

Original Research

Assessment of CKD-MBD Parameters for Hemodialysis Patients at Al Wahda Hospital in Derna, Libya

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ABSTRACT:

The World Health Organization and research centers have cautioned about the extraordinary expansion and growth of chronic renal failure. The fact that there are few, inconsistent, and hazardous studies on chronic renal failure in Libya is noteworthy for patients with renal failure in recent years. The study indicated to illness and how quickly it spreads. Data comprised a follow-up of 60 cases of both sexes and compared them to a group of healthy individuals. Estimates of calcium (Ca^{+2}) levels, phosphate (PO_4) levels, levels of vitamin D, and levels of parathyroid hormone (PTH) were measured. The findings revealed that the levels of vitamin D and calcium varied significantly, however parathyroid hormone and phosphate levels did not.

KEYWORDS: Calcium, Phosphate, Vitamin D, Parathyroid Hormone, Derna.



INTRODUCTION

The two primary metabolic buffer systems in our bodies that support the maintenance of the interior environment are the kidneys and bones. Naturally, a disease in one will eventually impact the other. (Valson *et al.*, 2014).

Many different abnormalities associated with chronic kidney disease (CKD) cause a complex problem that includes biochemical changes in the metabolism of calcium, phosphorus, parathyroid hormone (PTH), and vitamin D. (Moe *et al.*, 2007).

Together with soft tissue and vascular calcification, these systemic problems are usually known to be chronic renal disease mineral and bone problems, which may sometimes result in the clinical state of calcific uraemic arteriopathy. This problem affects morbidity, mortality, and the course of cardiovascular disease. (Moe *et al.*, 2007).

MATERIALS AND METHODS

Between January 12, 2022, and January 3, 2023, dialysis patients at Derna Hospital participated in this study. Sixty cases of boys and girls of various ages were included in the study.

Blood Sampling

Each patient had four milliliters of venous blood drawn, which was then continuously stirred in tubes filled with ethylene diamine tetra-acetic acid (EDTA). A device known as the total blood cells count (Sysmex American,

Inc.'s XP-300 Automated Hematology Analyzer) was then used to check each blood sample (Bain and Lewis, 2001).

Statistical Analysis

For statistical analysis, Graph Prism Pad and Minitab software 17 were used. Two samples T-test analysis was used to determine statistical significance when the data was found to have a normal distribution and the required $P < 0.05$ was deemed significant (Paulson, 2008).

The numerical data was displayed as a percentage and a number. The Pearson Chi-Square Test for Association was utilized to determine the significant difference between the observed variable under study, with a significance level of less than 0.05 for the P value.

RESULTS AND DISCUSSION

Calcium Parameter's

When comparing cases to controls, there was a statistically significant drop in calcium levels. Calcium levels are 7.582 ± 0.159 in female cases and 7.87 ± 0.22 in male cases ($p < 0.001$).

Table: (1). Calcium Parameter Values for Male and Female Cases.

Parameter	Female	Male
	Mean $\pm$ SEM	Mean $\pm$ SEM
calcium	7.582 ± 0.159^b	7.877 ± 0.224^b

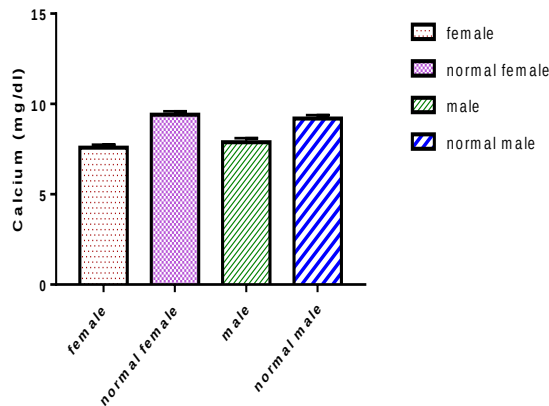


Figure: (1). Mean Calcium Levels in Cases and Controls

The phosphate parameter's

Phosphate levels are 5.150 ± 0.25 mg/dl for males and 6.062 ± 0.319 mg/dl for females.

Phosphate levels in cases are not statistically significant when compared to controls; the p value is less than 0.001.

Table: (2). Phosphate Parameter Values for Male and Female Cases.

Parameter	Female	Male
	Mean± SEM	Mean± SEM
PO⁴	6.062 ± 0.319^a	5.150 ± 0.25^a

Figure: (2). Mean Phosphate levels in cases and controls

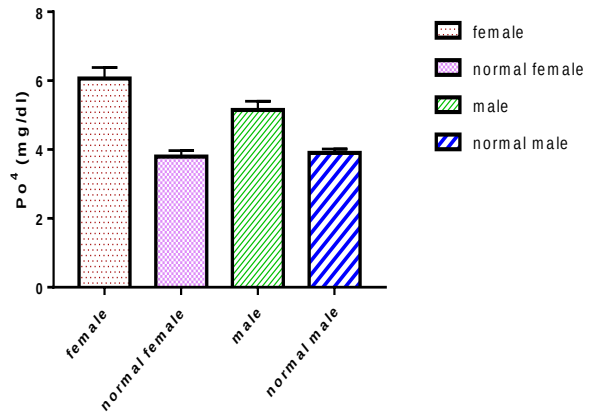


Figure: (2). Mean Phosphate Levels in Cases and Controls.

The Vitamin D parameter's:

Vitamin D levels were statistically significantly decreased in patients compared to controls ($p < 0.001$). The mean is 21.05 ± 1.82 ($p < 0.001$) in male cases and 12.23 ± 2.19 in female cases.

Table: (3). Vitamin D Parameter Values for Male and Female Cases.

Parameter	Female	Male
	Mean± SEM	Mean± SEM
Vitamin D	12.23 ± 2.19^b	21.05 ± 1.82^b

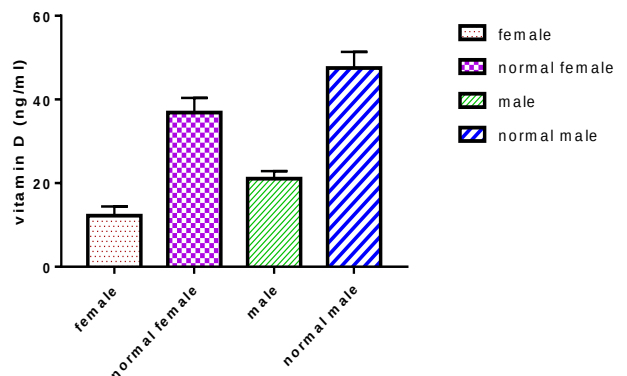


Figure: (3). Mean Vitamin D Levels in Cases and Controls.

The Parathyroid Hormones Parameter's

PTH levels are 328.8 ± 49.7 pg/ml in female patients and 354.6 ± 45.6 pg/ml in male cases. When comparing PTH levels in patients to controls, there is no difference that is statistically significant (p value <0.001).

Table: (4). Parathyroid Parameter Values for Male and Female Cases.

Parameter	Female	Male
	Mean $\pm$ SEM	Mean $\pm$ SEM
PTH	328.8 ± 49.7^a	354.6 ± 45.6^a

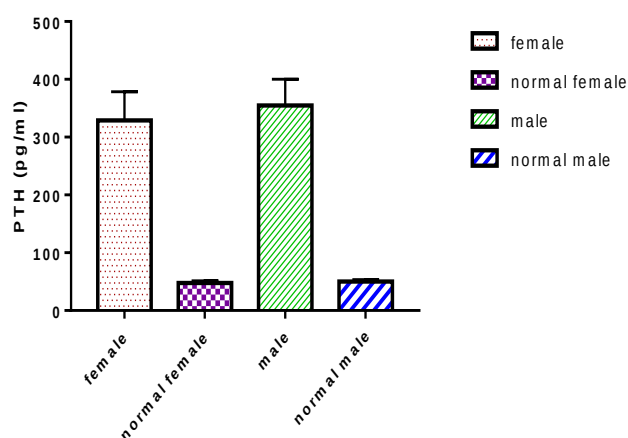


Figure: (4). Mean PTH Levels in Cases and Controls.

CONCLUSION

Secondary hyperparathyroidism is one of the metabolic problems that arise during renal failure. A number of interconnected processes, including disruptions in phosphocalcic metabolism and a decrease in 25-hydroxy vitamin D levels associated with

calcitriol levels, are responsible for the latter. Therefore, controlling these variables is crucial to reducing the negative consequences of the illness.

Additionally, early detection of renal insufficiency would be supported by improved control over the causes of the condition as well as community sensitization. It would be appropriate to assess parathormone and 25-hydroxyvitamin D in order to properly manage renal insufficiency. Many studies and papers have shown that CKD is linked to changes in the metabolism of the calcium also phosphorus, which raise mortality and morbidity. PTH levels would fluctuate in nearly every stage of the illness as a result of these changes.

In order to determine the value of elevated PTH levels as an early indicator of abnormalities in bone and mineral metabolism linked to chronic kidney disease (CKD), we used this in our research.

ACKNOWLEDGEMENT

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ETHICS

Before collecting blood sample, we explained the study to all patients and their caregivers and obtained their verbal consent to participate. We also got approval from the administration of Al-Wahda Hospital in Derna. The study was carried out in the dialysis unit.

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تقييم مؤشرات اضطراب المعادن والعظام المرتبط
لدى (CKD-MBD) بأمراض الكلى المزمنة
مرضى الغسيل الكلوي في مستشفى درنة

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المخلص

حدّرت منظمة الصحة العالمية ومراكز البحث العلمي من التوسع والنمو غير الاعتيادي لحالات الفشل الكلوي المزمن، وسرعة انتشار هذا المرض. ومما تجدر الإشارة إليه أن الدراسات المتعلقة بالفشل الكلوي المزمن في ليبيا لا تزال قليلة العدد، متضاربة النتائج، وتفتقر إلى الدقة المنهجية، وذلك فيما يخص مرضى الفشل الكلوي في السنوات الأخيرة. تهدف هذه الدراسة إلى تقييم مؤشرات اضطراب المعادن والعظام المرتبط بأمراض الكلى المزمنة (CKD-MBD) لدى مرضى الغسيل الكلوي، من خلال قياس مستويات الكالسيوم والفوسفات وفيتامين د وهرمون الغدة جار الدرقية. شملت الدراسة متابعة 60 حالة من كلا الجنسين، تمت مقارنتها بمجموعة من الأصحاء (المجموعة الضابطة). تم قياس مستويات كل من الكالسيوم (Ca^{+2}) ، والفوسفات (PO_4)، وفيتامين د (Vitamin D)، وهرمون الغدة جار الدرقية (PTH) لدى جميع المشاركين. أظهرت النتائج وجود تباين ذي دلالة إحصائية في مستويات فيتامين د والكالسيوم بين المجموعتين، في حين لم تُظهر مستويات هرمون الغدة جار الدرقية والفوسفات فروقاً ذات دلالة إحصائية. تشير هذه النتائج إلى وجود اضطراب واضح في مستويات فيتامين د والكالسيوم لدى مرضى الغسيل الكلوي، مما يستدعي المتابعة الدورية لهذه المؤشرات ضمن بروتوكولات الرعاية الخاصة بمرضى الفشل الكلوي المزمن للحد

من مضاعفات اضطراب المعادن والعظام المرتبط
بهذا المرض.

الكلمات المفتاحية: الكالسيوم، الفوسفات، فيتامين د،
هرمون الغدة جار الدرقية، درنة.