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ORIGINAL RESEARCH

ASSESSMENT OF SERUM PARATHYROID HORMONE LEVELS AND ITS RELATION WITH SEVERITY AND DURATION OF HEART FAILURE

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Abstract

Background: The present study was conducted for assessing the serum parathyroid hormone levels and its relation with severity and duration of heart failure.

Materials & methods: A total of 100 patients who were diagnosed with chronic heart failure were enrolled. Complete demographic and clinical details of all the patients was obtained. Thorough medical check was done along with assessment of biochemical variables in all the patients. Blood samples were obtained from all the patients and serum parathyroid levels were evaluated using auto-analyser. Correlation of parathyroid levels with severity and duration of heart failure was assessed. All the results were recorded in Microsoft excel sheet and were analysed by SPSS software.

Results: Mean Parathyroid levels among the patients with Class I, class II, class III and class IV was 45.3 pg/ml, 76.8 pg/ml, 115.7 pg/ml and 152.3 pg/ml respectively. Overall, mean parathyroid was found to be 108.3 pg/ml. While correlating parathyroid levels with severity and duration of heart failure, significant results were obtained.

Conclusion: Serum PTH is associated with increased cardiac morbidity and mortality.

Key words: Serum parathyroid, Heart failure

Introduction

Heart failure (HF) is a clinical syndrome caused by structural and functional defects in myocardium resulting in impairment of ventricular filling or the ejection of blood. The most common cause for HF is reduced left ventricular myocardial function; however, dysfunction of the pericardium, myocardium, endocardium, heart valves or great vessels alone or in combination is also associated with HF. Some of the major pathogenic mechanisms leading to HF are increased hemodynamic overload, ischemia-related dysfunction, ventricular remodeling, excessive neuro-humoral stimulation, abnormal myocyte calcium cycling, excessive or inadequate proliferation of the extracellular matrix, accelerated apoptosis and genetic mutations.[1- 3]

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Parathyroid hormone (PTH) is secreted by the parathyroid glands that control calcium homeostasis. Excess of PTH may adversely affect cardiovascular health beyond the regulation of calcium and phosphate homeostasis. To date, many observational studies have examined the relationship between circulating level of PTH and subsequent risk of heart failure in the general population as well as adverse outcomes in patients with heart failure. However, this association was not observed in all the studies. These conflicting findings among the studies may partly explained by differences in study population, lack of standardization of PTH assays, follow-up duration, gender difference, or adjustment for confounders.[4- 6] Hence; the present study was undertaken for assessing the serum parathyroid hormone levels and its relation with severity and duration of heart failure.

Materials & methods

The present study was conducted for assessing the serum parathyroid hormone levels and its relation with severity and duration of heart failure. A total of 100 patients who were diagnosed with chronic heart failure were enrolled. Complete demographic and clinical details of all the patients was obtained. Thorough medical check-up was done along with assessment of biochemical variables in all the patients. Blood samples were obtained from all the patients and serum parathyroid levels were evaluated using auto-analyser. Correlation of parathyroid levels with severity and duration of heart failure was assessed. All the results were recorded in Microsoft excel sheet and were analysed by SPSS software.

Results

In the present study, a total of 100 patients were analysed. Mean age of the patients was 56.2 years. Majority proportion of the patients were males. In the present study, mean Parathyroid levels among the patients with Class I, class II, class III and class IV was 45.3 pg/ml, 76.8 pg/ml, 115.7 pg/ml and 152.3 pg/ml respectively. Overall, mean parathyroid was found to be 108.3 pg/ml. While correlating parathyroid levels with severity and duration of heart failure, significant results were obtained.

Table 1: Corelation of parathyroid levels and severity of heart failure

NYHA classes of heart failure	Mean (pg/ml)	SD	p- value
Class I	45.3	12.3	0.000 (Significant)
Class II	76.8	25.2	
Class III	115.7	41.3	
Class IV	152.3	46.2	
Overall	108.3	31.8	

Table 2: Corelation of parathyroid levels and duration of heart failure

Duration of heart failure	Mean (pg/ml)	SD	p- value
Less than 1 year	53.3	13.3	0.000 (Significant)
1 to 2 years	106.2	35.1	
More than 2 years	149.8	42.8	

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Discussion

The parathyroid glands are unique organs responsible for maintaining the critical function of calcium homeostasis. There are commonly four parathyroid glands that weigh approximately 40 grams each and are generally located posterior and inferior to the thyroid in the neck. These organs secrete parathyroid hormone (PTH), which controls calcium regulation.[6- 10] Hence; the present study was undertaken for assessing the serum parathyroid hormone levels and its relation with severity and duration of heart failure.

In the present study, mean Parathyroid levels among the patients with Class I, class II, class III and class IV was 45.3 pg/ml, 76.8 pg/ml, 115.7 pg/ml and 152.3 pg/ml respectively. Overall, mean parathyroid was found to be 108.3 pg/ml. Similar to our study, Altay H et al, reported that mean levels of PTH were 43 ± 19, 84 ± 56, 121 ± 47, and 161 ± 60 pg/ml in New York Heart Association functional classes I, II, III, and IV, respectively ($p < 0.001$). In their study, in univariate analysis, body mass index, disease duration, PTH, BNP and hemoglobin levels, creatinine clearance, heart rate, systolic blood pressure, left ventricular ejection fraction, left ventricular diastolic diameter, left atrial size, presence of atrial fibrillation, and diuretic usage were found to be predictors of advanced HF. In multivariate logistic regression analysis, PTH level (hazard ratio 1.032, 95% confidence interval 1.003 to 1.062, $p = 0.003$) and body mass index (hazard ratio 0.542, 95% confidence interval 0.273 to 1.075, $p = 0.079$) were associated with advanced HF. Furthermore, serum PTH levels were correlated with BNP level and left ventricular ejection fraction ($p < 0.001$ for the 2 comparisons). In receiver operator characteristics curve analysis, the optimal cut-off value of PTH to predict advanced HF was >96.4 pg/ml, with 93.3% sensitivity and 64.2% specificity.[10]

In the present study, while correlating parathyroid levels with severity and duration of heart failure, significant results were obtained. Wu GY et al evaluated the serum PTH levels in patients with chronic right HF. A total of 154 patients with chronic right HF were enrolled in the present study. A binary logistic regression analysis model was used to assess the independent predictive value of PTH levels in chronic right HF. Partial correlative analysis was used to demonstrate the relevance of PTH levels on the parameters of assessment of right heart function. A multiple linear regression analysis model was used to evaluate the independent factors of PTH levels in patients with right HF. The results showed that the serum PTH levels in the right HF group were significantly higher compared with the control group. After adjusting for predictors of right HF, serum PTH levels were associated with right HF with an odds ratio of 1.066.[11]

Higher PTH level was an independent risk factor for hospitalization in heart failure patients. Moreover, higher PTH level was also associated with 90% excessive risk all-cause mortality in heart failure outpatients. These findings suggest that circulating level of PTH predicts subsequent risk of heart failure in the general population as well as adverse outcomes in patients with heart failure. Possible mechanisms can explain the relationship between PTH and heart failure risk. Higher PTH promotes endothelial dysfunction and increase aortic stiffness. In addition, PTH is also linked to arterial hypertension and left ventricular hypertrophy.[12- 14] Hence; further studies are recommended for better exploration of results.

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Conclusion

From the above results, the authors conclude that serum PTH is associated with increased cardiac morbidity and mortality.

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