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Prevalence of Hypercalcemia in Inpatient in a Tertiary Care

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Abstract

Background

The physicians and patients are not much aware about hypercalcemia. So it is important to evaluate the prevalence of hypercalcemia.

Materials and Methods

The retrospective study was conducted among 146 in patients with the aim to assess the prevalence of hypercalcemia in a tertiary care hospital. The study was performed in all departments of a tertiary care hospital.

Results

The calcium level was high in the age group of 61-72 years old patients. Hypercalcemia is more common in female patients than males.

Conclusion

Our study concluded that the prevalence of hypercalcemia was more in a tertiary care hospital.

Keywords

Hypercalcemia, PTH, Vitamin D

Introduction

Calcium is an important mineral for bone growth, bone strength, maintaining proper hormone levels and optimal functioning of nerves, muscles and the brain [1]. About 50 % of calcium is protein-bound in the blood, mainly to albumin, 45% is free, physiologically active calcium, known as ionized calcium, and about 5 % is bound as calcium citrate or calcium phosphate.(2)Calcium plays an important role in intracellular and extracellular metabolism controlling processes.

Hypercalcemia is a situation wherein the calcium stage withinside the blood turns into above normal (3) . PTH and vitamin D help to manage the calcium balance in the body.Main organs involved in the regulation of calcium are parathyroid glands and, when calcium levels drop, the parathyroid glands increase secretion of parathyroid hormone (PTH). PTH binds to the PTH receptor and causes serum calcium levels to increase. PTH causes osteoblast induction of osteoclasts and resorption of calcium from the bone. [4]

The most common cause of hypercalcemia is excess PTH released by parathyroid glands. This excess occurs due to an enlargement of the parathyroid glands or a growth on one of the glands. Calcium concentration is regulated via means of plasma membrane calcium receptor, PTH and its receptor, calcitonin and its receptors, and by the action of vitamin D on kidneys, bone and intestine. PTH mobilizes calcium directly by improving bone resorption, and indirectly, by stimulating one alpha-hydroxylase which increases vitamin D3 production, in turn, leading to increased absorption of calcium from the gut and increased bone resorption.[4]

Patients with calcium level between 10.5 and 12 mg per dL can be asymptomatic. When the serum calcium level rises above 12mg/dl, multisystem manifestations become apparent. The manifestation were emotional lability, confusion, delirium, psychosis, stupor, muscle weakness, headache, seizures (rare), nausea/vomiting, anorexia, constipation, abdominal pain, peptic ulcers, pancreatitis, bone pain/ arthralgia, osteopenia/ osteoporosis in cortical bone (often seen in wrist) shortened QT interval on ECG, arrhythmias (rare unless on digitalis), bradycardia, hypertension, AV blocks, cardiac arrest (if severe), hypercalciuria, nephrolithiasis, nephrocalcinosis, renal failure, shock.[5]

Hypercalcemia can be caused by endocrinological disorder, malignancy, granulomatous diseases, CKD, milk alkali syndrome and some medications also cause hypercalcemia that include lithium, thiazide, vitamin D and vitamin A.The recommended dietary allowance for vitamin D3 and calcium in older people is 600 to 800 IU/day and 1,200 mg/day. Hypercalcemia was more common in elderly people than younger people and most commonly seen in women than men [6] .

Materials and Methods

This retrospective study was conducted among 146 inpatients admitted in all departments at Believers Medical College Hospital, Thiruvalla. The study was approved by the Institutional Ethics Committee of Believers Medical College Hospital. The patient calcium and other lab parameters were randomly collected from the electronic health records of the hospital. The data collected from a period of January 1st 2016 to December 31st 2018. The patients of age above 20 years are included in the study and female patients who are pregnant are excluded in the study.

The data were collected in a predesigned data collection form which has been validated. The data collected were entered in Microsoft excel- 2010 version and results were presented in tabular form and presented as frequency and percentages.

Result

Table 1: shows distribution of patients based on age group. The study conducted among 146 population , majority of the subjects were in the age group of 62-71 years [28.7%] followed by 52- 61

years[23.9%], 72-81 years[19.8%], 42-51 years[10.2%], 82-91 years[9.5%], 22-31 years[4.1%], 32-41 years[3.4%]. **Figure 2:** shows distribution of gender. Among the 146 study population enrolled in the study majorities were female which is about 77 [52.7%] and males were 69[47.2%]. **Figure 3:** shows the serum calcium level. Among the 146 study population, the majority of the subjects have elevated serum calcium level than the normal serum calcium level. The subjects with serum calcium levels greater than 10.7mg/dl were about 113[77.3%] and the population with normal calcium levels were about 33[22.6%]. **Table 4:** shows albumin level. Among 146 study population, the majority of the subjects have normal albumin level which is about 74[59.25], followed by low albumin level which is about 49[39.2%] and high albumin level which is about 2[1.6%].

Discussion

The study conducted among 146 patients, our goal was to evaluate the prevalence of hypercalcemia in tertiary care hospital and how common hypercalcemia is in patients. The incidence of hypercalcemia in our study was about 77.3%. According to Machado MC, Bruce Mensah A et al conducted a study that concluded that the widespread use of calcium and vitamin D supplementation can manifest as hypercalcemia and worsening of kidney function in susceptible individuals [7]. According to D.M .Dent et.al the incidence of hypercalcaemia was 0.6%, being transient in 19.2% of patients and sustained in the remainder [8]. This study shows that the age group of 62-71 years were more affected and distribution of gender shows that females were more affected than males. According Palmer M, Jakobsson S, Akerstrom G et al performed a study concluded that the superiority of hypercalcaemia increased in women with advancing age and occurred in close to 3% of those above the age of 60, whilst in men it was found in less than 0·7% in all age groups. The mean serum calcium concentration in women above the age of 50 was significantly higher than in men.[9] The normal albumin level was more than that of abnormal levels in our study. According to a study conducted by Carroll MF et.al. low serum albumin level affect the total serum calcium level.[10]

Tables and Figures

Table No. 1: Distribution of Age

S. No.	Age	Frequency	Percentage
1	22-31	6	4.1
2	32-41	5	3.4
3	42-51	15	10.2
4	52-61	35	23.9
5	62-71	42	28.7
6	72-81	29	29.8
7	82-91	14	9.5
	Total	146	99.6

Figure No.2: Distribution of Gender

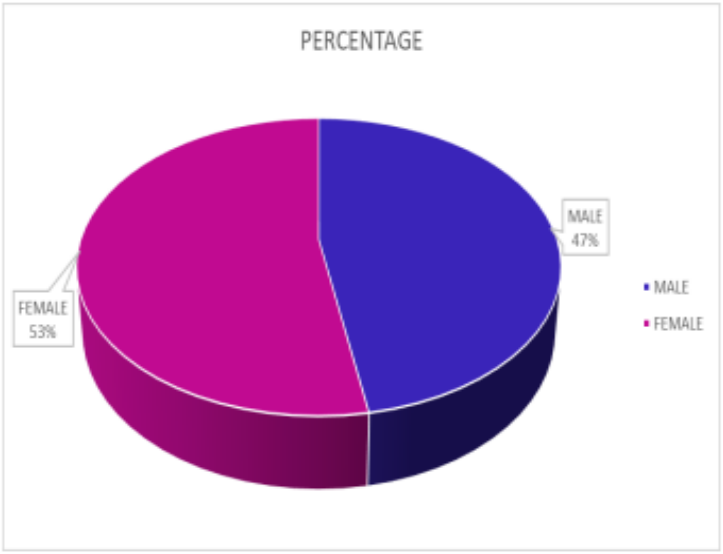

Figure No.3: Distribution of Serum Calcium Level

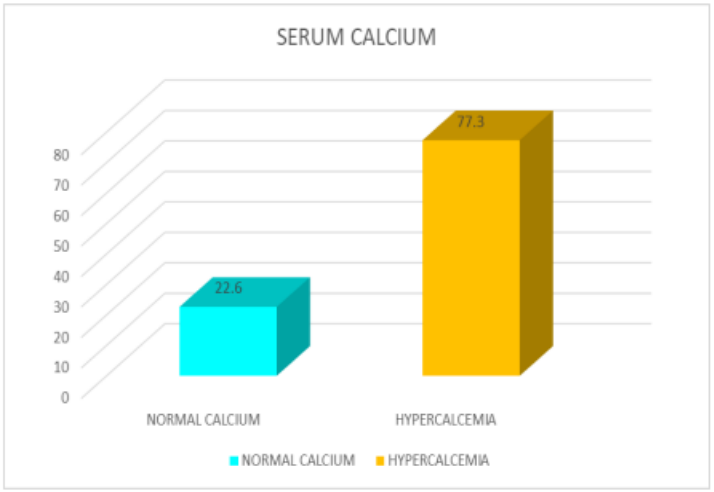

Table No.4: Distribution of Albumin Level

S. No.	Albumin	Frequency	Percentage
1	Low	49	39.2
2	Normal	74	59.2
3	High	2	1.6
4	Total	125	100

Conclusion

This retrospective study concluded that prevalence of hypercalcemia is high in inpatients in a tertiary care hospital. The incidence of hypercalcemia was about 77.3%. The hypercalcemia was more in the age group of 62-71 years of females.

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