. Contact your doctor or psychiatrist if you feel like you're experiencing any side effects from your medication. You can also have them check your lithium levels to find out if they're too high.

#### **IV. CONCLUSIONS**

Diligent monitoring is the best way to avoid lithium toxicity. You'll also need to make sure other medications you're on don't affect your lithium excretion. If your body excretes too much lithium, it can also create toxic levels in your body.

Medications that can interfere with this include:

- ACE inhibitors (used to treat high blood pressure and heart failure)
- Nonsteroidal anti-inflammatory medications (NSAIDs)
- COX-2 inhibitors (a type of NSAID)

Your doctor should monitor you closely to ensure you're taking the right levels of lithium. It's also important that you tell them about any side effects. Since lithium toxicity can happen through your body's excretion, you might not know initially whether you have high levels in your body. [15]

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