IDENTIFICATION OF RISK FACTORS AND SYMPTOMS OF CHRONICKIDNEY DISEASE ON ELDERLY IN NURSING HOME 'X' PEKANBARU

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ABSTRACT

Introduction: At this time, Chronic Kidney Disease (CKD) is still a world health problem, CKD is usually undetected until it reaches the severe or terminal stage. CKD ranks 16th as a cause of death worldwide. Nationally, CKD has been the second largest expense following heart disease.
Purpose: This study was conducted toidentify the symptoms and risk factors for chronic kidney disease in the elderly in social care institutions who are the population at risk.
Methods: A descriptive study was conducted on 38 elderly people aged ≥60 years who are residents of nursing home 'X'. The residents of the nursing home who met the criteria of inclusion were interviewed and identified the risk factors and symptoms of CKD by conducting interviews using the available questionnaires and physical examination. Data were collected and presented in frequency distribution table.
Results: from 38 respondents, 15 respondents had history of hypertension, 10 respondents had a history of diabetes mellitus, 16 respondents had history of smoking, 8 with history of NSAIDS use, and no one has history of kidney disease. The highest count of risk factor was found in 1 respondent (2.6%), meanwhile respondent with 1 and 2 risk factors was found in 11 respondents (28.9%). The most frequent symptom of CKD that appeared among respondents was decreased libido which 26 respondents experienced every day and the rarest symptom of kidney disease that appeared among respondents were restless legs which 35 respondents have never experienced.
Conclusion: Almost every respondent had risk factors of CKD with the most frequent distribution of risk factor is 1-2 risk factor/s in one respondent and the most frequent symptom among respondents is impotence/decreased libido.

Keywords: CKD, geriatric, risk factor, symptoms

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INTRODUCTION

Chronic Kidney Disease (CKD) is characterized by abnormalities in the structure or function of the kidneys shown by declining glomerular filtration rate (GFR) <60mL/menit/1,73m^2 that lasts more than 3 months. (KDIGO, 2013) Chronic kidney disease is caused by irreversible damage to the nephrons. Damage to the kidneys resulting from acute kidney disease, hypertension, or diabetes causes an increase in glomerular capillary pressure. (Chonchol and Kendrick, 2015).

Chronic kidney disease is one of the global health problems. According to the 2017 GlobalBurden of Disease report, in 2016,around 275.9 million people all over the world suffering from CKD, anincrease of 87% compared to 1990, which was 147.6 million people. CKD is also the 16th cause of premature death worldwide. (Global Burden of Disease Collaborative Network, 2018) Based on the National Health and NutritionExamination Survey (NHANES) report in 2007-2012, most CKD patients were in the age group> 60 years. In Indonesia, the prevalence ofCKD in 2018 is at 0.38%, there is an increase of 0.18% compared to 2013 which was at 0.2%. Riau has a CKD prevalence of 0.3%, there is an increase of 0.2% compared to 2013 which was at 0.1%. (Center forDisease Control, 2013).

At the age above 50 years, the kidneys will experience a decrease in function which will lead to decreased kidney function, especially at the rate of glomerular excretion and decreased tubular function. Risk factors of developing chronic kidney disease are elder age, bad drinking water habits, diabetes, hypertension, and a history of previous kidney problems. In addition, old age, race, gender, smoking history, and several other risks also play a role in the incidence of CKD. (Levey and Coresh, 2012).

The initial stage of chronic kidney disease does not cause significant symptoms. CKD symptoms in stage I-III remain unclear, therefore, CKD tends to be ignored until it reaches a more severeand advanced stage that already has more absolute symptoms. Those common symptoms including high blood pressure, changes in the amount of urination and the number of times you urinate in a day, bloodin the urine, weakness, and difficulty sleeping, loss of appetite, headaches that are unable to concentrate,itching, shortness of breath, nausea. and vomiting, and swelling,especially of the feet and ankles and of the eyelids in the morning. (Almutary, Bonner and Douglas, 2013).

Detecting risk factors and symptoms of CKD at the early stage can reduce morbidity and reduce the physical, psychological, and economic impact of chronic kidney disease, and can even slow or stop kidney damage. (the United States Renal Data System, 2015) Therefore this study aims to identify the risk factors and symptoms of chronic kidney disease on elderly in nursing home ‘x’ Pekanbaru.

METHOD

This research was conducted at Panti Sosial Tresna Werdha Khusnul Khotimah, Pekanbaru, andconducted from March to November 2020, after obtaining research ethics permit with ethical number B/198/UN.19.5.1.1.8/UEPKK/2019.
Subjects were all of the nursing home residents who met all of the inclusion criteria.

Participant selection criteria inclusion criteria included:

1) Ages ≥60 years,
2) Willing to take the bloodsampling,
3) Willing to be a respondent.

Exclusion criteria in this study were:

1) Residents with mental illness,
2) Linguistic problem,
3) Bedridden.

This research conducted on variables which are hypertension, diabetes mellitus (DM), acute kidney injury (AKI), smoking,

consumed non-steroid anti-inflammatory drugs (NSAID), body mass index (BMI), systolic blood pressure (SBP), diastolic blood pressure (DBP), blood glucose, and symptoms of CKD (itching, sleep disorder, loss of appetite, bone/joint pain, decreased concentration, shortness of breath, muscle cramps, restless leg, cold, polyuria, impotence/decreased libido, fatigue, and muscle weakness). This research used anamnesis of CKD's risk factors, questionnaire (Kidney Symptom Questionnaire: Development, ContentValidation and Relationship with Quality of Life)(Brown *et al.*, 2017) , blood pressure measurement, BMI measurement, and blood glucose measurement. Statistical analysis was performed using SPSS statistics software version 25.

RESULTS

In this study, we found 38 elderly people who meet the research criteria. Table 1 shows the youngest age in this study was 60 years and the oldest 92 years, with 21 people (55.3%) male and 17 female (44.7%).

Table 1 Characteristics of respondents based on age and gender

Variables	Average	Min	Max	N	%
Age	73.37	60	90		
Gender					
Male				21	55.3
Female				17	44.7
Total				**38**	**100**

Table 2 Distribution of risk factors in respondents

Risk factors	N	%
Hypertension		
Yes	15	39.5
No	23	60.5
DM		
Yes	10	26.3
No	28	73.7
AKI		
Yes	0	0
No	38	100
Smoking		
Yes	16	42.1
No	22	57.9
NSAID		
Yes	8	21.1
No	30	78.9
BMI		
Underweight	5	13.2
Normal	20	52.6
Overweight	7	18.4
Obese	6	15.8
SBP		
Normal	11	28.9
Pre-hypertension	14	36.8
Hypertension grade I	10	26.3
Hypertension grade II	3	7.9
DBP		
Normal	21	55.3
Pre-hypertension	8	21.1
Hypertension grade I	5	13.2
Hypertension grade II	4	10.5
Blood glucose		
Normal	35	92.1
Hyperglycemia	3	7.9
Total	**38**	**100**

DM : diabetes mellitus, AKI : acute kidney injury, NSAID : nonsteroidal anti-inflammatory drugs, BMI : body mass index, SBP : systolic blood pressure, DBP : diastolic blood pressure

Table 2 shows the distribution of risk factors in respondents. 15 people have ahistory of hypertension, 10 people have a history of DM, 16 people used to smoke, 8 people have a history of using NSAID while no onehas a history of AKI or other kidney problems.

We also measure the respondents' body mass index (BMI) by calculating the weight divided by height squared. There are 20 people with normal BMI, 5 were underweight, 7 were overweight and 6 people who are obese. The measurements of SBP result in 11people with normal SBP, 14 are pre- hypertension, 10 are in the category of hypertension grade I, and 4 with hypertension grade II. While the measurements of DBP shows thereare 21 people with normal DBP, 8 with pre-

hypertension, 5 withhypertension grade I, and 4 with hypertension grade II. As for the measurement of blood glucose, wefound 3 people with hyperglycemia while the others are in the normalrange.

Table 3 Total of risk factors in respondents

Total Risk Factors	N	%
0	2	5.3
1	11	28.9
2	11	28.9
3	4	10.5
4	8	21.1
5	1	2.6
6	1	2.6
Total	**38**	**100**

Table 3 shows that thehighest total of risk factors suffered by the respondents are 6 risk factors. There are 11 respondents (28.9%) with one risk factor and 11 respondents (28.9%) with two risk factors.

Table 4 Distribution of symptoms in respondents

Symptoms	Frequency									
	0		1		2		3		4	
	N=38	%	N=38	%	N=38	%	N=38	%	N=38	%
Itching	19	50.0	1	2.6	2	5.3	6	15.8	10	26.3
Sleep disorder	18	47.4	2	5.3	5	13.2	1	2.6	12	31.6
Loss of appetite	21	55.3	0	0	5	13.2	5	13.2	7	18.4
Bone/joint pain	18	47.4	3	7.9	1	2.6	3	7.9	13	34.2
Decreased concentration/vigilance	16	42.1	1	2.6	3	7.9	5	13.2	13	34.2
Shortness of breath	28	73.7	1	2.6	3	7.9	3	7.9	3	7.9
Muscle cramps/stiffness	18	47.4	4	10.5	2	5.3	4	10.5	10	26.3
Feet can't stay still	35	92.1	2	5.3	1	2.6	0	0	0	0
Cold	24	63.2	2	5.3	3	7.9	3	7.9	6	15.8
The desire to urinate frequently	22	57.9	3	7.9	0	0	2	5.3	11	28.9
Impotence/decreased libido	3	7.9	0	0	2	5.3	7	18.4	26	68.4
Fatigue	5	13.2	1	2.6	6	15.8	11	28.9	15	39.5
Muscle weakness	19	50.0	2	5.3	1	2.6	6	15.8	10	26.3

0 : Never, 1 : Less than 1 time a week, 2 : 1-2 times a week, 3 : Several times a week, 4 : Everyday

Table 5 Frequency of symptoms in respondents

Symptoms	Impact											
	0		1		2		3		4		5	
	N=38	%	N=38	%	N=38	%	N=38	%	N=38	%	N=38	%
Itching	19	50.0	2	5.3	2	5.3	3	7.9	8	21.1	4	10.5
Sleep disorder	18	47.4	3	7.9	0	0	0	0	10	26.3	7	18.4
Loss of appetite	21	55.3	1	2.6	1	2.6	7	18.4	6	15.8	2	5.3
Bone/joint pain	18	47.4	2	5.3	1	2.6	6	15.8	7	18.4	4	10.5
Decreased concentration/vigilance	16	42.1	2	5.3	2	5.3	6	15.8	8	21.1	4	10.5
Shortness of breath	29	76.3	0	0	0	0	1	2.6	5	13.2	3	7.9
Muscle cramps/stiffness	18	47.4	2	5.3	1	2.6	6	15.8	6	15.8	5	13.2
Feet can't stay still	35	92.1	1	2.6	2	5.3	0	0	0	0	0	0
Cold	24	63.2	3	7.9	2	5.3	5	13.2	3	7.9	1	2.6
The desire to urinate frequently	22	57.9	3	7.9	1	2.6	2	5.3	2	5.3	8	21.1
Impotence/decreased libido	3	7.9	24	63.2	5	13.2	4	10.5	2	5.3	0	0
Fatigue	5	13.2	0	0	5	13.2	5	13.2	18	47.4	5	13.2
Muscle weakness	19	50.0	0	0	3	7.9	2	5.3	6	15.8	8	21.1

0 : No symptoms, 1 : Not disturbing, 2 : Slightly disturbing, 3 : Moderate, 4 : Disturbing, 5 : Very distubing

Table 4 shows that the most frequent symptom amongrespondents is Impotence/decreased libido, 26 respondents (68.4%) experience this symptom everyday. Followed by other symptom, fatigue, 15 respondents (39.5%) experience this symptom everyday. The rarest symptom among respondents isrestless leg (feet that can't stay still), 35 (92.1%) respondents never experience this symptom.

Although Table 4 shows that the most frequent symptom is impotence/decreased libido, the most undisturbed symptom is impotence/decreased libido, 0 resident (0%) residents feel undisturbed by this symptom. While the most disturbing symptom is sleepdisturbance, 7 residents (18,4%) feel disturbed by this symptom.

DISCUSSION

Based on the results of thestudy, it was found that 15 peoplehad a history of hypertension and 23 others had no history of hypertension. Data from the Center for Disease Control and Prevention (CDC) shows that 20% of hypertensive patients can suffer from CKD. (Centers for Disease Control and Prevention, 2019) Based on a case-control study conducted at the West Java Big Education Hospital, as many as 30.7% of patients with CKD have hypertensive comorbid diseases. From this study, it was concluded that hypertension was the most common comorbid disease suffered in all samples. (Indrayanti *et al.*, 2019) Individuals with a history of hypertension are 3.2 times more likely to develop CKD. This is because high blood pressure in hypertensive people can increase intraglomerular pressure. High intraglomerular pressure can cause damage to the glomerulus both structurally and functionally. (Pranandari and Supadmi, 2015).

The results of this study found that 10 people had a history of DM, while 28 other people had no history of DM. Research conductedat Dr. Mohammad Hoesin Hospital in Palembang, the 300 samples of CKD patients who were taken, 61 of them had a history of diabetes mellitus. The results of this study concluded that diabetes mellitus was the second largest risk factor for developing CKD after hypertension. After conducting a bivariate analysis,it was found that diabetes mellitushad a significant relationship with the incidence of CKD (OR = 4; p<0.05).(Hervinda, Novadian and Tjekyan, 2014) Hyperglycemia in DM sufferers can cause changes in renal hemodynamics that cause mechanical stretching, pressure on endothelial cells and mesagium, activation of complex biochemical pathways that increase extracellular matrix production, hyperglycemia-induced injury, as well as damage and loss of podocytes, these changes cause internal damage. selective glomerular capillary permeability. (Wang, Jardine and Perkovic, 2014).

Based on the results of the study, it was found that all the elderly had no previous history of kidney disease. A history of kidney disease is a risk factor for the incidence of CKD. A recent meta-analysis of 82 studies showed an increased risk for hospitalized patients with AKI experiencing new or progressive CKD (HR 2.67, 95% CI 1.99–3.58).(See *et al.*, 2019). This is due to a maladaptive repair in AKI which involves many pathophysiological processes. When the damage to the kidneys is greater than the compensatory response, there will be a failure in the tissue repair process. Angiogenesis is disturbed and the cell cycle becomes dysfunctional, this leads to the development of chronic kidney disease.(Kurzhagen *et al.*, 2020).

Based on the results of this study, 22 people had no history of smoking, and 16 people with a history of smoking. A total of 16 people with a history of smoking hada greater risk of developing CKD than non-smokers.

This is supported by a cross-sectional study conducted by Yacoub *et al*, where approximately 43% of CKD patients have ever smoked regularly. From this study, it was found that in CKD patients, 56 people still smoke regularly and 30 people have a history of smoking regularly. Current smokers had an increased risk of developing CKD (OR = 1.63 p = 0.02, 95% CI = 1.08-2.45), while people who had a history of smokinghad no statistically significant difference.(Yacoub *et al.*, 2010) Nicotine activates the α7 nicotinic acetylcholine receptors (α7nAChR) in the proximal tubule and triggers the biosynthesis of profibrotic and proinflammatory cytokines that accelerate the development of CKD.(Rezonzew *et al.*, 2012).

Based on the results of thestudy, there were more elderly who did not have a history of NSAID use,namely 30 people, while 8 people had a history of NSAID use. Another study by A. Ingsathit *et al*. found the results of 626 people with CKD in Thailand, as many as 48.33% had a history of using NSAIDs.(Ingsathit *et al.*, 2010) Based on research by Hsu *et al*. there is a relationship between the use of NSAIDs and the risk of developing CKD. The results showedthat respondents who had a history ofusing NSAIDs ≥ 90 days had an increased risk of CKD by 32%.(Hsu *et al.*, 2015) The use of NSAIDs may cause decreased renal perfusion due to inhibition of prostaglandin synthesis.(Lefebvre *et al.*, 2020) When there is a reduction in blood flow to the kidneys, prostaglandins are to prevent ischemia. With the presence of NSAIDs, there will be a disturbance in the balance between vasoconstriction and renalvasodilation, causing ischemia and decreased renal filtration.(Wu and Huang, 2018).

Based on the results of the study, there were 5 people (13.2%) underweight, 20 people (52.6%) with normal BMI, 7 people (18.4%) overweight, and 6 people (15.8%) obese. Based on data from case studies conducted in the Framingham Heart Study, 152 (34.5%) of 441 CKD cases had a BMI ≥ 30 kg / m2 when diagnosed with CKD. (McMahon et al., 2014) Obesity increases the risk of the incidence of major risk factors for chronic kidney disease (CKD), such as diabetes and hypertension which have a direct impact on the development of CKD and End-Stage Renal Disease (ESRD). (Kovesdy et al., 2017) Obesity can contribute to the pathogenesis of kidney damage through inflammation, oxidative stress, and endothelial dysfunction, prothrombotic states, hypervolemia, and adipokine derangements. (Mirrakhimov, 2012) Excess visceral adipose tissue can lead to activation of the sympathetic nervous system and the renin- angiotensin system resulting in a feedback loop whereby obesity-induced decline in renal function leads to the development of hypertension, resulting in further damage to the kidneys. (Hashimoto *etal.*, 2015).

Research in South Korea states that individuals with a systolic blood pressure of 130-139 mmHg and ≥140 mmHg have a 1.30 and 1.79 times higher risk of having an incidence of CKD G3-G5 compared to systolic blood pressure of 120-129mmHg. (Chang *et al.*, 2020) This study is in accordance with the theory which states that the kidney asthe main target organ is affected by an increase in blood pressure. Hypertensive nephrosclerosis is the second most common cause of kidney failure. Long-term elevations in blood pressure can lead to decreased renal function through a variety of mechanisms. (Chang *et al.*, 2020) Most guidelines recommend a target blood pressure <140/90 mmHgas the primary prevention of CKD. (Whelton *et al.*, 2018).

Studies on the risk factors for CKD in Nigerians reveal that there is a significant difference in blood pressure between the CKD patient group and the control group. In the group of patients with CKD, diastolic blood pressure

ranges from 100-130 mmHg. The study concluded that the more severe the level of hypertension, the greater the risk of developing kidney damage. (Nwankwo, Wudiri andAkinsola, 2010) In an increase in systolic and diastolic blood pressure, there is an increase in sympatheticnerve activity which plays a role in worsening hypertension and kidneydisease. (Bae *et al.*, 2019).

The results showed that 35people had a blood glucose <200 mg/dl while 3 others had a blood glucose ≥ 200 mg/dl. Blood glucose examination is performed as early detection of DM. (Centers for Disease Control and Prevention, 2019) Therecommended tests for screening for DM are HbA1c, fasting blood sugar, or oral glucose tolerance test (OGTT). (Isfeedvajani, 2018) Basedon the CDC, DM is the most dominant risk factor for CKD. (Centers for Disease Control and Prevention, 2019).

Result of this study show most of the respondents have one or two risk factors with the percentage of 28.9% for each group. While the highest number of risk factorssuffered by the respondent are 6 risk factors with the percentage of 2.6%. Knowing the risk factors of CKD and implementing screening for high-risk populations will increase early detection for CKD. Thus, it will allow people to do initiate treatment for those modifiable risk factors. (Kazancioğlu, 2013).

Research at Leicester General Hospital on CKD stage 1-5 patients using the LUSSquestionnaire with a mean age of 60.5 ± 1.0 years, it was found that the most commonly reported symptoms were muscle weaknesswith a frequency (75%) decreased appetite (58%), bone pain/joints (56%), itching (56%) and dyspnea (49%). 24 Another study at the University of Pittsburgh in stage 4CKD patients reported that the most common symptoms were fatigue or lack of energy (78%), dry skin (53%), difficulty sleeping (44%), pruritus (44%), and bone or joint pain (39%). (Brown *et al.*, 2017).

Based on the results of this study, it was found that the most common symptom was impotence/decreased libido. Decreased libido in patients with chronic kidney disease occurs due to disturbances in the hormonal system and also due to disorders of the sympathetic nervous system. Decreased arterial or venous supply from the penis and psychological effects can cause erectile dysfunction in men withchronic kidney disease. Chronic kidney disease causes arterial occlusion and causes weak blood flow to the penis as well as venous occlusion leading to the inability to have persistent erections. Chronic kidney disease also causes atherosclerosis and vascular disorders in the pelvic region, so that these vascular system problems lead to decreased erectile function orerectile dysfunction. Psychological factors also play an important role in the erectile function of people with chronic kidney disease. Life- threatening illnesses cause fear in thesufferer. Neurogenic disorders also occur in patients with chronic kidney disease. Patients undergoing hemodialysis generally experience disorders of autonomic innervation.This innervation disorder causes problems with the adrenergic and cholinergic neurotransmitters that regulate blood flow in the corpus cavernosa so that it is thought to cause erectile dysfunction. (Ahmad *etal.*, 2009).

This study reported that fatigue was experienced by 15 people (39.5%) of respondents every day. Several complex clinicalfactors, some of which can be modified, correlate with fatigue in patients with CKD, including a high burden of medical comorbidities, sedentary lifestyle, obesity, hypoalbuminemia, and use of sleeping pills. (Jhamb *et al.*, 2013)Based on research by Gregg et al. conducted in patients with non- chronic non-dialysis CKD, reported that of 266 respondents, 69.2% have symptoms of fatigue and 10.9% havesevere symptoms of severe

fatigue. Fatigue arises as a result of various factors, such as insomnia, depression, pain, and drug use. (Moreh, Jacobs and Stessman, 2010),

This study reported that another disturbing symptom of kidney disease that was most prevalent in the nursing home was sleep disorder with a frequency of 12 (31.6%) who experiencing it. Research conducted by Tan et al. in CKD patients at China Medical University Hospital reported that 33.3% of CKD patients and in patients who had received hemodialysis therapy had sleep disturbances, the prevalence of sleep disorders increased to 46.7% . (Tan *etal.*, 2019) These symptoms can be caused by multifactorial causes including psychological disorders (depression, anxiety), lifestyle factors (coffee/nicotine use, sleep hygiene), treatment-related factors (dialysis time, napping, cytokine production, changes in thermoregulation, dialysis disequilibrium syndrome, circadian rhythm disorders, medication side effects) and intrinsic, specific kidney disease (anemia/obstructive sleep apnea/restless leg syndrome and other comorbidities, uremia, changes in neurotransmitter production). Sleep disorder is a common disorder that occurs in the elderly population, it is reported that 50% of the elderly suffer from sleep disorders. (Patel, Steinberg and Patel, 2018).

Restless leg syndrome (legs can't stay still) is a symptom that rarely appears in the elderly at the Tresna Werdha Khusnul Khotimah Social Home, Pekanbaru, with a frequency of 35 people (92.1%) never experienced these symptoms. The causes are related to iron deficiency, anemia, uremia leading to encephalopathy, and peripheral neuropathy. A study conducted 66 at CKD stages 1-5 conducted by Lin etal. showed that 28.4% of CKD patients experienced these symptoms, but in early-stage CKD patients, only 9.9% had symptoms of restless leg syndrome. Respondents in this study were healthy populations and none of them experienced a decrease in GFR stage4-5. So, it is natural that the symptoms of restless leg syndrome were not found in the respondents of this study. (Mahaldar, 2014).

CONCLUSION

From the research of identification of risk factors and symptoms of chronic kidney disease on elderly in nursing home 'x', Pekanbaru, this research concluded that almost respondents had risk factor/s of CKD with the highest count of risk factors suffered by the respondents are 6 risk factors and the most frequent symptom among respondents is impotence/decreased libido. Thus, frequent screening test is absolutely needed, especially on risky population.

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