

## iPTH and Heart Failure: An Association

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**Abstracts:** Background: Heart failure is a major public health burden. It is associated with considerable morbidity and mortality. There is a complex relationship between genetic, neuro hormonal, inflammatory and biochemical changes in the heart. High PTH level has been found to be associated with increased heart failure hospitalization. PTH has been shown to be an independent predictor of all cause and cardiovascular mortality in patients with heart failure. Strong correlation between high PTH level and advanced heart failure has been observed We tried to find out an association between iPTH and Heart Failure. Method: A pilot case control study involving 50 subjects (25 cases and 25 controls) have been done to identify the level of iPTH, 25 hydroxy vitamin D, serum phosphate and ionized calcium in heart failure patients. Serum iPTH and 25 hydroxy Vitamin D estimation was performed on Abbott Architect i1000 SR Analyzer using enhanced chemiluminescent immunoassay technique. Serum creatinine, phosphate and alkaline phosphatase were analyzed on fully automated analyzer AU480 from Beckmann Coulter using spectrophotometric technique. Statistical Analysis has been done by SPSS. Results: The level of iPTH, phosphorous and calcium significantly varied among both the groups (case and control); p value is less than 0.05. Interpretation and Conclusion: In our study it has been found that iPTH level is high in heart failure cases compared to controls which are statistically highly significant. Therefore the study indicates a strong association of iPTH and heart failure. [Anupa P NJIRM 2017; 8(2):123-125]

**Key Words:** Heart Failure, iPTH, Cardiovascular disease.

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**Introduction:** Heart failure is a major public health burden. It is associated with considerable morbidity and mortality<sup>1</sup>. There is a complex relationship between genetic, neuro hormonal, inflammatory and biochemical changes in the heart. Parathyroid hormone (PTH) elevation with low serum calcium is usually secondary to renal impairment or vitamin D deficiency. Role of PTH as a key regulatory hormone in bone health and mineral homeostasis is well established. However excess PTH may have a contribution in the development of heart failure. High PTH level has been found to be associated with increased heart failure hospitalization<sup>2</sup>. PTH has been shown to be an independent predictor of all cause and cardiovascular mortality in patients with heart failure<sup>3, 4</sup>. Strong correlation between high PTH level and advanced heart failure (NYHA Class III & IV functional class) has been observed<sup>5</sup>. The results of prospective studies to find out an association between vitamin D and heart failure have been equivocal<sup>6,7,8</sup>. We tried to find out an association between iPTH, vitamin D, serum calcium, serum phosphate and heart failure.

**Methods:** A pilot case control study involving 50 subjects (25 cases and 25 controls) have been done to find out the association of iPTH, 25 hydroxy vitamin D, serum calcium, phosphate and alkaline phosphatase and heart failure patients. The study was approved by Institutional Ethical Committee.

**Inclusion Criteria:** Patients enrolled in department of Cardiology (Superspeciality Centre) at RIMS, Ranchi for echocardiographic examination during April'2015 - July'2015 and diagnosed to be having heart failure were taken as cases whereas those whose echocardiographic studies were normal were considered as controls.

**Exclusion Criteria:** Unwillingness to participate, any associated acute or chronic illness other than heart failure, Insulin dependent Diabetes mellitus, Uncontrolled Diabetes Mellitus, Sepsis, history of malignancy within the past five years, any other form of cardiac illness, and patients on calcium and/or vitamin D therapy as well as the patients on Lithium or spironolactone therapy.

Serum iPTH and 25 hydroxy vitamin D estimation was performed on Abbott Architect i1000 SR Analyzer using enhanced chemiluminescent immunoassay technique. Serum creatinine, phosphate and alkaline phosphatase were analyzed on fully automated analyzer AU480 from Beckmann Coulter using spectrophotometric technique. Serum ionized calcium estimation was carried out by ion selective electrode method on Ecolyte analyzer by Eschweiler in the Department of Biochemistry, RIMS, Ranchi. Statistical Analysis has been done by SPSS version 19.0.

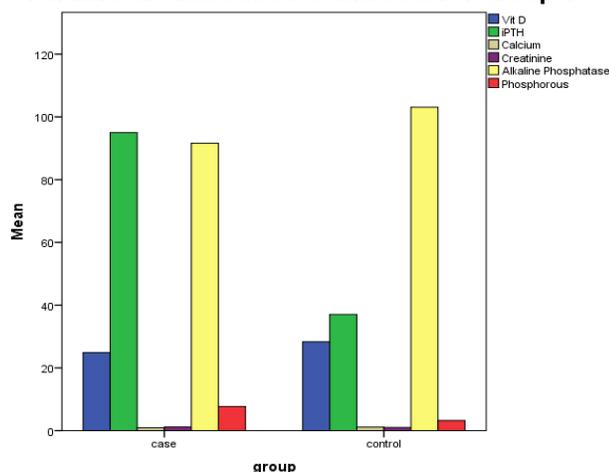
**Result:** Independent t-test and multivariate logistic analysis has been performed over 50 subjects including 25 cases and 25 controls. Table 1 shows the descriptive statistics of various biochemical properties with their P value. P value of less than 0.05 is considered significant. From the table it can be depicted that the level of iPTH significantly varies among both the groups (case and control); p value is 0.001. Similarly Calcium, Alkaline Phosphatase and Phosphorous level also varies significantly among the groups.

**Table:1 Characteristics of study subjects with P values**

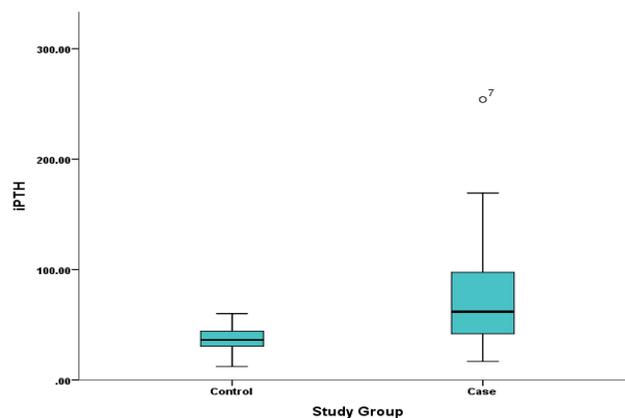
Parameters	Group	N	Mean	Std. Deviation	P value
Vitamin D	case	25	25.22	17.55	.963
	control	25	25.05	6.01	
iPTH	case	25	77.50	54.97	.001
	control	25	36.68	11.28	
Calcium	case	25	0.91	0.28	<.0001
	control	25	1.13	0.08	
Creatinine	case	25	1.15	0.45	.300
	control	25	1.05	0.14	
Alkaline Phosphatase	case	25	91.64	19.4	.032
	control	25	102.24	13.5	
Phosphorous	case	25	4.73	1.6	<.0001
	control	25	3.18	0.6	

Graph 1 depicts comparative analysis of biochemical parameters by means of bar chart. The level of iPTH and phosphorous is significantly increased in cases as compared to control. The level of Vitamin D and Creatinine has no statistical significant change whereas calcium and Alkaline Phosphatase level have significantly reduced in the cases as compared to controls

**Graph- 1: Comparative Analysis of Biochemical Parameters in both Case and Control Groups.**



**Graph- 2: Box Plot indicating the level of iPTH in both Case and Control group**



From graph 2, it can be observed that majority of the patients have the level of iPTH in the upper quartile region in cases whereas in controls the level of iPTH seems to be almost normal.

**Discussion:** In this study, heart failure patients had significantly higher serum iPTH level (77.50 ± 54.97) than controls (36.68 ± 11.28). PTH receptors have been found to be expressed in the myocardium and in the vessel walls. In in-vitro studies, iPTH has been found to induce hypertrophy of the cardiomyocytes. Our study on plasma iPTH and heart failure shows similar results as shown by S. Goya Wannamethee, who concluded that elevated plasma PTH (>55.6 pg/ml) was associated with increased risk of heart failure 9. This association between iPTH and heart failure was independent of the effects of serum ionized Ca<sup>2+</sup> and phosphate levels. No association was found between 25(OH) vitamin D and heart failure in our study which was again consistent with their study. Vitamin D deficiency was found to be common in both the study groups.

**Conclusion:** Elevated PTH and not 25 (OH) vitamin D is associated with higher risk of heart failure.

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