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IMPORTANCE OF "CORRECTED" SERUM CALCIUM AND "RESULTS FROM A SHORT TERM STUDY CONDUCTED AT MAHARANI LAXMI BAI MEDICAL COLLEGE, JHANSI, UTTAR PRADESH, INDIA"

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Article Info	ABSTRACT
	Measurement of corrected total serum calcium reflects true calcium status of the body in health and disease. In the present study, 17 subjects were evaluated for serum calcium, albumin, and corrected total serum calcium was calculated. Following the correction, the calcium status shifted to normocalcemia from hypercalcemia in one of the patients, while in another patient the status shifted to hypocalcemia from normocalcemia. Thus, corrected total serum calcium is a better parameter than commonly used total calcium for assessing calcium status in patients suspected of altered calcium homeostasis.

INTRODUCTION

Calcium is the fifth most common element and the most prevalent cation found in the body [1]. It has a very important role to play in skeletal mineralization, blood coagulation, neuromuscular conduction, maintenance of normal tone and excitability of skeletal and cardiac muscle, stimulus secretion of exocrine glands and preservation of cell membrane integrity and permeability, particularly in terms of sodium and potassium exchange [2].

Hence, calcium estimation has great clinical importance in many diseases. Measurement of serum total calcium is commonly used to assess calcium status [3]. Albumin is the principle transport and depot protein for calcium in blood plasma and the albumin bound fraction constitutes about half of the total concentration of calcium in plasma [4, 5]. At physiological pH, albumin binds approximately 45% of serum total calcium. Variation in serum albumin concentration, therefore, alters the concentration of serum total calcium, while the concentration of physiologically important ionized calcium remains constant [3]. The purpose of this study was to internally validate an albumin-adjusted calcium equation in randomly selected patients, as compared to measured total serum calcium levels.

MATERIALS AND METHODS

The study was conducted in Biochemistry Department of Maharani Laxmi Bai Medical College (MLBMC), Jhansi, U.P., India. Consecutive 439 outpatients with simultaneous serum total calcium and albumin measurements determined over a 12 month time period from July 2013 to June 2014 were included from office records. 2 ml of venous blood sample was taken and serum was separated as per the standard guidelines and protocol; total calcium and albumin was estimated in each case by OCPC (O- Cresolphthalein Complexone) method

[6] and *bromocresol green, end point assay* [7], respectively.

Reference range:

Total serum calcium: 8.5- 10.5 mg/dl [1].

Serum albumin [7]:

0-4 days	2.8-4.4 g/dl
4 days to 14 years	3.8-5.4 g/dl
>14 to 60 years	3.5-5.2 g/dl
>60 years	3.2-4.6 g/dl

Calculation of corrected total serum calcium levels [1]:

Adjusted/corrected Ca (mg/dl) = total Ca (mg/dl) + 0.8 [4 – albumin (g/dl)].

RESULTS AND DISCUSSION

The total number of subjects evaluated for total serum calcium were 439, out of which only 17 subjects were examined for both calcium and albumin. The data along with the corrected calcium levels and calcium status are shown in Table 1. Interestingly, following the correction, the calcium status shifted to normocalcemia from hypocalcemia in one of the patients (serial no. 5), while in another patient the status shifted to hypercalcemia from normocalcemia (serial no. 11).

Table 1. The corrected total serum calcium and calcium status of 17 subjects

S. No.	Age	Gender	Total serum calcium (mg/dl)	Calcium status	Serum albumin (g/dl)	Corrected serum calcium (mg/dl)	Corrected calcium status
1.	22 years	Female	6.5	Hypocalcemia	3.4	6.98	Hypocalcemia
2.	22 years	Female	5.5	Hypocalcemia	3.6	5.82	Hypocalcemia
3.	19 years	Male	8.8	Normocalcemia	3.8	8.96	Normocalcemia
4.	40 years	Female	9.9	Normocalcemia	4	9.9	Normocalcemia
5.	35 years	Male	8.25	Hypocalcemia	3.12	8.954	Normocalcemia
6.	26 years	Male	10	Normocalcemia	3.7	10.24	Normocalcemia
7.	24 years	Female	11.8	Hypercalcemia	2.7	12.84	Hypercalcemia
8.	14 months	Female	9.14	Normocalcemia	4.1	9.06	Normocalcemia
9.	57 years	Female	9.71	Normocalcemia	3.4	10.19	Normocalcemia
10.	55 years	Male	10.5	Normocalcemia	3.4	10.98	Hypercalcemia
11.	7months	Male	10.27	Normocalcemia	3.1	10.99	Hypercalcemia
12.	50 years	Male	10.6	Hypercalcemia	3.5	11	Hypercalcemia
13.	40 years	Female	10.2	Normocalcemia	3.8	10.36	Normocalcemia
14.	24 years	Female	8.5	Normocalcemia	3.1	9.22	Normocalcemia
15.	3 years	Male	10.6	Hypercalcemia	2.7	11.64	Hypercalcemia
16.	10 years	Male	9	Normocalcemia	3.2	9.64	Normocalcemia
17.	60 years	Male	8.8	Normocalcemia	3.2	9.44	Normocalcemia

CONCLUSION

Corrected total serum calcium is a better parameter than commonly used total calcium for assessing calcium status in patients suspected of altered calcium homeostasis.

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