



Impact of diabetes mellitus on parathyroid hormone in hemodialysis patients

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Abstract

Secondary hyperparathyroidism can progress early in the course of chronic kidney disease and becomes more noticeable as renal function declines. We studied the effect of diabetes mellitus on parathyroid function in 60 hemodialysis patients. Serum intact parathormone, calcium, phosphorus and alkaline phosphatase were measured. In this study, serum intact parathormone and alkaline phosphatase were significantly lower among diabetics than non-diabetic hemodialysis patients. We interpreted that a significantly lower parathyroid activity in diabetic hemodialysis patients, implies more prevalence of bone disease in elderly diabetic hemodialysis patients. Further study of bone disease in this group of patients is required to evaluate its effect on outcome and different therapeutic interventions.

Keywords: Hyperparathyroidism, End-stage renal disease, Hemodialysis

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Introduction

Secondary hyperparathyroidism is common among patients with chronic renal failure and is defined by parathyroid hyperplasia, excessive parathyroid hormone secretion, and an imbalance in calcium and phosphorus metabolism (1). Parathyroid hormone is an important uremic toxin and may be accountable for long-term consequences that consist of vascular calcifications, renal osteodystrophy, modifications in cardiovascular structure and function, anemia and immune dysfunction. These unfavorable effects may contribute to an increased risk of cardiovascular mortality and morbidity among end-stage kidney failure patients (1-3).

Secondary hyperparathyroidism progresses early in the sequence of chronic kidney disease and becomes more noticeable as renal function diminishes (2-4). In fact, vascular calcifications and bone derangement are problematic to reverse when established, which mandates early management of secondary hyperparathyroidism and consideration of factors interacted in the activity of the parathyroid glands (1-5). Despite dramatic progresses in our understanding of the pathophysiology and pathogenesis, consequence of secondary hyperparathyroidism,

investigation is still mandatory to better find the role of parathormone in dialysis patients (2-5). In this regard, studies have shown that the risk of developing secondary hyperparathyroidism is not the same for all uremic patients. Various studies shown that diabetics on regular hemodialysis have an impaired secretion of parathormone. In this investigation, we aimed to compare the intensity of secondary hyperparathyroidism in diabetic and non-diabetic dialysis patients.

Patients and Methods

Patients

This is a cross-sectional investigation was conducted on hemodialysis patients.

Laboratory tests

Intact serum parathormone was assessed by the radioimmunoassay method [DSL8000 kits of USA (normal range of values is 10-65 pg/ml)]. Peripheral venous blood samples were obtained for biochemical analysis consisting serum calcium, phosphorus and alkaline phosphatase using standard kits.

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■ Implication for health policy/practice/research/ medical education

Secondary hyperparathyroidism can progress early in the course of chronic kidney disease and becomes more noticeable as renal function declines. We studied the effect of diabetes mellitus on parathyroid function in 60 hemodialysis patients. Serum intact parathormone, calcium, phosphorus and alkaline phosphatase were measured. In this study, serum intact parathormone and alkaline phosphatase were significantly lower among diabetics than non-diabetic hemodialysis patients. We interpreted that a significantly lower parathyroid activity in diabetic hemodialysis patients, implies more prevalence of bone disease in elderly diabetic hemodialysis patients. Further study of bone disease in this group of patients is required to evaluate its effect on outcome and different therapeutic interventions.

Ethical issues

1) The research followed the tenets of the Declaration of Helsinki; 2) informed consent was obtained; 3) the research was approved by the institutional review board.

Statistical analysis

Data are expressed as the mean \pm standard deviation (SD) and median values. Comparison between the groups was performed using Student's t-test. Statistical correlations were assessed using partial correlation test. All statistical analyses were performed using SPSS 11.5 (SPSS Inc., Chicago, IL, USA). Statistical significance was determined at p value < 0.05 .

Results

The study contained 44 non-diabetic and 16 diabetic hemodialysis patients. The mean age of the patients was 46 (18) years. The median duration of patients on hemodialysis was 13 months. The median value of serum intact parathormone was 223 pg/ml. The median values of alkaline phosphatase level was 347 IU/L. In this study, we detected a significantly lower serum alkaline phosphatase and intact parathormone levels in diabetics than non-diabetic dialysis patients ($p = 0.019$, $p = 0.022$, respectively). Meanwhile, there were no significant differences of serum calcium, phosphorus between diabetics and non-diabetic patients ($p > 0.05$).

Discussion

Present study showed significant differences of serum parathormone between diabetic and non-diabetic hemodialysis patients, with lower values in the diabetic group. Guh *et al.* showed that hemodialysis patients with diabetes were older, had lower parathormone level

(6). Vincenti *et al.* detected that diabetic patients had significantly lower serum calcium and parathormone levels than non-diabetic patients. They also found that, serum intact parathormone was not related to total serum calcium, but was positively associated with serum phosphorous in non-diabetic and diabetic patients, and intact parathormone was solely correlated with alkaline phosphatase in none-diabetic patients (7). Likewise, Inaba *et al.* also concluded that serum intact parathormone level were significantly lower in hemodialysis patients with diabetes mellitus than those without diabetes (8).

Conclusion

We interpreted from our results and the mentioned above investigations that lower parathyroid activity in diabetic hemodialysis patients, implies more prevalence of bone disease in elderly diabetic dialysis patients and further study of bone disease in this group of patients is needed to consider its effect on outcome and different therapeutic modalities.

Author's contribution

HN is the single author of the manuscript.

Conflict of interests

The author declared no competing interests.

Ethical considerations

Ethical issues (including plagiarism, data fabrication, double publication) have been completely observed by the author.

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Diagnosing diabetes mellitus in a patient with known chronic pancreatitis may not be that difficult. Yet, the correct classification of type 3c diabetes mellitus is often missed and patients are commonly misclassified. In a German study only about half of the cases of type 3c diabetes mellitus were classified correctly. Screening for type 3c diabetes mellitus in chronic pancreatitis Any patient with chronic pancreatitis should of course be monitored for the development of type 3c diabetes mellitus. 32. Pancreatic hormone secretion in chronic pancreatitis without residual betacell function / S. Larsen, J. Hilsted, B. Tronier, H. Worning // Acta Endocrinol (Copenh). 1988. Vol. 118. P. 357-364. Functional hypoparathyroidism among type 2 diabetic patients on hemodialysis: impact of glycemic control. Download. Functional hypoparathyroidism among type 2 diabetic patients on hemodialysis: impact of glycemic control. IJAR Indexing. ISSN: 2320-5407 Int. J. Adv. Res. 21. Luigi Gnudi (2008): Serum intact parathyroid hormone in diabetic patients on hemodialysis: what is the treatment goal? Nephrol Dial Transplant; 23: 24-26. 22. Gal-Moscovici A & Popovtzer MM (2005): New worldwide trends in presentation of renal osteodystrophy and its relationship to parathyroid hormone levels. ABSTRACT Introduction: Osteodystrophy is more common among hemodialysis patients than normal population. Earlier the higher incidence of osteodystrophy among maintenance hemodialysis (MHD) patients was attributed to high Intact Parathyroid Hormone (iPTH) level (150-300 pg/ml). Osteodystrophy due to high iPTH level is called High Turnover Bone Disease (HTBD). It was later found that another type of osteodystrophy, which can be attributed to low iPTH level and called Low Turnover Bone Disease (LTBD), also afflicts a subset of hemodialysis population, the diabetic End Stage Renal Disease (ESRD) patients. In our study, we propose to ascertain if diabetic ESRD patients on MHD have lower iPTH level than their non-diabetic counterparts. Impact of Diabetes Mellitus on iPTH Levels in CKD Patients on Maintenance Hemodialysis. Dr. P. Srinivasa Rao. 1MD. Diabetic patients present with a lower level of Serum PTH, Calcium and Magnesium values than the non-diabetic population. Low PTH concentrations can result in decreased bone formation and weak bones which lead to a higher risk of vertebral fractures in diabetic patients[4]. An excess of glucose or a deficit of Insulin, were independent and additive in their action on PTH[5]. Diabetes mellitus (DM) and thyroid dysfunction (TD) often tend to coexist in patients. Both hypothyroidism and hyperthyroidism are more common in type 2 di. Circulating thyroid hormones affect several different organs and cells, have a major impact on glucose, lipid, and protein metabolism, and can worsen glycaemic control in T2DM. Hyperthyroidism and thyrotoxicosis can worsen subclinical DM and cause hyperglycaemia in T2DM patients, increasing the risk of diabetic complications. T2DM reduces thyroid-stimulating hormone levels and impairs the conversion of thyroxine (T4) to triiodothyronine (T3) in the peripheral tissues. Poorly managed T2DM can lead to insulin resistance and hyperinsulinaemia, which causes thyroid tissue proliferation and increases nodule formation and goitre size.