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Original Article

The Correlationbetween the Parathyroid Hormone Patterns and the Left Ventricular Hypertrophy in a Cohort of Hemodialysis Patients in King Abdulaziz University Hospital

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ABSTRACT

Background:In end-stage renal disease patients on hemodialysis, it is important to identify the pattern of relation between parathyroid hormone & left ventricularhypertrophy to reduce the risk of cardiovascular morbidity and mortality. This study was conducted to find the relation between the Parathyroid hormone and the left ventricular hypertrophy in hemodialysis patients in King Abdul-Aziz university hospital in Jeddah. Method&Results Apilot study was conductedin King Abdulaziz university hospital among inpatients & outpatients on dialysis for at least three months,all the demographic & medical data were collected from patients'files including PTH level & echo findings. The total patients were 41(26 males & 15 females) with mean age 53.5±16.6. 19 (46.3%) were diabetes &30 (73.2%) had hypertension. The ejection fraction mean score was (56.4±13.8). The mean log for PTH was 1.0±0.4, 2.4±0.3 for corrected calcium &1.9 ±0.2 for ALP. A significant difference was found between PTH & hemodialysis patients (P=0.002). There was a significant correlation between PTH &LVH. conclusion: More studies need to conduct to help in improving the mortality &the morbidity rate in hemodialysis patients due to cardiovascular disease particularlyleft ventricular hypertrophy

1. Introduction

Several studies showed that more than 50 % of deaths in the patients with end-stage renal diseasedue to cardiac diseases basically left ventricular hypertrophy disease the study conduct by Christopher T. Chan et all in 2012 showed that the rates of cardiovascular death 10- to >100-fold higher than in the age-matched general population (1),the Ventricular remodeling is identified as the changes occurring at the molecular and cellular level, which clinically manifested by changes in size, shape, and cardiac function due to cardiac injuries,(1)several factors participate in the incidence of LVH such as hypertension, anemia, dyslipidemia, hyperphosphatemia, and yperparathyroidism. Also, an abnormal levels of Calcium & phosphorus were found in hemodialysis patients. (2, 3) Systemic arterial hypertension happens in 80-90% of patients at the beginning of hemodialysis, Echocardiographic evidence of left ventricular hypertrophy (LVH) due to systemic arterial hypertension and anemia has been shown in over 50% of patients with end-stage renal disease(4, 5, 6). There are several studies reported the relation between PTH level & LVH, and indicated PTH as an important cardio-toxin in end-stage renal disease,(7, 8)furthermore, there are number of studies indicate the effect of Abnormalities of mineral and bone metabolism which called chronic kidney disease–mineral and bonedisorder" "CKD-MBD" on alterations of arterial structure and function , among that the abnormal metabolism ofcalcium &phosphor (hyperphosphatemia, hypercalcemia) & the secondary hyperparathyroidism in inducing frequent and progressive vascular calcification in hemodialysis patient.(2, 9 , 10)

This study was conducted to find the relation between the Parathyroid hormone and the left ventricular hypertrophy in hemodialysis patients in King Abdul-Aziz university hospital in Jeddah.

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Materialsand Methods

A retrospective study was conducted in department of medicine at KAUH, in Jeddah, Saudi Arabia , After getting the approval from the local institutional ethical committee.The patients included in this study were all inpatients & outpatients on dialysis for at least three months between October 1st, 2015 to January 31st, 2016 and treated for LVH. All patients with the following medical problems were excluded from the study (chronic infections or diseases, liver diseases, autoimmune diseases, sepsis & patients with cancer).

Clinical information was retrieved retrospectively from case notes, patients' files and the hospital registration book including age, gender,race,past medical history, clinical features, results of laboratory investigations, andecho findings.

Statistical analysis

The data collected was analyzed using SPSS version 20 statistical software. Parametric data were expressed as mean and standard deviations (minimum and maximum) and descriptive data were expressed as number (percentage). Non parametric data will be transformed to parametric using log transforming. Comparison between case & control was made using independent "t" test for parametric parameters and Chi – square test for non- parametric parameters. The correlation between PTH and LVH and the other variables was evaluated by Spearman's correlation coefficient. P -value <0.05 was considered significant.

Results

41 patients were enrolled in this study (26 males & 15 females) with mean age 53.5±16.6. 19 (46.3%) were diabetes & 30 (73.2%) had hypertension, and only 10 (24.4%) were smokers. (Table 1)

The results showed that only 5 (13.5%) had a family history of heart diseases & 17 (45.9%) had previous history of heart diseases.25(61%) of the participators suffered from left ventricular hypertrophy with high level of PTH in 16 patients (64%), with an ejection fraction mean score (56.4±13.8). The result of echocardiography showed that 17 (41.5%) had a wall motion abnormality. (Table1)

Regarding laboratory variables for the patients, the log mean for PTH was 1.0±0.4 .The means scores for blood components were as the following 12.9±2.1 forhemoglobin, 2.5±0.6 for ferritin & 1.5±0.4 for ESR. Also the log mean for renal function were 2.4±0.5 for creatinine and 1±0.3 for urea. The mean scores for other laboratory investigations were 3.8±1.3 for total cholesterol,2.3±0.3 for Ca, 34.2±5.4 for albumin 1.9 ±0.2 for ALP and 2.4±0.3 for correction calcium. (Table 1)

On the other hand, the result showed significant difference between hemodialysis patients & the following variables: PTH, corrected Ca, creatinine, urea,ferritin, transferrin &ejection fraction (P=0.002, P=0.001, P< 0.000, P< 0.000, P< 0.000, P< 0.000 & P=0.001) respectively. Also, there is a significant difference between LVH& the following variables: ferritin,transferrin, TIBC &(P= 0.003, P= 0.005, P= 0.010) respectively. Likewise the relation between hemodialysis &hypertrophy,PTH showed a significant difference (p=0.04)respectively. (Table 2)&(figures 1& 2)

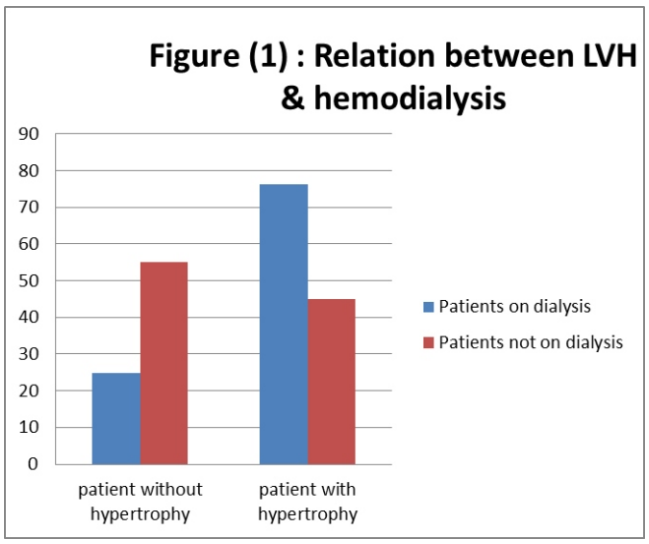
There was a significant correlation between PTH & LVH (r= 0.37, p= 0.02. Also, there was a correlation between kidney function & PTH from one site & between kidney function & LVH from the other site. (Figure3)

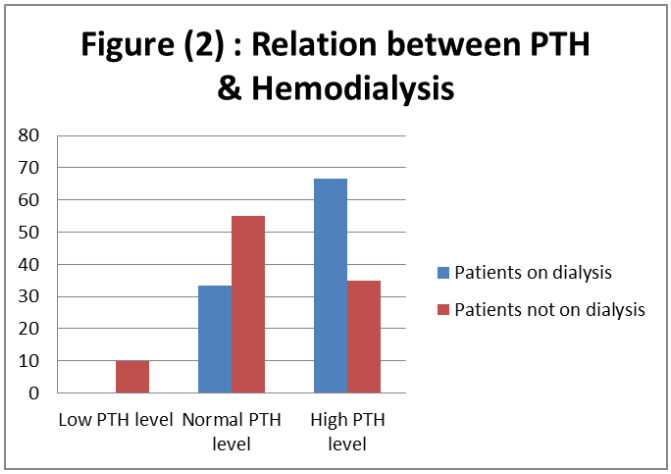
Table (1): Demographics & Medical Characteristics:

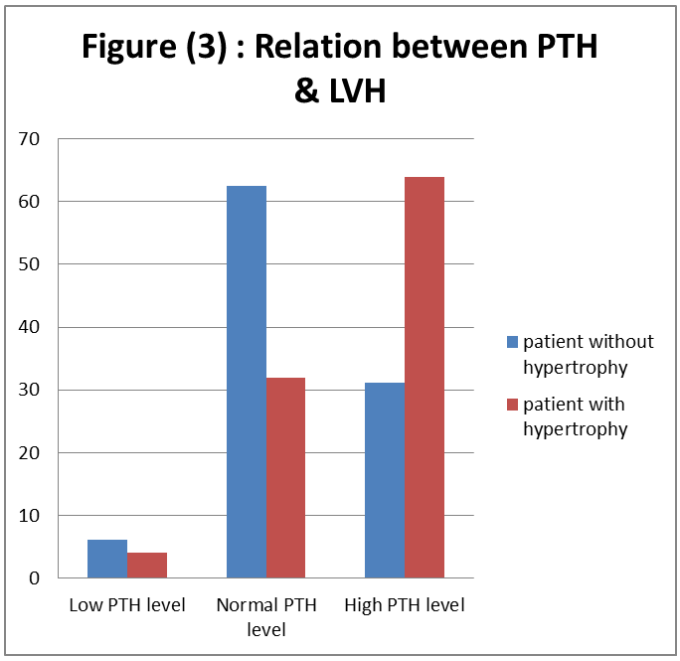
Characteristic	Value
Age (year)	53.5±16.6
Gender Male (%)	26 (63.4%)
Female (%)	15(36.6%)
Diabetes mellitus (%)	19 (46.3%)
Hypertension (%)	30 (73.2%)
Smoking (%)	10 (24.4%)
History of heart diseases (%)	17 (45.9%)
Hypotrophy (%)	25 (61%)
Ejection fraction	56.4±13.8
serum PTH pmol/L	1.0±0.4
Serum albumin, g/L	34.2±5.4
Serum calcium, mmol/L	2.3±0.3
Corrected calcium	1.9 ±0.2
Blood hemoglobin, g/dl	12.9±2.1
Serum ferritin	2.5±0.6

Table (2): Comparison depending on hemodialysis:

Variables	Patients on dialysis	Patients not on dialysis	P value
PTH	1.2±0.4	0.8±0.2	**P=0.001**
Ferritin	2.9±0.3	1.8±0.5	**p<0.000**
TIBC	1.6±0.1	1.8±0.1	**P=0.004**
Serum Ca	2.4±0.3	2.2±0.6	**P=0.01**
Ejection fraction	58±9.9	54.6±17.1	**P=0.01**
Corrected Ca	2.5±0.3	2.3±0.1	**P=0.001**
Hypertrophy	16 (55%)	9 (45%)	**P=0.04**







Discussion:

The study showed a significant correlation between PTH level & LVH in end stage renal disease (ESRD) patients on hemodialysis treatment. Also, there was asignificant relation PTH level & hypertension (p=0.03), similar results were found in the studies conduct in Iran2004 & 2011. Duck et al found that there is improvement in cardiovascular performance after parathyroidectomy(3, 5).

PTH is secreted from the parathyroid glands, and it is responsible of increasing calcium levels in the blood, where the level of calcium concentration in plasma control the secretion of the hormone, this gives PTH a big impact on the development of cardiovascular disease.(11)

The abnormal calcium levels due to the hyperparathyroidism or hypoparathyroidism increase mortality & morbidity rate of cardiovascular diseases in hemodialysis patients. In the case of hyperparathyroidism, the risk of hypertension in dialysis patients increases the risk of left ventricular hypertrophy, coronary artery disease, congestive heart failure, cerebrovascular complications, and mortality, which showed that the association between hypertension and hyperparathyroidism is one of the most dangerous risk factors contribute in rising LVH(7) , while in the case of low parathyroid hormone , mineral favors deposition in vascular and other soft tissues instead of bone which increase CV calcifications disease & mortality rate .(9, 12)

The results showed a relation between anemia &LVH in hemodialysis patients which suggest anemia in chronic kidney diseases would be primarily occurred & involved in inducing LVH, similar results were found in the study conduct in Italy 2003 (6)

This study showed the importanceof the following issues, first it is important to evaluate the levels of calcium, phosphate, PTH on periodic basis as well as cardiac evaluations; including echocardiograms, and cardiac CT scans (2), second it is important to monitor & control PTH level in patients with early renal failure (8), and lastly it is important forevaluating hemoglobin concentration& start correcting anemia from the early stage to reduce its effect on LVH disease. (6)

Limitation:

Thesmall number of participators (41) was themain limitation of this retrospective study.

Conclusions.

This pilot study showed a positive relationship between serum PTH level and severity of LVH in hemodialysis patients in KAUH,Jeddah. We conclude that the controllingof PTH levelis a necessary requirement in managing of LVH.

Further study with wide scale & big number of patients need to conduct to improve the mortality &the morbidity rate in hemodialysis patients.

Conflict of Interest:

None declared.

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