

# FIBROBLAST GROWTH FACTOR 23 (FGF23) CORRELATED WITH PHOSPHATE BUT NOT CALCIUM IN ROUTINE HEMODIALYSIS

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RUDIANSYAH, M<sup>1,2</sup>, Roesli, RM<sup>3</sup>, Martakusumah, AH<sup>3</sup>, Rachmadi, D<sup>4</sup>, Bandiara, R<sup>5</sup>, Lubis, L<sup>5</sup>

<sup>1</sup> Division of Nephrology and Hypertension, Department of Internal Medicine - Faculty of Medicine University of Lambung Mangkurat / Ulin General Hospital, Banjarmasin, Indonesia, <sup>2</sup> Doctoral Programme - Faculty of Medicine, University of Padjadjaran, Bandung, Indonesia, <sup>3</sup> Division of Nephrology and Hypertension, Department of Internal Medicine - Faculty of Medicine University of Padjadjaran / Dr Hasan Sadikin General Hospital, Bandung, Indonesia, <sup>4</sup> Division of Nephrology and Hypertension, Department of Pediatrics - Faculty of Medicine University of Padjadjaran / Dr Hasan Sadikin General Hospital, Bandung, Indonesia, <sup>5</sup> Department of Anatomy Physiology and Cell Biology - Faculty of Medicine, University of Padjadjaran / Dr Hasan Sadikin General Hospital, Bandung, Indonesia Introduction: Chronic kidney disease (CKD) is a chronic disease that have high prevalence rate among the world, as big as 5-10% and being the 12<sup>th</sup> leading cause of death and the 17<sup>th</sup> of disability.<sup>1-3</sup> Based on data from the latest IRR (Indonesian Renal Registry) in 2015, there was 21.050 patients diagnosed with Terminal Renal Failure (TRF) or end stage renal disease (ESRD) undergoing routine hemodialysis. A fourfold increase compared to 2007, 4.977 patients with the highest cause of death, around 44% due to cardiovascular disease.<sup>4</sup>

Chronic Kidney Disease (CKD) is the most common cause of elevated level of Fibroblast Growth Factor 23 (FGF23).<sup>5</sup> Fibroblast growth factor 23 is a protein expressed primarily by bone osteocytes.<sup>6</sup> Kidney is the main target of FGF23 and its main function is to regulate phosphate reabsorption and production of 1,25(OH)<sub>2</sub>D.<sup>7</sup>

High levels of FGF23 is a very strong independent risk factor for the progression of CKD, cardiovascular disease and death in CKD.<sup>8-11</sup> The discovery of Fibroblast Growth Factor 23 (FGF23) represents a major milestone for understanding the impaired metabolism of phosphorus and vitamin D in CKD.<sup>12</sup> C-terminal measurement of FGF23 (cFGF23) in circulation using ELISA Determination of Human Fibroblast Growth Factor 23 Levels in Plasma or Cell Culture Media, Immotopis, Inc. Increased of cFGF23 in CKD patients, especially in end stage renal disease / ESRD is possible as a compensatory response due to hyperphosphatemia or phosphate excess, but it still remains unclear.<sup>13</sup> Block et al., found that in dialysis patient, the survival was decrease significantly when serum phosphate predialysis concentration exceeds Kidney International Reports (2019) 4, S1-S437

6.5 mg/dL.<sup>14</sup> FGF23 also being a marker of bone mineralization such as hyperphosphatemia, hyperparathyroid, and calcium homeostatic abnormalities. High phosphate levels will binds blood calcium to form salt of calcium phosphate so that the blood calcium levels will be decreased. This situation will stimulate the synthesis and secretion of parathyroid hormone.<sup>15,16</sup> There are a lot of research about the correlation between calcium, phosphate, and FGF23 with chronic kidney disease but until now there is no such research in Indonesia. This study is aimed to

find out the correlation between calcium and phosphate with FGF23 levels in CKD-5D patients

**Methods:** This is a cross-sectional study. The subjects were CKD patients undergoing routine hemodialysis twice weekly at least 3 months, aged > 18 years, anemia which hemoglobin level <13 g / dL (male) and <12gr / dL (female) and willing to participate as well as in the research by signing an informed consent letter at Hemodialysis Unit of Hasan Sadikin General Hospital Bandung. The statistical test used Pearson correlation when normal distributed and Rank Spearman Analysis when not normally distributed. Significantly when  $p < 0,05$ .

**Results:** There were 181 patients with CKD-5D, 137 patients had complete data and 75 patients were fulfilled inclusion and exclusion criteria. There were 75 patients randomly to be the subject of the study from 97 patients. Male FGF23 level is higher than female. FGF23 correlated with phosphate level ( $r=0.451$ ,  $p<0.001$ ). There was no correlation between FGF23 and calcium level ( $r=0.176$ ,  $p=0.066$ ).

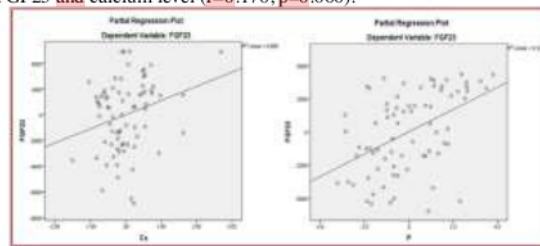


Figure 1. Correlation regression chart of calcium, phosphate, with FGF23 level in CKD patients on routine HD.

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