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### The Influence Deep Breath And *Intradialytic Exercise* On Muscle Spasm In Hemodialysis Patients

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#### ABSTRACT

##### Background

Chronic kidney failure is one of the biggest diseases in Indonesia. Patients with end-stage chronic kidney failure have two alternative management therapies, namely hemodialysis and kidney transplantation. Hemodialysis therapy alone can replace damaged kidney function. Hemodialysis complications can be prevented by means of nonpharmacological therapies deep breath and include intradialytic exercise.

##### Method

The type of research is used research Quasy Experimental with a pretest-posttest control group design. This study compiled two groups, namely the intervention group and control group. Technique Non probability sampling with purposive sampling method was used to get 30 respondents divided into 2 groups.

##### Results

The test results *Mann Witney* show values *p value* 0.009 which indicates that there is a significant difference in muscle spasm between the intervention and control groups.

##### Conclusion

The results of the study after being given an intervention increased the muscle spasm of patients who received deep breath therapy and *intradialytic exercise*, so that the therapy was effectively implemented for patients did hemodialysis especially those with chronic renal failure.

**Keywords:** *Deep Breath, Intradialytic, Muscle Spasm, Chronic Kidney Failure, Hemodialysis.*

#### INTRODUCTION

Kidney is one of the important organs in the body whose function is to filter out blood that has been mixed with the rest of the body's metabolism. Kidney Disease Core Outcomes (KDQI) describes CKD as a structural or renal function disorder that

occurs for 3 months with or without a decrease in Filtration Rate (GFR) with a value of less than 60 ml / minute per 1.73 m<sup>2</sup>. [1]

The number of people with kidney failure in the world is currently increasing and is of particular concern. In 2010 kidney failure became the 18th disease as a cause of death. [2] There are millions

of patients who die from chronic kidney failure and 10% of the population suffer from chronic kidney failure because they do not have sufficient access to treatment. [2]

Chronic kidney failure is one of the biggest diseases in Indonesia. A survey showed that there were 12.5% or as many as 25 million Indonesians who suffered kidney damage. [3] The prevalence of chronic renal failure based on the diagnosis of doctors in Indonesia is 2% (499.800) and East Java is 0.3% in 2013. [4] The increasing prevalence and incidence of chronic renal failure causes chronic kidney failure to become a global health problem. This shows the number of cases of kidney failure. [5]

In patients with end-stage chronic kidney failure, there are two alternative treatments for treatment, namely hemodialysis and kidney transplantation. Of the two management that is often done is hemodialysis therapy. Transplants are rarely done because not many people donate their kidneys, not all kidneys of one person with another are the same, and costs are not cheap. Hemodialysis therapy alone can replace damaged kidney function. [6]

Hemodialysis has several complications caused by kidney failure itself and because of the process during hemodialysis. During the period of hemodialysis initiation, it was found that patients who experienced hypotension reached 30%, muscle spasm (muscle spasm) by 15%, and the rest experienced disorders of oxygen saturation, dialysis disequilibrium syndrome (DSS), arrhythmia, angina, dialysis reactions and complications caused by composition dialysate. [7]

Changes in muscle spasm in hemodialysis patients occur due to decreased nephron function and increased levels of urea and creatinine. At that time there was a disturbance of acid base and acid production in patients increased. This causes the patient to have muscle spasm. [9] Changes in muscle spasm are complications as long as the patient undergoes hemodialysis.

Hemodialysis complications can be prevented by pharmacological therapy and non-pharmacological therapy. We know that pharmacological therapy is the administration of antihypertensive drugs or beta blockers. Whereas the therapy that can be given to nonfarmacids is diet and a healthy lifestyle. [9] Other nonpharmacological therapies that can be given to

prevent interdialysis complications are deep breath and intradialytic exercise. Both of these therapies provide comfort to patients and are safe to do.

In patients with chronic renal failure, decreased erythropoetin production results in reduced hemoglobin levels. The patient will experience anemia and cause the circulation of oxygen to the peripheral level to decrease. Peripheral oxygenation can be seen from the patient's oxygen saturation. A way to increase oxygen saturation is the deep breath technique. Deep breath technique is one of the nursing care actions carried out by a nurse by teaching a patient to do deep breaths deep, slow and slowly. Deep breathing techniques can reduce the patient's pain and increase lung ventilation and promote oxygenation in the blood. [10]

Another form of preventing complications from non-pharmacological hemodialysis patients is intradialytic exercise. Intradialytic exercise is a 3-stage exercise performed when the patient is under going hemodialysis. Intradialytic exercise can increase blood flow in the muscles so that the flow of urea and toxins in the blood runs smoothly which is then transferred to the dialyser. [11] Patient awareness of exercise can help improve the quality of life of patients undergoing hemodialysis.

The effectiveness of nursing interventions to prevent muscle spasm of hemodialysis patients has not been so effective. This is shown in a study of the level of muscle spasm given 15 minutes of intradialytic exercise for 3 times hemodialysis from 30 patients who experienced severe muscle spasm 14 patients changed to 10 patients. While patients who experienced moderate muscle spasm from 16 patients changed to 20 patients. The location of muscle spasm in hemodialysis patients is more common in both leg calves. [12]

The data above shows that, previous studies on the effectiveness of intradialytic exercise for muscle spasm. So to improve the health status of hemodialysis patients a combination of deep breathing and intradialytic exercise is needed. Other studies have shown that intradialytic exercise has not been effective in dealing with muscle spasm. With this, more duration and frequency are needed to overcome muscle spasm in hemodialysis patients.

Some previous studies have only examined intradialytic exercise against muscle spasm, where as deep breath and intradialytic exercise studies have been linked to muscle spasm. Until now there

has been no research in the field of nursing that specializes in researching deep breath therapy combined with intradialytic exercise on muscle spasm, in hemodialysis patients in hospitals or treatment rooms. In connection with this matter, it is deemed necessary to conduct research on "Effect of deep breath and intradialytic exercise on muscle spasm in hemodialysis patients".

## METHODS

The type of this study used research *Quasy Experimental* with a *pretest-posttest control group design*. The researchers compiled two groups, namely the intervention group and the control group. Respondent muscle spasm measurements using the instrument *Numeric Rating Scale (NRS)* were performed 5 minutes after the needle was inserted into the patient.

The population in this study were patients with chronic kidney failure who underwent hemodialysis 2 times a week at Dr. Sayidiman Magetan. Determination of the minimum number of samples using a technique *sampling non probability* with *purposive sampling* and based on inclusion and exclusion criteria as many as 30 respondents divided into 2 groups with each of the 15 respondents in the intervention group and 15 respondents in the control group.

In this study researchers conducted data collection by observing, identifying, interviewing and filling out the questionnaire. The collected data was analyzed through IBM SPSS program version 21.0, and continued with a different test namely non-parametric test (*Wilcoxon and Mann Withney*). The processed data is used as the basis for discussing problem statements, which are then presented in table form so conclusions can be drawn.

## RESULTS

**Table 1 Frequency distribution of respondents in the intervention group and control group based on demographic characteristics (n = 30)**

Variable	Range	Group				Total	P	
		Control		Intervention				
		F	%	F	%			
Age	26-45	4	26.7%	1	26.7%	5	16.6%	0.739
	46-65	10	66.7%	11	73.3%	21	70%	
	> 65	1	6.7%	0	0%	1	3.3%	
Sex	L	9	60%	11	73.3%	20	66.7%	0.456
	P	6	40%	4	26.7%	10	33.3%	

Table 1 shows that the average age of respondents in the control group was 48.87 and the average age of respondents in the intervention group was 49.13, maximum age was 73 years and at least 27 years in the control group, maximum age

59 years and at least 33 years in the intervention group. Whereas the frequency and presentation based on the sex of the most respondents were 20 (66.7%) while the sex of the female respondents was 10 (33.3%).

**Table 2 Analysis of variables confounding between the control group and intervention grup based on Hb, weight loss and long hemodialysis (n = 30)**

Variable	Group	Mean	SD	P	Δ
levels of HB	Control	10.820	1.755	0.34	0.589
	Intervention	11.160	1.646		
Weight	Control	55.67	9.123	6.8	0.068
	Intervention	62.47	10.433		
Long HD	Control	41.47	16.600	0.92	0.845
	Intervention	42.93	23.554		

Based on table 2 shows that the hemoglobin level in the two groups had no significant

difference with a value of  $p$  0.589 or more than  $>0.05$ . Once also the respondent's weight in both

groups did not have a significant difference with the value of  $p = 0.068$ . For the duration of hemodialysis the average patient in the control

group was 41.47 months and the intervention group was 42.93 months and there were no significant differences with a value of  $p > 0.05$  or 0.845.

**Table 3 Differences muscle spasm in control group before deep breath In and intradialytic exercise and after hemodialysis (post2)**

Measurement		Control group		Intervention group	
		$\Delta$	$\rho$	$\Delta$	P
spasm pre	spasm post1	0.07	0.739	1.47	0.004
spasm pre	spasm post2	0,33	0.160	2.13	0.001

\*Wilcoxon Statistics Test

From the table above, shows the results of difference in muscle spasm before and after treatment in the intervention group  $p \text{ value} = <0.05$ . This shows that there is a significant difference between muscle spasm before and after treatment in

the intervention group. Where as in the control group  $p \text{ value} = > 0.05$  which means there is no significant difference between muscle spasm before and after treatment.

**Table 4 Analysis of muscle spasm difference between intervention group and control after therapy is given a deep breath and intradialytic exercise**

Measurement	Variable	Group	Mean Rank	P	$\Delta$
Pretest	Muscle Spasm	Control	14.13	0.33	0.345
	Muscle spasm	Intervention	16.87		
Post Test 1	Muscle spasm	Control	16.67	1.47	0.004
	Muscle spasm	Intervention	14.33		
PostTest 2	Muscle spasm	Control	19.20	0.6	0.009
	Muscle spasm	Intervention	11.80		

\*Mann Witney Statistic Test

Table above, we can see the results of the test the difference between the intervention and control value  $p = 0.009$  post test 2. This shows that there is a significant difference between the difference in muscle spasm between the intervention group and control.

## DISCUSSION

The results of measurements using the NRS instrument showed a significant increase in muscle spasm  $p = <0.05$  in the intervention group. But in the control group there was no significant difference  $p = > 0.05$ . So that the intervention group given internal and deep breath therapy and intradialytic exercise was better at increasing muscle spasms in hemodialysis patients.

Another similar study showed that stretching exercises also significantly reduced muscle spasm in hemodialysis patients with a value of  $p = 0,000$ . [13] This shows that intradialytic exercise and deep breathing can significantly reduce muscle spasm.

Deep breath technique is a non-pharmacological treatment that functions to make the body more calm and harmonious. In addition, deep breath can respond to the mass discharge. [14] Basically the mechanism of muscle spasm is decreased when performing intradialytic exercise. The patient experiences increased blood flow in the muscles and extends the capillary area which can make urea flow and poisons faster towards the vascular, which then continues to the dialysis capillary. Muscle work will be lighter and muscle spasm can be minimized. [15] Both of these interventions help the body relax. When the body relaxes, there will be a decrease in lactic acid and avoid muscle spasms.

In intradialytic exercise and the deep breath response can change rapidly and there is an increase in gas exchange, body temperature, epinephrine levels of stimulation of joint and muscle receptors. Increased blood flow can increase oxygen levels in the blood. In addition, the exercises carried out can change the diffusion

capacity more broadly and increase the surface area of the alveolar capsicum. This causes breathing to become deeper and more efficient. [9]

From the results of the calculated effect size this study shows the value of Cohen's effect for muscle spasm 1.081 which means that the effect is strong. Muscle spasm is different from previous studies with the effect size of only 0.005, which means that previous research was weak. [16] It can be seen from the data above stating that deep breath and intradialytic exercise can strongly influence the muscle spasm of hemodialysis patients. It's just that some of these studies differ in giving the duration and frequency of these interventions. The intervention was able to change the cardiovascular system, breathing, and muscles used to adapt to the exercise. Adaptation results in increased efficiency

of the cardiovascular system and active muscles. The result of these changes is improving performance. These changes occur during rest and also during exercise. What must be considered is the changes - these changes are not produced from one exercise but need to be done regularly to achieve and maintain fitness.

## CONCLUSION

Deep breath performed 15 times and intradialytic exercise in 20 minutes 2 times a week for 4 weeks (every HD is done) in hemodialysis patients affects the level of muscle spasm in hemodialysis patients who have chronic renal failure.

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