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INCIDENCE OF IRREGULAR PARATHYROID HORMONE IN PATIENTS OF RENAL FAILURE PLANNED TO UNDERGO HEMODIALYSIS

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Abstract:
Objective: *To define the frequency distribution of abnormal parathyroid hormone in patients of renal failure planned to undergo hemodialysis, at a tertiary care center.*
Study Design: *Single center, cross sectional study*
Place and Duration of Study: *This study was conducted at the Department of Nephrology, Mayo Hospital Lahore from August 2019 to July 2020.*
Materials and Methods: *There were 90 patients with diagnosis of CRF planned to undergo hemodialysis included. Before dialysis blood sample was obtained and sent to the laboratory of the hospital for assessment of PTH level. Then patients underwent hemodialysis. Dialysis was done as per hospital protocol. All the data was collected using the proforma.*
Results: *Patients` mean age was computed to be 53.79±6.51 years. Frequency of abnormal parathyroid was observed in 71.11% (64/90), in which hypoparathyroidism was 44.44% (40/90) and 26.67% (24/90) had hyperparathyroidism.*
Conclusion: *We found high frequency of abnormal parathyroid hormone in patients of renal failure planned to undergo hemodialysis. Derangement of Parathyroid hormone is progressive and it prevalence is found in the patients with chronic kidney disease (CKD) and with serious outcomes for the health of patients. If it is poorly overcome, this imbalance can result in the bone disease, calcification of soft tissue and vascular calcification, all of these are found to be influential on mortality and morbidity.*
Key Words: *Chronic Kidney Disease, Hemodialysis, Hypoparathyroidism, Hyperparathyroidism.*

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INTRODUCTION:

Chronic Kidney Disease (CKD) is a commonly found its prevalence is more in population of elder patients (1). CKDis observed to an increasing extent and has been the global public issue. Although, lack of information is there on the side of its determinants, prevalence, and management from the countries having middle and low income (2). A study which is population based revealed that the rate of End Stage Renal Disease (ESRD) was counted to be 152 per population of million in South Asia (3). In a cross-sectional investigation on 2873 members led in Karachi found that the general commonness (95% CI) of Chronic Kidney disease (CKD) was found to be 12.5% (11.4 – 13.8%) (2). Hyperparathyroidism is one of the pathologic appearances of CKD which may prompt expanded danger of cardiovascular disease (CVD)(1). Hyperparathyroidism with hoisted serum parathyroid hormone (PTH) is related with expanded CV mortality in end Stage Renal Disease and this association is indistinct in moderate Chronic Kidney Disease (CKD) (4).

Hyperparathyroidism, which is related with the hazardous complications, which can be developed in patients who are dependent on dialysis and having chronic Kdney Disease CKD(5). Early determination of auxiliary hyperparathyroidism is vital in the administration of patients with CKD(6). It is known that renal failure has some negative impact on life of the patient and may cause some other problems in body. Through literature, it has come to know that due to CKD, parathyroid hormone level may derange which may lead to CVD, bone diseases, Chronic Resistant Anemia and in addition to that dialysis may exaggerate this disturbance. So we want to conduct this study to find the frequency of disturbed parathyroid hormone level in local population of CKD. So that abnormal PTH level can be detected on early stages and patients can be prevented from developing CVD diseases as well as bone destruction due to loss of calcium and vitamin D which is also manifested due to abnormal PTH level. This study will help in planning better management protocols for such delicate cases and can give them better quality of life.

MATERIALS AND METHODS:

This single center, cross sectional study was carried out in Department of Nephrology, Mayo Hospital Lahore from August 2019 to July 2020. 90 patients fulfilling the inclusion criteria were incorporated in the study from OPD, admitted in ward of Department of Nephrology, Mayo Hospital Lahore. Data was collected with the consensus of the patients which taken before the data collection by keeping in view the ethical consideration. Demographic information (name, age, gender, duration of CKD and dialysis) were also recorded. Then patients were undergone dialysis. Before dialysis blood sample was obtained and sent to the laboratory of the hospital for assessment of PTH level. Reports was assessed and abnormal PTH level was labeled (as per operational definition). Then patients undergo haemodialysis. Dialysis was done as per hospital protocol. All the data was collected using the proforma (attached).

Statistical analysis:

Data analysis was conducted in statistical package for social sciences (SPSS) version 20.0.Mean and standard deviation of quantitative variables i.e. age and duration of CKD were calculated. Frequency distribution of qualitative variables i.e. gender and abnormal PTH level (hypothyroidism or hyperparathyroidism) was presented. Data was stratified for age, gender and duration of CRF. Chi square test was applied for post-stratification, with confidence interval of 95%.

RESULTS:

There were 90 patients with diagnosis of CKD planned to undergo hemodialysis included. The average age of the patients was 53.79±6.51 years similarly mean duration of CKD is also shown in table 8. Out of 90 cases, 52(57.78%) were male and 38(42.22%) female as shown in Table-I.

Frequency of abnormal parathyroid hormone in patients of renal failure planned to undergo hemodialysis was observed in 71.11% (64/90) cases. It was also found that hypoparathyroidism was observed in 44.44% (40/90) cases and 26.67% (24/90) had hyperparathyroidism in patients of CKD undergoing hemodialysis as shown Table-2.

Stratification analysis was performed and observed that hypoparathyroidism was significantly high in above 50 years of age patients (p=0.005) while hyperpara-thyroidism was not statistical significant among different age groups as shown in Table-3. Rate of hypoparathyroidism was high in female as compare to male (p=0.028) while rate of hyperparathyroidism was significantly high in male than female (p=0.046) as shown in Table-4.

Table No.1: Descriptive statistics of study patients n=90

Statistics		Age (Years)	Duration of CKD (months)	PTH (pg/ml)
Mean		53.79	11.71	279.93
Std. Deviation		6.51	3.82	167.90
95% Confidence Interval for Mean	Lower Bound	52.42	10.91	244.77
	Upper Bound	55.15	12.51	315.10
Median		53.00	12.00	246.00
Inter quartile Range		9	3	358

Table No.2: Frequency distribution of gender &Abnormal parathyroid hormone)(n=90)

Gender		Frequency n=(100)	Percentage (%)
Male		52	57.78%
Female		38	42.22%
Total		**90**	**100%**
Abnormal parathyroid hormone			
Yes	Hyperpara-thyroidism	24	%
	Hypoparathy-roidism	40	%
No		26	28.89%
Total		**90**	**100%**

Table No.3: Abnormal parathyroid hormone (Hypoparathyroidism and Hyperparathyroidism) with respect to age groups & gender

Abnormal PTH	Age Group (Years)			P-Value
	41 to 50 Years	51 to 60 Years	61 to 70 Years	
Hypopara-thyroidism	4(17.4%)	29(58%)	7(41.2%)	0.005
Hyperpara-thyroidism	6(26.1%)	12(24%)	6(35.3%)	0.65

Table No.4: Abnormal parathyroid hormone (Hypoparathyroidism and Hyperparathyroidism) with respect to gender

Abnormal PTH	Male n=52	Female n=38	P-Value
Hypopara-thyroidism	18(34.6%)	22(57.9%)	0.028
Hyperpara-thyroidism	18(34.6%)	6(15.8%)	0.046

DISCUSSION:

Chronic kidney infection (CKD) is expanding being perceived as a noteworthy general medical issue internationally [7]. The antagonistic results related with CKD incorporating kidney failure, quickened cardiovascular ailment (CVD), and untimely mortality have more prominent societal and prudent effect in countries of low-and medium income [8]. South Asian nations are experiencing an epidemiological change with an expansion in hazard elements of CKD, and therefore representing a weight on health systems of wellbeing [9]. Besides, CKD is likewise known to advance quick in Asians contrasted with Western partners underscoring the requirement for anticipation through early recognition and risk factors` administration [10] . Unsettling influences in mineral digestion that are optional to chronic kidney disease (CKD, for example, hypocalcaemia, hyperphosphatemia and weakened union of 1,25-dihydroxyvitamin D3 (calcitriol), result in abundant secretion of parathyroid hormone (PTH) which is a feature of secondary hyperparathyroidism (sHPT) [11,12]. As opposed to low levels of

parathyroid organ multiplication and development in typical grown-ups, hyperparathyroidism optional to CKD is described by strangely expanded parathyroid cell expansion [13] . Expanded parathyroid cell multiplication has additionally been seen in patients with essential hyperparathyroidism with noticeable parathyroid hyperplasia [14].

Those patients who were having renal disease of last stage and chronic hemodialysis, Adequate consideration of PTH serum levels are somewhere in the range of 150 and 300 pg/ml. Four to eightfold rises of PTH are prescient for high-turnover bone disease and levels over this have strong association with Osteitisfibrosacystica (OFC) [15,16].

In our study criteria, It was labeled as hypoparathyroidism if PTH levels < 100 pg/ml and hyperparathyroidism if PTH > 400 pg/ml. In our study out of 90 cases, 57.78% were males and 42.22% were females. This male predominance was also observed in a prospective, multicenter epidemiologic study conducted in the Ile-de-France district, A total of 2775 adult patients were recorded, including 64% males and 36% females.[17]

In NHANES, the conveyance of evaluated GFRs for the phases of CKD was found to be similar in both genders. In the United States Renal Data System (USRDS) 2011 Annual Data Report, nonetheless, the occurrence rate of ESRD cases at the commencement of hemodialysis year 2009 was found to be greaterinmale patients, with 415.1 for every million populationin comparison with 256.6 for female patients [18]. Patients having age from 40 to 70years of belonging to either gender with the analysis of CRF were incorporated, the mean age of the patients came out to be 53.79±6.51 years in our investigation. Chronic kidney disease (CKD) is basic in the patients who are elderly [19,20] driving some expert associations to suggest routine age-based examination for CKD in the essential care setting [21]; Most past investigations of CKD and current proposals for its administration have not recognized patients of various ages, and endeavors to distinguish hazard factors for movement of CKD have for the most part centered around patient attributes other than age. [22,23].

Patients in the beginning periods of CKD don't generally demonstrate any difference in their serum calcium and phosphate levels, and their PTH levels might be just marginally higher than reference esteems. Recent literature have demonstratedan increased levels of FGF-23 in these patients, which may control serum levels of phosphate and calcium [24] . Numerous patients who are having mild to moderate chronic kidney disease CKD additionally have diminished serum 1,25(OH)2 vitamin D and greater PTH levels [25] and their bone biopsies indicate the proof of PTH abundance and excessive turnover of bone [26].

In patients with end stage renal disease measurement of PTH is helpful in assessing parathyroid function, estimating bone turn over and improving management [27]. In our study, frequency of abnormal parathyroid hormone in patients of renal failure planned to undergo hemodialysis was observed in 71.11%. Hypo parathyroidism was observed in 44.44% cases and 26.67% had hyperparathyroidism. Previously it was reported elevation of PTH levels are common among patients with moderate CKD [28]. Our results are in contrast to Gallieni et al [29] study, hypoparathyroidism was observed in 43% cases and 25.4% had hyperparathyroidism in patients of CKD undergoing hemodialysis. [7] One more study has also showed that there were 47% cases of CKD undergoing dialysis had hypoparathyroidism. [30]

Hypoparathyroidism is occasionally seen in the dialysis population, of which the most common cause is Para thyroidectomy for advanced SHPT. Diabetes mellitus is another potential cause of hypo-parathyroidism. High concentrations of glucose suppress PTH secretion in parathyroid cells in vitro , and observational studies also show an association between poor glycemic control and lower intact PTH levels. Excessive synthesis and secretion of PTH leads inadequate hindrance of PTH interpretation, therefore, broadening of hyperplasia and parathyroid gland add to raised serum PTH [28] .

CONCLUSION:

Parathyroid hormone level usually deranged in patients of CKD, and dialysis may exaggerate this disturbance. We found high frequency of abnormal parathyroid hormone in patients of renal failure planned to undergo hemodialysis. Derangement of Parathyroid hormone is progressive and it prevalence is found in the patients with chronic kidney disease (CKD) and with serious outcomes for the health of patients. If it is poorly overcome, this imbalance can result in the bone disease, calcification of soft tissue and vascular calcification, all of these are found to be influential on mortality and morbidity.

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