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Association of High-Sensitivity C-Reactive Protein (hsCRP) Levels with Hemodialysis Adequacy: A Cross-Sectional Study

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Objectives : The overall mortality rate among patients with End-Stage Renal Disease (ESRD) was 11.1% in Indonesia, with the most common cause of death attributed to cardiovascular complications (34.4%). In hemodialysis patients, High-Sensitivity C-Reactive Protein (hsCRP) is a well-established biomarker for inflammation and cardiovascular risk. While the previous findings emphasize the relevance of hsCRP in dialysis-related complications, specific studies linking hsCRP directly to hemodialysis adequacy remain limited. The objective of this study is to measure the association between dialysis adequacy and hsCRP.
Methods : This study was a cross-sectional design in patients with ESRD who were over 18 years old and undergoing routine hemodialysis twice a week at Sardjito General Hospital Yogyakarta, Indonesia. Patients with history of malignancy, autoimmune, and severe cardiovascular disease were excluded. Adequacy of dialysis was measured by Kt/V, urea reduction ratio (URR), and level of albumin serum. The cut-off value of hsCRP was 3 mg/L. The odds ratio (OR) was used to measure the association between dialysis adequacy and hsCRP.
Results : From a total of 80 subjects analyzed, there are 50 subjects (62.5%) who have high hsCRP levels. Patients with URR <80% have 3.857 times greater probability of having high level of hsCRP (95% CI 1.151-12.931, p=0.023). Patients with hypoalbuminemia (<3.97 g/dL) also tend to have high hsCRP, with OR 5.444 (95% CI 2.028 – 14.619, p<0.001). Meanwhile, dialysis inadequacy as measured by Kt/V < 1.8 also increases the risk for high hsCRP levels (OR 2.333, 95% CI 0.914-5.956, p=0.074), but the value is not significant.
Conclusions : Inadequate dialysis (low URR and low albumin serum) will increase the odds for elevated HsCRP levels. With high levels of this biomarker in hemodialysis patients, the risk for cardiovascular complications is predicted to increase in the future.

Table Abstract- Association of High-Sensitivity C-Reactive Protein (hsCRP) Levels with Hemodialysis Adequacy A Cross-Sectional Study.png

Table 1. Association between hsCRP and Hemodialysis Adequacy

	Subjects by Level of hsCRP		OR (95% CI)	p
	hsCRP > 3 mg/L (n=50)	hsCRP < 3 mg/L (n=30)		
Kt/V, n (%)				
Kt/V <1.8	35 (70)	15 (50)	2.333 (0.914-5.956)	0.074
Kt/V >1.8	15 (30)	15 (50)		
URR, n (%)				
URR < 80%	45 (90)	21 (70)	3.857 (1.151-12.931)	0.023*
URR >80%	5 (10)	9 (30)		
Hypoalbuminemia, n (%)				
Yes (<3.97 g/dL)	35 (70.0)	9 (30.0)	5.444 (2.028 – 14.619)	<0.001*
No (>3.97 g/dL)	15 (30.0)	21 (70.0)		

hsCRP: high-sensitivity C-Reactive Protein, URR: urea reduction ratio
*statistically significant test result ($p<0.05$)