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The Effectiveness of Foot Massage on Reducing Intradialytic Blood Pressure in the Hemodialysis Room of RS.TK. II Pelamonia Makassar

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ABSTRACT

Chronic Kidney Disease (CKD) is a health problem with an increasing prevalence every year. Deaths caused by chronic kidney failure increased by 31.7% over the last 10 years and became the 3rd leading cause of death in the world. The number of patients with chronic kidney failure in the world exceeds 500 million with 1.5 million undergoing hemodialysis. Objective: The purpose of this study was to determine the effectiveness of foot massage in reducing intradialytic blood pressure given to patients with chronic kidney failure who were in the hemodialysis room of the hospital. kindergarten. II Pelamonia Makassar. This type of research is quasi-experimental with a one-group pre-post-test design to compare the results of the intervention before and after giving a foot massage to the decrease in intradialytic blood pressure in the Hemodialysis Room of the Hospital. kindergarten. II Pelamonia Makassar. Results: Statistical test results showed that foot massage was effective in reducing intradialytic blood pressure (ρ=0.00). Conclusion: this study is that foot massage is effective for reducing intradialytic blood pressure, both systolic and diastolic blood pressure.

Keyword: Kidney Failure; Foot Massage; Intradialytic Hypertension; Hemodialysis

INTRODUCTION

A decrease in the glomerular filtration rate below the value of 60 ml/minute/1.73 m2 indicates the occurrence of chronic kidney disease (CKD) or also commonly referred to as *End Stage Renal Disease* (ESRD). Patients with CKD have a mortality rate of more than 75% with a risk of hospitalization up to 5 times higher (Srikartika, Intannia, & Nurlely, 2014). It was revealed in Hallan et al., (2012) that Asian, European countries and America has an incidence of CKD with a percentage of 15% mainly in adults. Data from *the World Health Organization* in 2013 states that the number of people with CKD in the world exceeds 500 million with 1.5 million undergoing hemodialysis and in one million Americans there is an incidence of CKD of 448 people (Collins, Foley, Gilbertson, & Chen, 2015).

In Indonesia, according to the results of the 2018 Basic Health Research, out of 260 million people, 713,783 Indonesians over the age of 15 were diagnosed with CKD (Health Research and Development Agency, 2018). While the population undergoing dialysis therapy in 2011 amounted to 15,353 people and in 2012 amounted to 19,621 people (Indonesian Renal Registry, 2018). Because the prevalence of CKD patients undergoing dialysis is increasing, it is necessary to pay attention to complications related to the dialysis/hemodialysis process. The increased risk of cardiovascular disorders and mortality in CKD patients undergoing hemodialysis is still quite high (Collins et al., 2015). Apart from renal artery stenosis, diabetic neuropathy, and kidney transplantation, hypertension can also be affected by hemodialysis/peritoneal dialysis (Tedla, Brar, Browne, & Brown, 2011) . Based on observations at the Pelamonia Hospital Makassar in 2020-2021, 54 ESRD patients were found undergoing hemodialysis therapy.

Hypertension that occurs during the hemodialysis period, namely an increase in systolic blood pressure reaching 10 mmHg is called intradialytic hypertension with an incidence rate of up to 15% of the entire population of hemodialysis patients (Naysilla, 2012). Patients with intradialytic hypertension are at risk of being hospitalized (Inrig, Patel, Toto, & Szczech, 2009) and dying within six months (Choi et al., 2017). Factors of age, *Interdialytic Weight Gain* (IDWG), *Ureum Reduction Ratio* (URR) *, Residual Renal Function* (RRF), duration of hemodialysis, psychological condition, and the number of antihypertensive drugs are thought to be related to the incidence of intradialytic hypertension (Inrig, 2010). In hemodialysis services, reducing *Quick Blood* (Qb) and Ultrafiltration (Uf), even stopping HD is taken as a step to anticipate the risk of intradialytic hypertension so that the HD process is no longer according to prescription/inadequate (Chazot & Jean, 2010). These measures are not effective in reducing intradialytic blood pressure, thereby affecting the adequacy of hemodialysis.

METHODS

The type of research used is *Pre Experiment* (quasi-experimental) with *One Group Pretest Posttest design* which aims to compare the results of the *pretest* and *post-test interventions* by performing foot massage on decreasing intradialytic blood pressure in the hemodialysis room of RS.TK. II Pelamonia Makassar. The sample in this study were patients who were enrolled in the hemodialysis room who were randomly drawn through *purposive sampling*.

RESULTS

Table 1 shows the demographic characteristics of 32 respondents who were divided into the control group (n=16) and the intervention group (n=16). The distribution of the sex characteristics of the respondents was dominated by women as many as 22 people (68.8%), with the same number of respondents, namely 9 people (28.2%) found in the age range of 51-60 years and hemodialysis to 201-300 times, while almost all respondents who 27 people (84.4%) are users of two types of antihypertensive drugs, for *interdialytic weight gain* about 14 people (43.8%) of the respondents increased by 2 Kg, half of the respondents had a *quick blood target of* 230 ml/minute, namely 16 people (50 %), and the last for the 2 Liter ultrafiltration target is the highest number with 14 respondents (43.8%)

Table . 1 Distribution frequency based on data demographics respondent

Characteristics demographics respondent	Control Group		Intervention Group		P Value
	n (16)	%	n (16)	%	
Man	5	(31.3)	5	(31.3)	1,000
Woman	11	(68.8)	11	(68.8)	
Age					
mean (SD)	44.75	(16,279)	47.06	(16,192)	0.836
Hemodialysis to					
<100	2	(12.5)	3	(18.8)	0.312
100-200	5	(31.3)	2	(12.5)	
201-300	5	(31.3)	4	(25.0)	
301-400	2	(12.5)	3	(18.8)	
401-500	-	-	1	(6.3)	
>500	2	(12.5)	3	(18.8)	
Anti-hypertensive drugs2 type	15	(93.8)	12	(75.0)	0.154 **
>3 jenis	1	(6.3)	4	(25.0)	
Interdialitik weight gain (IDWG)					
1 Kg	4	(25.0)	4	(25.0)	1.000
2 Kg	7	(43.8)	7	(43.8)	
3 Kg	4	(25.0)	4	(25.0)	
4 Kg	1	(6.3)	1	(6.3)	
Quick Blood (Qb)					
220 ml/minute	1	(6.3)	1	(6.3)	1,000
230 ml/minute	8	(50.0)	8	(50.0)	
240 ml/minute	4	(25.0)	4	(25.0)	
250 ml/minute	2	(12.5)	2	(12.5)	
280 ml/minute	1	(6.3)	1	(6.3)	
Target Ultrafiltration					
1 liter	4	(25.0)	4	(25.0)	1,000
2 liter	7	(43.8)	7	(43.8)	
3 liter	5	(31.3)	5	(31.3)	

Table 2. shows the effectiveness of the respondent's characteristic data that has been analyzed on age on the value of blood pressure, both systolic and diastolic. The effectiveness of the foot massage intervention in the two groups showed a significant difference since the second intervention or at the second hour of HD to Post HD.

Table 2. Analysis of covariate demographic data on the respondent's age on blood pressure values

Pressure blood systole	**Control Group**	**Intervention Group**	**P Value**
	mean (SD)	**mean (SD)**	
HD Pre	142.50 (16,533)	138.75 (18,574)	0.581
HD o'clock 1	170.00 (18.974)	156.25 (17.464)	0.046
HD jam 2	176.25 (15.438)	147.50 (18.439)	0.000
HD jam 3	177.50 (16.931)	145.63 (16.721)	0.000
HD Post	168.13 (16.008)	141.88 (12,230)	0.000
Pressure blood diastole			
HD Pre	84.38 (6.292)	79.38 (9.287)	0.096
HD o'clock 1	90.00 (9.661)	85.00 (9.661)	0.172
HD o'clock 2	91.25 (5,000)	80.63 (11,236)	0.002
HD o'clock 3	93.75 (8,851)	79.38 (5,737)	0.000
HD Post	89.38 (6,801)	80.63 (5,737)	0.000

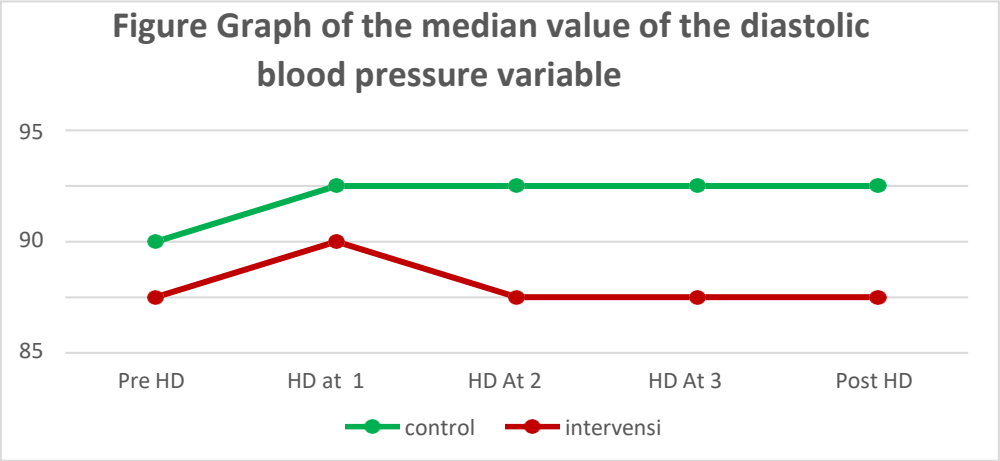
Table 3. shows that between the control group and the intervention group there was a significant difference in systolic blood pressure after the first intervention on hemodialysis (HD) o'clock first until post HD with score $p < 0.05$, whereas for diastolic blood pressure the difference was significant with a *p value* <0.05 new occurs in HD second hour until post HD.

Table 3 Difference in mean (standard deviation) Among group control with group intervention to pressure blood

Variable	Pre HD			HD clock 1			HD clock 2			HD clock 3			Post HD		
	Mean (SD)			Mean (SD)			Mean (SD)			Mean (SD)			Mean (SD)		
	Kontrol (n=16)	Intervensi (n=16)	p^*	Kontrol (n=16)	Intervensi (n=16)	p^*	Kontrol (n=16)	Intervention (n=16)	p^*	Control (n=16)	Intervention (n=16)	p^*	Control (n=16)	Intervention (n=16)	p^*
Pressure blood systole	142.50 (16,533)	138.75 (18,574)	0.340	170.00 (18,974)	156.25 (17,464)	0.022	176.25 (15,438)	147.50 (18,439)	0.000	177.50 (16,931)	145.63 (16,721)	0.000	168.13 (16.008)	141.88 (12230)	0.000
Pressure blood diastole	84.38 (6,292)	79.83 (9,287)	0.114	90.00 (9,661)	85.00 (9,661)	0.114	91.25 (5,000)	80.63 (11.236)	0.003	93.75 (8.851)	79.38 (5.737)	0.000	89.38 (6.801)	80.63 (5.737)	0.001

$^*p$ <0.05. HD, Hemodialysis. *difference Among group use test Mann Whitney (distribution data no normal). Source: data primary, 2022.Blood pressure measurements performed on pre-HD, HD o'clock 1, HD o'clock 2, HD o'clock 3, and post-HD

The image above shows a comparison of the median values of diastolic blood pressure between the control group and the intervention group. Second diastolic blood pressure groups viewed at pre HD, first hour HD, second hour HD, third hour HD, and HD posts. After the first massage at 1 hour HD, there was a decrease in blood pressure diastole in the next hour and stable until post HD. But for the group In control, there was no decrease in diastolic blood pressure after 1 hour HD without being given massage.



DISCUSSION

1. Score Pressure Blood systolic and Diastolic on Patient With Hypertension Intradialytic After Given Intervention Massage Foot

The results showed an increase in blood pressure began to be experienced in the first hour of HD. Hypertension that occurs during the hemodialysis period, namely an increase in systolic blood pressure reaching 10 mmHg is called intradialytic hypertension with an incidence rate of up to 15% of the entire population of hemodialysis patients (Naysilla, 2012). The foot massage relaxation technique is one of the nursing interventions which in the *Nursing Intervention Classification* (NIC) book is a complementary therapy in overcoming hypertension. (Bulechek, Butcher, Dochterman, & Wagner, 2013) . Foot massage performed in this study was carried out three times which were repeated every hour in the intradialytic phase, each for 10 minutes. Foot massage stimulates a decrease in systolic blood pressure which affects the activation of the parasympathetic nervous system in response to relaxation (Kaur & Bhardwaj, 2012).

It should be noted that in this study, blood pressure measurements were carried out on the legs but not uniformly on one leg. While it is known that between the left leg and right foot there is a difference in blood pressure between 5-10 mmHg. A difference of

more than 10 mm Hg indicates a vascular disorder. There is a reciprocal relationship between the incidence of hypertension and peripheral vascular disease.

Vascular damage due to hypertension is clearly visible in all vessels peripheral. Hypertension causes structural changes in the small arteries and arteriole, which result in happening blockage of vessels progressive. The existence of atherosclerotic which is accelerated by hypertension and necrosis medial aorta, is a predisposition to happening aneurysm and dissection (Price & Wilson, 1995).

The measurement of blood pressure (systolic and diastolic) from pre-HD to post-HD experienced a significant decrease as seen from a p-value <0.05 with a median difference between the control and intervention groups of 25 mmHg for systolic blood pressure and 10 mmHg for diastolic blood pressure. These results appear to be better than the research Ju et al., (2013) which revealed a significant decrease in blood pressure where systolic blood pressure decreased by up to 15 mmHg while diastolic blood pressure decreased by up to 4 mmHg. Nonetheless, the reduction in diastolic blood pressure occurred only once after the second hour of intervention and remained stable until post-HD.

A similar intervention was also carried out in the study of Malekshahi, Aryamanesh, & Fallahi (2018) where the application of foot massage to end-stage renal failure patients undergoing hemodialysis was carried out for 10 minutes during the hemodialysis process three times. The duration of the foot massage for 10 minutes can give a significant change in blood pressure. Research by Moyle et al., (2013) showed significant results in reducing systolic blood pressure ($p<0.01$) and diastolic blood pressure ($p=0.04$) with the same duration. Thus these results were strengthened in the study of Abdelaziz & Mohammed (2014) with a significant decrease in blood pressure ($p<0.001$) after 10 minutes of foot massage between the control group and the intervention group. So it can be seen that there is indeed a difference in systolic and diastolic blood pressure between the control group and the intervention group which decreased after the massage.

Basically, massage is a method to expedite blood flow again. The existence of pressure or movement that touches the central reflex point stimulates smooth blood circulation so that the narrowing, and blockage in the blood vessels become normal again. Massage/emphasis on the heart's central reflex points and *hypertension points* will stimulate nerve impulses to act on the autonomic nervous system, the branch of the parasympathetic (Georgianos, Sarafidis, & Zoccali, 2015).

2. The effectiveness of age-characteristic data on blood pressure

The results of this study indicate that most of the respondents are female (68.8%) most of whom are in the age range of 51-60 years with HD to 201-300 times, almost all of whom use two types of antihypertensive drugs (84.4%), as many as 43.8% of respondents with IDWG and Ufg reached 2 kg and 2 liters, and it is known that 50% of respondents reached the target Qb 230 ml/minute. These results are supported by the research of Kandarini, Suwitra, & Widiana (2018) which suggests that women dominate the incidence of intradialytic hypertension with a percentage of 52.8 % at the age of more than 44 years. On average, more than two types of antihypertensive drugs were used, namely *angiotensin-converting enzyme inhibitors* and *beta blockers*, $p > 0.05$ (VanBuren, Kim, Toto, & Inrig, 2011) .

Recent research by Hanivah (2019) recommends that to determine the effect of the intervention, data related to Qb, UFg, and age are needed. Dewi (2010) displays data on HD frequency, IDW, and gender. Meanwhile, Locatelli et al., (2010) suggested that the use of antihypertensive drugs is suspected to affect the incidence of intradialytic hypertension. It should be noted that previous studies have not focused on the intradialytic hypertensive population. The difference between the results of this study and this research is in the population, number of samples, and sampling method. The study was conducted on a hemodialysis population without complications of intradialytic hypertension, carried out by *accidental sampling*, and the number of respondents was twice as large as this study. It should also be noted that in this study, the circulation access used was the AV shunt, while the Hanivah (2019) combines an access type AV shunt and a *double-lumen catheter.*

CONCLUSION

Foot massage can affect the decrease in intradialytic blood pressure, both systolic and diastolic blood pressure. Covariate analysis of respondent characteristics data showed a significant difference in the reduction of intradialytic blood pressure between the control group and the intervention group.

SUGGESTION

This intervention can be used as a recommendation for dialysis nurses so that it can be implemented in the hemodialysis room. Future research is expected to uniformly measure blood pressure.

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