



ESTIMATING THE PREVALENCE OF SECONDARY HYPER PARATHYROIDISM IN CHRONIC KIDNEY DISEASE

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ABSTRACT

Objectives: Secondary hyperparathyroidism (SHPT) is a serious complication of chronic kidney disease (CKD) characterized by an overproduction of parathyroid hormone (PTH) as a result of abnormalities in the metabolism of vitamins D, calcium, and phosphate. Inadequate phosphate excretion and reduced vitamin D activation lead to hypocalcemia as a consequence of parathyroid gland overproduction of parathyroid hormone (PTH), which occurs with chronic kidney disease (CKD). which is why chronically high PTH increases the risk of arterial calcification, bone problems, and cardiovascular disease. This research aims to determine how common SHPT is in chronic kidney disease (CKD) patients and how PTH, calcium, phosphate, and vitamin D levels interact with one another in the blood. It also claims to evaluate the efficacy of current treatments, such as phosphate binders, vitamin D analogs, and calcimimetics, and to determine the effects of SHPT on cardiovascular and bone health. Patients diagnosed with SHPT and undergoing chronic kidney disease (CKD) at any stage from 1 to 5 will participate in the prospective observational study. The results of many tests, such as those measuring blood calcium, phosphate, parathyroid hormone, vitamin D, and alkaline phosphatase, will be collected with demographic information and medical history. Research in this area will use descriptive statistics to determine prevalence, regression models to evaluate risk variables linked to SHPT progression, and correlation analyses for biochemical indicators.

Methodology: Subjects with chronic kidney disease (CKD) will have their biochemical profiles and rates of secondary hyperparathyroidism (SHPT) monitored prospectively. To be eligible for inclusion, patients must satisfy the following requirements: they must be at least 18 years old, have a confirmed diagnosis of chronic renal disease, and have access to biochemical data about vitamin D, calcium, phosphate, and parathyroid hormone or PTH. The goal of this study is to conduct a focused investigation of secondary hyperparathyroidism (SHPT) in chronic kidney disease (CKD) by excluding individuals with a history of parathyroidectomy, acute kidney injury (AKI), or primary hyperparathyroidism. Age, gender, comorbidities, length of chronic renal illness, and medication usage are some of the demographic details that will be collected. The function of the parathyroid glands may be measured by blood parathyroid hormone (PTH) levels; mineral imbalances can be investigated by calcium and phosphate levels; and vitamin D insufficiency can be determined by vitamin D levels. In order to assess renal function, we will measure serum creatinine and estimated glomerular filtration rate (eGFR), and to gauge bone turnover, we will look at alkaline phosphatase. In order to analyze the data, descriptive statistics will be utilized to gather biochemical traits and patient demographics. The relationship between parathyroid hormone (PTH) levels and biochemical markers such vitamin D, calcium, and phosphate will be examined in correlation research. Secondary hyperparathyroidism (SHPT) risk variables can be identified using regression analysis. **Results:** A non-random purposive selecting strategy was used to choose 121 patients in total for the investigation. According to the age distribution, around 31% of CKD patients' SHPT fell into the 59–68 age group, 20% into the 69–80 age group, 16% into the 29–38 age group,

14% into the 48–58 age group, 9% into the 39–48 age group, and 6.7% into the 18–28 age group. **Conclusion:** From the obtained data we analysed that affected individuals are more Males, with the strong trend of increasing PTH and phosphorus levels and decreasing Calcium and Vitamin D Predominantly.

KEYWORDS: SHPT, CKD, PTH, Prevalence, Calcium, Phosphorus, Vitamin-D.

ETIOLOGY

When kidney function is reduced due to chronic kidney disease (CKD), it causes abnormalities in the metabolism of calcium, phosphate, and vitamin D, which in turn produce secondary hyperparathyroidism (SHPT). Here are the main components that contribute to the cause.

Hyperphosphatemia, or phosphate retention, occurs when the kidneys' capacity to excrete phosphate decreases due to a decrease in renal function. The parathyroid glands increase their production of parathyroid hormone (PTH) in response to elevated phosphate levels. This is done to bring the calcium-phosphate balance back into equilibrium.

Vitamin D Insufficiency: The kidneys manufacture calcitriol, the active form of vitamin D. This conversion is impaired in chronic kidney disease (CKD), which leads to a decrease in active vitamin D levels. Hypocalcaemia, brought on by this shortage, increases parathyroid hormone secretion and lowers gastrointestinal calcium absorption.

METHODOLOGY

Materials and Methods Source of Data.

Patient prescriptions

Case report forms

Patient case sheets/medication charts

Laboratory reports

Patient questionnaire (Morisky Medication Adherence Scale - MMAS)

Study Design and Duration.

This research followed participants for six months in a prospective observational fashion.

Study Centre

The research will take place at the Kamineni Academy of Medical Sciences, Research Centre and Hospital, L.B. Nagar, Hyderabad, outpatient clinic of the Department of Nephrology.

Inclusion Criteria

Patients aged between 18 and 80 years diagnosed with CKD (stages 1 to 5).

Patients with recent laboratory results for parathyroid hormone (PTH), calcium, phosphorus, and vitamin D levels.

Exclusion Criteria

Patients with primary hyperparathyroidism or known parathyroid gland disorders unrelated to CKD.

Patients receiving medications specifically targeting SHPT (e.g., cinacalcet) unless included as part of the study.

Individuals who recently had significant surgery.

Patients with post-surgical or post-radiotherapy hypothyroidism.

Patients taking drugs that alter thyroid function tests.

Individuals with a body mass index (BMI) of greater than 40 kg/m².

Study Site: Kamineni Hospital, L.B. Nagar, a tertiary care facility with cutting-edge patient care facilities, will host the research.

Method of Data Collection

Study Tools

Self-designed case report form: A structured data collection form designed to gather demographic and disease-specific details of study subjects.

Morisky Medication Adherence Scale (MMAS): A validated tool to assess patient adherence to prescribed medications.

Study Procedure: During outpatient (OP) visits, the investigator will identify potential research participants who fulfill the established inclusion and exclusion criteria. A customized case report form will be used by the investigator to gather demographic and disease-related data. The research will be explained to eligible participants, and their permission to take part will be sought.

Data on SHPT prevalence and health-related quality of life will be gathered using specific questionnaires. To provide insightful findings, the collected data will be methodically entered into an Excel spreadsheet and subjected to statistical analysis.

Statistical Analysis

Data will be analyzed using SPSS software.

Sample Size: The study will include all cases of secondary hyperparathyroidism with CKD in the Department of Nephrology during the study period, with an estimated sample size of 121.

RESULTS 1: GENDER

This statistic depicts the gender wise distribution of SHPT IN CKD of both males and females. About 91 of the SHPT IN CKD are males & 30 of the SHPT IN CKD are females.

ETHNICITY

STATE	TOTAL COUNT	PERCENT
WEST BENGAL	15	12.4%
HYDERABAD	60	44.59%
ANDHRA PRADESH	40	33.05%
OTHERS	6	4.96%

The percentage distribution of a certain attribute throughout the four categories of West Bengal, Hyderabad, Andhra Pradesh, and Others is shown in the bar chart. With the largest percentage—roughly 50%—Hyderabad has a notable concentration in this area. West Bengal has a far smaller percentage, about 12%, while Andhra Pradesh comes in second with over 35%. At less than 5%, the "Others" group has the smallest proportion. According to this distribution, West Bengal and other regions contribute substantially less data than Hyderabad and Andhra Pradesh, which together account for the majority of the data.

RESULT-2

BIOCHEMICAL FACTORS

parameter	increasing	decreasing
PTH	80%	20%
Calcium	30%	70%
Phosphorus	75%	25%
Vitamin-D	5%	95%

PTH, calcium, phosphorus, and vitamin D are the four biochemical indicators whose rising and falling tendencies are depicted in the chart. According to the statistics, PTH and phosphorus levels are mostly rising (around 80% and 75%, respectively), with very little declining. Calcium, on the other hand, shows a distinct tendency, with only 30% of cases showing an increase and roughly 70% showing a reduction. With almost 90% of levels falling and only a very tiny fraction rising, vitamin D levels show the worst reduction. This trend raises the possibility that disorders affecting bone metabolism, kidney function, or hormone regulation are linked to increased PTH and phosphorus levels, declining calcium, and a marked decline in vitamin D.

DISCUSSION

Prevalence of secondary hyperparathyroidism in chronic renal illness was estimated in this prospective observational investigation. We gathered information from both inpatients and outpatients for this investigation.

Non-random purposive sampling was used to select 121 patients for the study. The age groups most impacted were those between 59 and 68 years old, followed by those between 68 and 80 years old, those between 29 and 38 years old, and finally, those between 39 and 48 years old. Those between 18 and 28 years old were found to be the least impacted. In our study we found that males are most commonly affected by SHPT in CKD compare to females.

In our study results, it was observed that males (75.3%) are more affected when compare women constituting (24.7%)

In this study we observed that the PTH and phosphorus levels are mostly elevated and Calcium and vitamin D are mostly declining.

CONCLUSION

Increasing levels of parathyroid hormone (PTH) and phosphorus and decreasing levels of calcium and vitamin D indicate a disturbance in mineral balance, which is likely caused by secondary hyperparathyroidism, according to the research. When vitamin D and calcium levels are low, the parathyroid glands try to compensate by producing too much parathyroid hormone (PTH), which leads to this condition. Bone resorption and renal calcium reabsorption are both facilitated by increased PTH, which also improves phosphate excretion. When vitamin D levels are low or chronic renal illness is present, it can hinder phosphorus removal and cause hyperphosphatemia. Because vitamin D deficiency further hinders intestinal calcium absorption, hypocalcemia and high PTH production become an even worse cycle.

A number of CKD patients had elevated phosphorus and parathyroid hormone (PTH) levels together with decreased calcium and vitamin D levels, strongly indicating the presence of secondary hyperparathyroidism (SHPT).

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