INTISARI

HUBUNGAN KADAR *MATRIX METALLOPROTEINASE-9* DENGAN KEJADIAN STENOSIS FISTULA ARTERIOVENOSA PADA PASIEN PENYAKIT GINJAL KRONIK DI RSUP Dr SARDJITO YOGYAKARTA

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Latar Belakang: Stenosis Fistula arteriovenosa (FAV) pada pasien Penyakit ginjal kronis (PGK) dengan hemodialis diakibatkan oleh hiperplasi neointima. Kejadian hiperplasi neointima dipengaruhi oleh *wall shear stress* (WSS), peradangan, hipoksia dan lingkungan uremik yang bekerja secara sinergis. Enzim *metalloproteinase* (MMP-9) merupakan enzim utama yang menyebabkan pemecahan protein matriks ekstraseluler seperti kolagen dan elastin yang memfasilitasi migrasi sel otot polos pembuluh darah dalam pembentukan hiperplasia neointima.
Tujuan Penelitian: Mengetahui hubungan antara biomarker MMP-9 terhadap kejadian stenosis FAV pada pasien PGK di RSUP Dr Sardjito.
Metode Penelitian: Penelitian ini merupakan studi observasional analitik dengan desain *case control*. Penelitian ini dilakukan pada pasien PGK yang menggunakan FAV di RSUP Dr. Sardjito Yogyakarta periode April 2021-Januari 2024.
Hasil: Terdapat 51 pasien yang memenuhi kriteria inklusi dan eksklusi, 29 subjek dengan stenosis FAV dan 22 subjek dengan FAV yang paten. Kadar MMP-9 pada kelompok stenosis FAV 1384.2 (801-4822) ng/ml dan pada kelompok FAV paten 743.4 (122-3195.6) ng/ml (p=0,001). *Cut-off* kadar MMP-9 berdasarkan kurva *receiver operating characteristic* (ROC) pada penelitian ini adalah 962,2 ng/ml dengan nilai *area under the curve* (AUC) 83,3% (IK 95% 0,71-0,95). Uji bivariat MMP-9 terhadap kejadian stenosis FAV bermakna secara statistik (p=0,001, OR 7,00 dan IK 2,02-24,25). Analisis multivariat MMP-9 tetap menunjukkan hubungan signifikan terhadap stenosis FAV (p=0,013 OR=8,692, IK 95% 1,575-47,986). Faktor lain yang signifikan terhadap kejadian stenosis yaitu lokasi FAV radiosefalika (p=0,002, OR=16,618, IK95% 2,9-92,221).
Simpulan: Didapatkan kadar MMP-9 lebih tinggi pada subyek yang mengalami stenosis FAV dibandingkan pada subyek dengan FAV yang paten.

Kata kunci: fistula arteriovenosa, penyakit ginjal kronik, enzim *matrix metalloproteinas-9*.

ABSTRACT

THE RELATIONSHIP OF MATRIX METALLOPROTEINASE-9 LEVELS WITH THE OCCURRENCE OF ARTERIOVENOUS FISTULA STENOSIS IN PATIENTS WITH CHRONIC KIDNEY DISEASE at Dr SARDJITO HOSPITAL YOGYAKARTA

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Background: Stenosis of arteriovenous fistula (AVF) in Chronic Kidney Disease (CKD) patients undergoing hemodialysis is caused by neointimal hyperplasia. The occurrence of neointimal hyperplasia is influenced by wall shear stress (WSS), inflammation, hypoxia, and uremic environment working synergistically. Matrix Metalloproteinase-9 (MMP-9) is the main enzyme responsible for breaking down extracellular matrix proteins like collagen and elastin, facilitating the migration of smooth muscle cells in blood vessels during neointimal hyperplasia formation.
Objective: To determine the relationship between MMP-9 biomarkers and AVF stenosis in CKD patients at Dr. Sardjito General Hospital.
Method: This observational analytical study has a case control design and was conducted on CKD patients using AVF at Dr. Sardjito General Hospital, Yogyakarta, from April 2021 to January 2024.
Results: Out of 51 patients meeting inclusion and exclusion criteria, 29 subjects had AVF stenosis, and 22 subjects had patent AVF. MMP-9 levels in the AVF stenosis group were 1384.2 (801-4822) ng/ml, and in the patent AVF group, it was 743.4 (122-3195.6) ng/ml (p=0.001). The MMP-9 cutoff based on the receiver operating characteristic (ROC) curve was 962.2 ng/ml with an area under the curve (AUC) of 83.3% (95% CI 0.71-0.95). Bivariate analysis of MMP-9 and AVF stenosis showed statistical significance (p=0.001, OR 7.00, 95% CI 2.02-24.25). Multivariate analysis maintained a significant association between MMP-9 and AVF stenosis (p=0.013, OR=8.692, 95% CI 1.575-47.986). Another significant factor for stenosis was the radiocephalic AVF location (p=0.002, OR=16.618, 95% CI 2.9-92.221).
Conclusion: The MMP-9 levels were found to be higher in patient with stenosis AVF compare to those with patent AVF.

Keywords: arteriovenous fistula, chronic kidney disease, matrix metalloproteinase-9 enzyme.