Factors Associated with Chronic Kidney Disease Among Patients Undergoing Hemodialysis

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Abstract

Introduction*: The development of chronic kidney disease (CKD) and later proportion of decline in renal function are diverse among individuals. This reflects the multifactorial biological mechanisms that are involved in the underlying disease process. The risk factors and resources for care of CKD also vary from place to place. Identifying the risk factors of CKD is crucial and develop prevention strategies, including screening, might be beneficial to reduce burden cost, morbidity and mortality of CKD. We aim at identifying the factors associated with CKD in individuals who have undergone hemodialysis.*

Material and Methods*: All adult patients (age ≥18 years) admitted to the department of internal medicine either as in- or out-patient for undergoing hemodialysis at the Mardi Rahayu Hospital in Kudus, Middle Java, Indonesia from January to August 2016 were included in the study.*

Results*: Eighty-two patients were evaluated during the study period. Most of the patients were in older age (> 50 years old). Sixty (73%) were male and 22 (27%) were female patients. Fifty (61%) patients had mild anemia, 23 (28%) patients had moderate anemia and 8 (10%) patients had severe anemia. Among 82 patients, 77 (94%) of the patients were hypertensive, 19 (23%) of the patients had DM, 23 (28%) of the patients had renal stone, 8 (10%) of the patients had renal cysts, and 7 (9%) of the patients suffered from glomerulonephritis.*

Conclusion*: Older age, male gender, anemia, and hypertension were factors that associated with CKD among patients undergoing hemodialysis.*

Keywords: *chronic kidney disease, risk factors, hemodialysis, anemia, hypertension*

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Faktor-Faktor Terkait dengan Penyakit Kronis di Antara Pasien yang Menjalani Hemodialisa

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Abstrak

***Pendahuluan**: Perkembangan penyakit ginjal kronis (PGK) dan proporsi penurunan fungsi ginjal selanjutnya beragam di antara individu. Hal ini mencerminkan mekanisme biologis multifaktorial yang terlibat dalam proses penyakit yang mendasarinya. Faktor-faktor risiko dan sumber untuk perawatan PKG juga bervariasi dari satu tempat ke tempat lain. Mengindentifikasi faktor-faktor risiko PKG adalah sangat penting dan mengembangkan strategi pencegahan, termasuk skrining, dapat bermanfaat untuk mengurangi beban biaya, morbiditas dan mortalitas PGK. Kami bertujuan untuk mengindentifikasi faktor-faktor terkait dengan PGK pada individu yang telah menjalani hemodialisa.*

***Bahan dan metode**: Semua pasien dewasa (usia ≥18 tahun) yang diterima di Bagian Ilmu Penyakit Dalam baik sebagai pasien rawat inap ataupun rawat jalan untuk menjalani hemodialisa di Rumah Sakit Mardi Rahayu di Kudus, Jawa Tengah, Indonesia dari Januari hingga Agustus 2016 dimasukkan dalam penelitian ini.*

***Hasil**: Delapan puluh dua pasien dievaluasi selama masa penelitian ini. Sebagian besar pasien berusia lebih tua (>50 tahun). Enam puluh (73%) adalah laki-laki dan 22 (27%) adalah pasien perempuan. Lima puluh (61%) pasien mengalami anemia ringan, 23 (28%) pasien mengalami anemia sedang dan 8 (10%) pasien mengalami anemia berat. Di antara 82 pasien, 77 (94%) dari pasien menderita hipertensi,19 (23%) dari pasien memiliki DM, 23 (28%) dari pasien memiliki batu ginjal, 8 (10%) dari pasien memiliki kista ginjal, dan 7 (9%) dari pasien menderita glomerulonefritis.*

***Kesimpulan**: Usia lebih tua, jenis kelamin laki-laki, anemia, dan hipertensi adalah faktor-faktor yang terkait dengan PGK di antara pasien yang menjalani hemodialisa.*

***Kata kunci:** penyakit ginjal kronis, faktor risiko, hemodialisa, anemia, hipertensi.*

Introduction

Chronic kidney disease (CKD) is a current public health problem in Indonesia and throughout the world. Its increasing incidence and prevalence along with the high costs due to frequent hospitalizations and poor outcome have led to a tremendously high impact on morbidity and mortality.[1]

The development of CKD and later proportion of decline in renal function are diverse among individuals. This individual variability reflects the multifactorial biological mechanisms that are involved in the underlying disease process.[2] The risk factors and resources for care of CKD also vary from place to place[3]. Thus, identifying the risk factors for CKD and ultimately determining screening and prevention strategies may help reduce the cost burden and improve morbidity and mortality.[4]

Unfortunately, data on the risk factors of CKD patients in Indonesia are still very restricted. Faced with this problem, the present study aims at identifying the factors associated with CKD in individuals who have undergone hemodialysis at a rural hospital in Middle Java, Indonesia.

Material and Methods

This cross-sectional and descriptive study was carried out from Mei to August 2016. All adult patients (age e" 18 years) admitted to the department of internal medicine either as in- or out-patient for undergoing hemodialysis at the Mardi Rahayu Hospital in Kudus, Middle Java, Indonesia from January to August 2016 were included in the study.

We collected data retrospectively from the medical records of each patient regarding age, gender, hemoglobin, and the related underlying factors associated with CKD, such as: hypertension, diabetes mellitus (DM), renal stone or cysts and glomerulonephritis. CKD is defined as kidney damage as glomerular filtration rate (GFR) <60 ml/min/1.73m² for 3 months or more, irrespective of causes.[5] Hypertension was defined as either systolic blood pressure >140 mmHg, or diastolic blood pressure >90 mmHg (confirmed by at least three elevated readings taken at least 1 week apart), or use of antihypertensive medications, or any self-reported history of hypertension.[6] DM was defined positive if random blood glucose test >200 mg/dL. Any renal stone or cysts were ex-

amined by ultrasonographic examination. Glomerulonephritis was confirmed by ultrasonographic and urinalysis examination. The study protocol was approved by our Ethics Committee, and the need for individual informed consent was waived.

SPSS software (the Statistical Package for the Social Sciences, Version 20.0, SPSS Inc, Chicago, Illinois, USA) was used for the statistical analysis. Data were expressed as frequency (%).

Results

According to the hospital's records, 82 patients were admitted to the department of internal medicine either as in- or out-patient for undergoing hemodialysis during the study period. The clinical characteristics of the patients are presented in table 1. Most of the patients (n=44, 53%) were in older age (>50 years old). Among them, 60 (73%) were male and 22 (27%) were female patients. Out of the 82 patients, 50 (61%) patients had mild anemia, 23 (28%) patients had moderate anemia and 8 (10%) patients had severe anemia. Table 2 shows the factors associated with CKD among patients undergoing hemodialysis. Among 82 patients, 77 (94%) of the patients were hypertensive, 19 (23%) of the patients had DM, 23 (28%) of the patients had renal stone, 8 (10%) of the patients had renal cysts, and 7 (9%) of the patients suffered from glomerulonephritis.

Discussion

The prevention and control strategies for development of CKD are a key factor for reducing the burden of the disease. Identifying individual's risk factors and at-risk populations are potential targets for a suitable intervention in different populations and places. This should include active expansion of the existing perception of health care, social, and economic risk factors at both the individual and the community level.[2]

In general, risk factors for CKD can be divided into four types: 1. Susceptibility factors, increased susceptibility to kidney damage. This include older age, gender, family history of CKD, reduction in kidney mass, low birth weight, racial or ethnic minority status, low income and education; 2. Initiation factors, will directly initiate kidney damage and include DM, hypertension, autoimmune diseases, systemic infections, urinary tract infections, urinary stones, lower urinary tract obstruction, drug induced toxicity and hereditary diseases; 3. Progression factors, this cause worsening kidney damage and include high level of proteinuria, poor glycemic control in DM, smoking and dyslipidemia; and 4. Other factors include anemia, NSAID, CAD, and late referral to nephrologist.[7]

In this study, we found a higher proportion of patient with older age and male gender. Urine markers of renal and vascular damage were found to be twice in men than in women. The occurrence of tubulointerstitial damage is supported more by proteinuria and pattern of microalbuminuria predominance rather than glomerular etiology. Even though there is no sex difference in renal physiology in all age groups, GFR is lower in men than those of women.[8] Study showed that absolute loss of renal function was more in men than in women and it begins in youth. The drop in renal work with age was more in men than women and men reached renal failure earlier than women.[9]

Majority of patients in this study had anemia. Anemia develops at early stages of CKD and its early detection improves quality of life of patients and survival in CKD and helps to stop the renal failure progression. Anemia correction using erythropoiesis stimulating agent has shown to improve renal outcomes. Measuring plasma level of erythropoiesis helps to detect renal anemia. When GFR decreases, anemia develops in a patient by the blood loss.[10]

Hypertension is well known to be a risk factor for CKD worldwide.[11] We found almost all of the patients in our study had hypertension. In fact, hypertension has been consid-

Table 1. Clinical Characteristics of Patients Undergoing Hemodialysis

Variable	Frequency (%)
Age (yrs)	
10 - 19	1 (1)
20 - 29	1 (1)
30 - 39	15 (18)
40 - 49	21 (26)
50 - 59	29 (35)
≥60	15 (18)
Gender	
Male	60 (73)
Female	22 (27)
Hemoglobin (gr%)	
No	1 (1)
Mild (8 - 12.9)	50 (61)
Moderate (6 - 7.9)	23 (28)
Severe (<6)	8 (10)

Table 2. Factors Associated with CKD Among Patients Undergoing Hemodialysis

Variable	Frequency (%)
Hypertension	
No	5 (6)
Yes	77 (94)
Diabetes mellitus	
No	63 (77)
Yes	19 (23)
Renal stone	
No	59 (72)
Yes	23 (28)
Renal cyst	
No	74 (90)
Yes	8 (10)
Glomerulonephritis	
No	75 (91)
Yes	7 (9)

ered a ubiquitous disease in CKD; because, besides being one of the most important causes for the disease onset and development, hypertension itself is a result of CKD.[12] In hypertension, glomerular infiltration rate (GFR) has been reported to decline faster compared to those without hypertension. Some studies have found a close relationship between the rate of decline of GFR and the development of new onset CKD after a while in patients with hypertension.[2]

There is a global increase in the prevalence of DM associated CKD with an expected doubling of the number of people with diabetes in many countries within the next 20 years.[13] In our studies, its association as a factor for CKD was not seen. This may partly be explained by the small number of DM patients recruited in our study. The possibility of missing undiagnosed cases of DM patients could be reduced if the patients were screened with fasting blood glucose.

CKD attributed directly to renal stones is relatively modest, with an estimated prevalence of 3.2% among patients who start maintenance hemodialysis.[14] In our study, we found 28% of the patients suffered from renal stone in history. Obstruction by renal stone will increase the intratubular pressure, and then followed by vasoconstriction which leads to renal ischemia. Prolonged ischemia induces glomerulosclerosis, tubular atrophy and interstitial fibrosis. Complete obstruction for 24 hours can cause a permanent lost of nephron function as high as 15%.[15]

Data from the Chinese Renal Data System, a national registry system for patients undergoing dialysis, revealed that glomerular disease was the most common cause of CKD (57.4%), followed by diabetic nephropathy (16.4%), hypertension (10.5%), and cystic kidney disease (3.5%).[16] In this study, we found that of 82 patients undergoing hemodialysis, 8 (10%) of them suffered from renal cysts and 7 (9%) of them suffered from glomerulonephritis.

Conclusion

In conclusion, we found that older age, male gender, anemia, and hypertension were factors that associated with CKD among patients undergoing hemodialysis.

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