



A Cross-Sectional Study of Drug-Induced Hypercalcemia in a Tertiary Care Hospital

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Abstract

Hypercalcemia is a relatively common condition in hospital populations. The significance of understanding the clinical importance of hypercalcemia has diminished relatively. In, Fact there are inadequate data and studies related to drugs causing hypercalcemia. Moreover, the widespread use and availability of calcium and vitamin D supplements over - counter progress.

However, Vitamin D toxicosis remains common in underdeveloped nations. Along with that inadequate routine Calcium and vitamin D, screening results lead to undetected hypercalcemia. Therefore our study helps to find the triggering medications that cause hypercalcemia.

Keyword

Hypercalcemia, Vitamin D toxicosis, Calcium supplement.

Introduction

Hypercalcemia is defined by a serum calcium level above 2.6 mmol/L or 10.5 mg/dL.^[1]The drug-induced hypercalcemia can be possible through Vitamin D or vitamin D analogs, Calcium supplements, Aluminum, Diuretics, and Vitamin A intoxication. Vitamin D-mediated supplements can elevate calcium levels through excessive or ergocalciferol indigestion and ingestion or administration of excessive calcitriol.

It is suggested that standard intake of calcium may be too much for some women comparatively^[2]. There is evidence showing that 20.8% of those with

non-PHT mediated hypercalcemia satisfied all the criteria for the diagnosis of calcium supplement syndrome. This was a retrospective study conducted on patients with hypercalcemia over 3 year period^[3]. In Asian countries, an appreciable number of subjects though were asymptomatic at diagnosis^[4]. Another study has documented that Vitamin D toxicosis was also noticed in 5.5% of the non-PHT mediated hypercalcemia. This study was conducted on 78 patients. Of that 29 patients were studied retrospectively and 49 were studied prospectively^[5]. Only 45% of patients accounted for either malignancy or PHT; the remaining 55% is not clear. From the above-mentioned statement importance of the study is assured.

Materials and Methods

A six-month Hospital-based cross-sectional research among students was conducted from January to June 2022. This Cross-sectional Study was Conducted among 125 inpatients admitted to the general medicine department at Believers Church Medical College Hospital, Thiruvalla, a tertiary care hospital. The study was approved by the Institutional

Ethical Committee of Believers Church Medical College Hospital, Kerala, India. We excluded patients with comorbidities, those under the age of 50, and female subjects who were pregnant. Source of data collected from Patient Medical Records and Lab Report. The serum calcium level was measured by standard methods. The data were collected by visiting the general medicine department and entering the data into a predesigned data collection proforma. Thereby analyzing calcium, vitamin D supplements, and other drugs causing hypercalcemia. The collected data were entered in Microsoft excel-2010 version and results were presented in tabular form and presented as frequency and percentages.

Results

A study was conducted on 125 populations. Table 1 represents a distribution of hypercalcemic patients based on age group. Among 125 study population enrolled in the study, the majority of the subjects belong to the age group of 61-70 years [27%] followed by 51-60 years [24%], 71-80years [22%], 81-90years [13%], 41-50years [9%], 21-30years [3%] and 2% in the age group of 31-40.

Table 1: Distribution of age group

S. No.	Age Group	Frequency	Percentage
1	21-30	4	3
2	31-40	3	2
3	41-50	11	9
4	51-60	30	24
5	61-70	34	27
6	71-80	27	22
7	81-90	16	13
-	TOTAL	125	100

Figure 1: Shows the distribution of patients based on gender. Female population is dominant with 52% [65 subjects] and 48% were male [60 subjects].

Figure 1: Distribution of patients based on gender

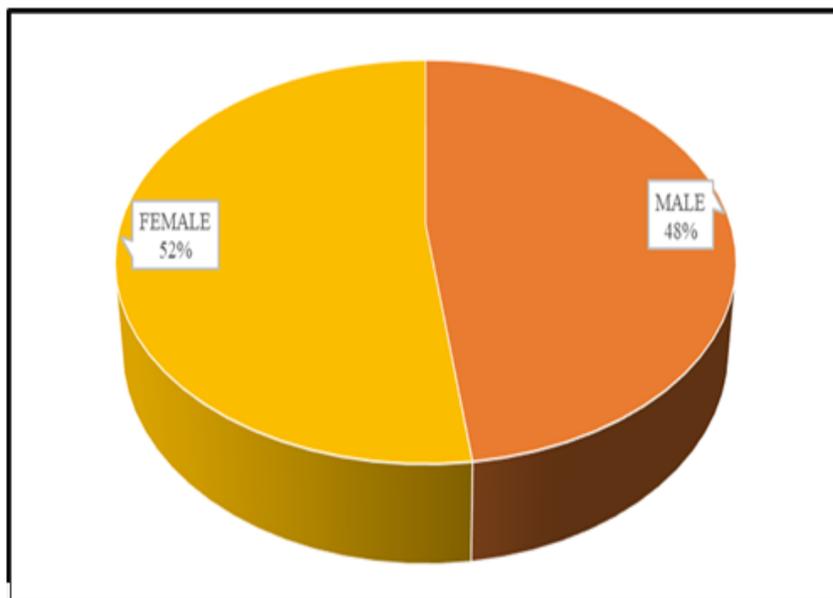


Figure 2: shows represent grading among 125 populations where the majority of subjects were mild which were about 46.4% (58 subjects), followed by 38 subjects who had a moderate range(30.4%), followed by 15 subjects who had a normal range(12%) and 11.2% were severe(14 subjects).

Figure 2: Distribution of calcium level

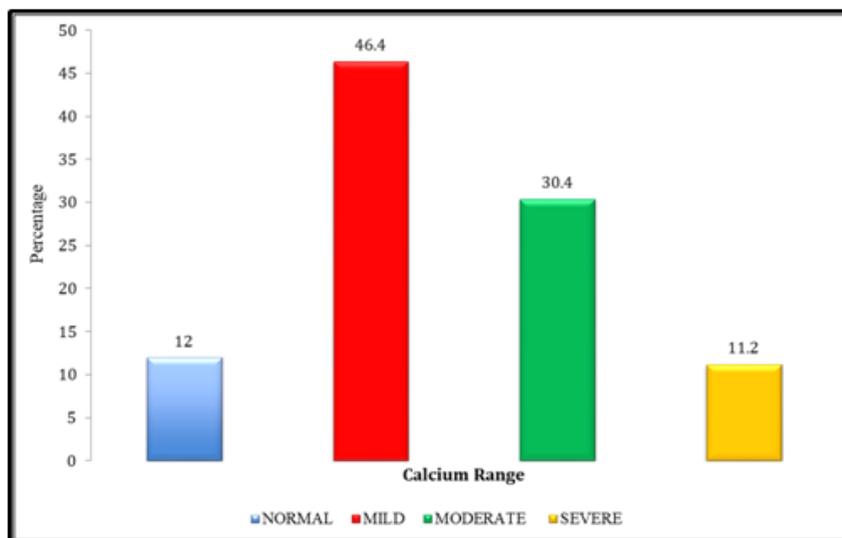


Table 2: represents the Distribution of Drug-induced hypercalcemia. Among 125 population enrolled in the study, the majority of subjects used Theophylline (42%), followed by 33% of Vitamin D users, 17% of Calcium carbonate users, and 8% of Hydrochlorothiazide users were found to be hypercalcemic.

Table 2: Distribution of Drug -induced hypercalcemia

S. No.	DRUG	FREQUENCY	PERCENTAGE
1	Hydrochlorothiazide	1	8
2	Calcium carbonate	2	17
3	Vitamin D	4	33
4	Theophylline	5	42
-	TOTAL	12	100

Discussion

In this study which was conducted on 125 study population, we observed that there is changing trend of medications leading to hypercalcemia. Based on the study conducted by Machado MC, Bruce-Mensah A et al evaluates the prevalence and characteristics of hypercalcemia induced by calcium intake (calcium supplement syndrome) in hospitalized patients. The study concluded that the widespread use of calcium and vitamin D supplementation can manifest as hypercalcemia.^[3] In another study conducted by Sohal PM, Gupta D, Garg S et al all patients admitted with hypercalcemia over two years were prospectively studied for clinical profile, and the outcome was result shows that fifty-two patients had hypercalcemia. The mean age was 56.6±14.2 years with an almost equal male to female ratio. Mild, moderate, and severe grades of hypercalcemia were observed in 25%, 44%, and 30% respectively. Hypercalcemia is an important medical emergency and if diagnosed and treated properly can save many lives.

It is most important that vitamin D toxicosis is not uncommon these days, especially in under - developed nations where parenteral vitamin D

preparations are available over-the-counter. Given the above - mentioned statements, there should be areas for the proper screening test and observing triggering drugs causing hypercalcemia. Moreover, since Calcium and Vitamin D supplements are easily available OTC and are highly recommended on social media, we suspect that a significant portion of hypercalcemia would be due to toxicosis. Results showed the relationship between vitamin D and episodes of hypercalcemia. The adverse effects and safety profiles of calcium and vitamin D supplementation are clear despite their widespread use.

In this study, 61-70 age group are hypercalcemic whereas in gender females are dominant over males. Based on serum calcium levels majority of patients belong to the mild category(58 subjects) followed by the moderate category(38 subjects). Therefore our study comprehensively analyses different perspectives including serum calcium values, age, gender, and prescribing patterns leading to hypercalcemia. Our study helps to evaluate the impact of patients' increased calcium levels on their health

which will help the physician to find out what to expect from these drugs.

Conclusion

This cross-sectional study summarizes the clinical significance of understanding drugs causing hypercalcemia. Based on our study findings we concluded that theophylline has a significant leading cause of hypercalcemia over calcium and vitamin d supplements followed by hydrochlorothiazide. Thus the profiling of hypercalcemia makes clinicians aware of the changing patterns of hypercalcemia in hospital settings.

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