

# Magnesium Level in Patients With Adult T-Cell Leukemia: A Case Report

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## Abstract

**Introduction:** Adult T-cell leukemia (ATL) is a rare neoplasm of post-thymic lymphocytes observed in only 3% - 4% of patients infected with human T-lymphotropic virus (HTLV-1). The exact mechanism by which HTLV-1 triggers ATL is still under investigation. HTLV-1 is endemic in specific regions of the world including Mashhad, Iran, where the present study was performed.

**Case Presentation:** The current paper reports serum levels of calcium, magnesium and phosphorus as the main traced elements as well as parathormone (PTH) in five patients with ATL referred to Imam Reza hospital in Mashhad, Iran, in 2014.

**Conclusions:** We observed upper limit values of the normal range for Mg in the ATL cases which may not be neglected from a clinical point of view. The other measurements did not show a remarkable difference with normal levels.

**Keywords:** Magnesium, ATL, HTLV-1

## 1. Introduction

Human T-lymphotropic virus (HTLV-1) is a retrovirus infecting CD4+ lymphocytes. This virus has a distinct geographical distribution (1). It is prevalent in Japan, the Caribbean basin, certain regions of South America and Africa and in immigrants from these countries to other regions. (2). In Iran, the main highly endemic regions for HTLV-1 are the Northeastern regions, particularly Mashhad and Neyshabur (3).

Adult T-cell leukemia (ATL) is a rare mature T-cell neoplasm of post-thymic lymphocytes etiologically linked to HTLV-1. The disease manifests with leukemia in greater than two thirds of patients, while the remaining patients have a lymphomatous form. The clinical course is aggressive with a median survival of less than 12 months in the acute and lymphoma forms (4).

Clinical form, age, performance status, elevation of lactate dehydrogenase (LDH),  $\beta$ 2-microglobulin, level of CD25, serum neuron-specific enolase, the presence of hypercalcemia and a high proliferative rate are the main prognostic factors of ATL (5, 6).

Serum levels of minerals may change during chronic infections. This also occurs in malignancies. Patients infected with ATL have all these conditions simultaneously. Therefore, the current study aimed to explore serum mineral levels of five patients with ATL referred to Imam Reza

hospital, Mashhad, Iran.

## 2. Case Presentation

The study was performed in 2014 evaluating four females and a male referred to hematology/oncology clinic of Imam Reza hospital in Mashhad, Iran. This third level referral hospital is one of the two main teaching hospitals in the city. The mean age of patients was  $56 \pm 9.8$  years (range: 47 - 73). The minerals were measured based on photometric kits and parathormone (PTH) was quantified using Euroimmun ELISA kit. The measurements were performed in Imam Reza teaching hospital central clinical lab with a high standard laboratory and all instrumentations were checked and calibrated routinely with quality control companies.

A descriptive analysis of main laboratory findings is presented in Table 1. As shown in this table the mean Magnesium was higher than the population mean value of serum Magnesium based on Up to date normal values. Other variables did not show a notable clinical difference.

## 3. Discussion

A community-based seroepidemiologic study demonstrated that the overall prevalence of HTLV-1 infection in

**Table 1.** Laboratory Findings in the Patients With ATL

Parameter	Mean $\pm$ SD	Range
Mg, mg/dL	2.28 $\pm$ 0.28	1.85 - 2.61
P, mg/dL	4.04 $\pm$ 0.66	3.20 - 5.0
Ca, mg/dL	9.44 $\pm$ 0.96	8.50 - 10.90
PTH, pg/mL	28.69 $\pm$ 14.83	6.14 - 47.71

Abbreviations: ALT, adult T-cell leukemia; PTH, parathormone.

Mashhad was 2.12% (3). Generally, most individuals infected with HTLV-1 are asymptomatic carriers; however, a few patients would present some conditions such as ATL. It is reported that the possibility of ATL development in seropositive individuals is estimated to be only less than 4% with an interval of about 30 years between acquiring the infection and development of the symptoms, and the diagnosed patients do not have a long standing survival (7). This is the reason for few published studies on them.

The exact mechanism involved in the malignant behavior of infected T-cells is still under investigation. ATL is characterized by systemic lymphadenopathy and/or extranodal lesions, leukemic changes in the blood, and positive retroviral serology for HTLV-1 (8). Most common sites of the extranodal ATL involvement are skin, liver, spleen, bone and bone marrow (9).

Hypercalcemia is one of the most common disease features observed in up to 70% of patients with ATL (10, 11), but no significant difference was observed compared with that of the normal range of population. This might be due to low number of patients. Higher observed Mg levels in our patients might be due to cell lysis effect during a highly malignant status seen in ATL patients though the exact mechanism should be elucidated in further studies.

The present study was a case report based on five patients. Therefore, these findings should be confirmed

with further multi central studies with larger sample sizes. However, based on the current literature review it was one of the first studies reporting lower magnesium levels in patients with ATL.

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