

# The Effect of Breathing Exercise and Range of Motion (ROM) Exercise towards the Decrease of Intradialysis Fatigue Level in Hemodialysis Unit at Dr. Adjidarmo Hospital, Banten

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**Abstract** – Fatigue is a condition of the patient's response that appears after the treatment which is one of the nursing problems in patients receiving hemodialysis therapy. The purpose of this study is to determine the effect of breathing exercise and Range of Motion (ROM) exercise towards the decrease of intradialysis fatigue level in Hemodialysis unit at RSUD Dr. Adjidarmo Banten. Furthermore, the design of this study is Pre-Experimental Design and the design used is the One Group Pretest Post-Test design with the number of samples of 28 respondents and the measuring instrument used is Fatigue Severity Scale (FSS). Chi square is used as sample, with p value of 0,001. The results of this study showed a significant effect between breathing exercise and Range of Motion (ROM) exercise towards the decrease of intradialysis fatigue level (p value <0.05). This study also showed a significant effect between confounding variables (they are age, education background and the length of undergoing hemodialysis) intradialysis towards fatigue. However, the confounding variables (gender and occupation) are not related to intradialysis fatigue.

**Keywords:** *fatigue, breathing exercise, Range of Motion (ROM) exercise, chronic kidney failure, hemodialysis.*

## I. INTRODUCTION

Chronic kidney failure is a condition of damaged kidney resulting in a decrease in glomerular filtration that is able to be seen for three months or longer, with Glomerular Filtration Rate (GFR) of less than 60 mL/min/1.73 m<sup>2</sup> [1]. One of the substitute therapies for chronic kidney failure is Dialysis. Two types of dialysis are Hemodialysis (HD) and Continuous Ambulatory Peritoneal Dialysis (CAPD). Hemodialysis is a process of functionally replacing the impaired renal function of filtration, in which fluid and electrolytes are maintained in a balanced condition by excreting excess fluid and excreting accumulated toxins using a dialyzer (dialysis machine)[2]. The time or duration

of hemodialysis is different for each patient. Hemodialysis is ideally carried out 10–15 hours/week, QB 200–300 mL/minute with duration of 4–5 hours per hemodialysis process carried out 2-3 times a week. The process potentially leads to physical as well as psychological stresses in patients and the most dominant thing felt by the patients undergoing hemodialysis is fatigue [3]. The prevalence of fatigue is quite high in patients undergoing hemodialysis which is approximately 44.7-97% with low to severe levels of fatigue [4]. In reference [5], 94% of hemodialysis patients suffered from the increase of fatigue level and the decrease of life quality score. The physical exercise, long duration of hemodialysis, anemia, low income and education were the factors potentially leading to fatigue in patients undergoing hemodialysis therapy [6].

One of the methods that can be used to reduce fatigue is Breathing Exercise. Breathing exercise is one of the natural therapies as a part of a holistic self-care strategy in overcoming various complaints such as fatigue [7]. Reference [8] also explained that Breathing exercise affects the quality of life of 42 hemodialysis patients doing the exercises regularly. In addition to Breathing Exercise, another method to lower the fatigue level is Range of Motion (ROM). Range of Motion (ROM) is an activity or physical exercise carried out to make the body healthy, to improve health, and to maintain physical health. Range of Motion (ROM) is good for increasing the cardiac output, alveolar ventilation, basal metabolic rate, and joint mobilization. Moreover, it is also good for reducing weakness and increasing stress tolerance [9].

## II. METHODS

This research was conducted in Hemodialysis unit at Dr. Adjidarmo Hospital, Banten. After receiving a letter of ethical review approval from Universitas Indonesia. This research applied four main principles in the ethics of nursing research, such as respect for human dignity, respect for privacy and confidentiality, respect for justice inclusiveness and balanced harm and benefits.

The research design applied was the Pre-Experimental Design by using the design of One Group Pretest Posttest. It was the design of the research that did not use a control group but it carried out the first observation (pretest), which enabled to communicate the changes in the tests of in Bahasa Indonesia after the experiment [10]. Next, 28 people of the total number of samples met the inclusion criteria set by the researchers, such as being able to, and agreeing to be respondent by signing a consent form including important information of the participant's, stable vital signs, the use cimino access during hemodialysis, no joint disorders, hemodialysis therapies twice a week, each 4-5 hours. Hence, Chi square is used as sample, with p value 0.001.

The instrument that was used in this research to measure fatigue level is Fatigue Severity Scale (FSS). Pre-test is conducted 30 minutes after hemodialysis. Then, for 8 weeks, I gave the interventions, which were breathing exercise and Range of Motion (ROM) exercise. Range Of Motion (ROM) applied is hand and foot exercise, each is 8 times. Breathing Exercise is applied twice, before and after Range of Motion (ROM)

### III. RESULTS

This study employed univariate and bivariate data. In analyzing the data, I employed frequency distribution in univariate analysis and paired T Test in bivariate analysis. It was a quantitative study with pre-experimental design, without control group. Most of the respondents, namely 25 respondents (89.3%) were 41 to 60 years old that were mostly male, namely 17 people (60.7%). In respect to the educational background, 22 people (78.6%) of total respondents were higher education graduates (D3,S2,S1) and in respect to occupation, 10 respondents (35.7%) were entrepreneurs. There were 23 respondents (82.1%) that underwent hemodialysis for > 6 months.

TABLE 1. FREQUENCY DISTRIBUTION of RESPONDENTS BASED on FATIGUE LEVEL of RESPONDENTS in HEMODIALYSIS UNIT of Dr. ADJIDARMO HOSPITAL, BANTEN 2016 (n = 28)

| Variables        | Pre-test |            | Post-test |            |
|------------------|----------|------------|-----------|------------|
|                  | Total    | Percentage | Total     | Percentage |
|                  | n        | %          | n         | %          |
| Not fatigue      | 0        | 0          | 12        | 42.9       |
| Light fatigue    | 0        | 0          | 16        | 57.1       |
| Moderate fatigue | 7        | 25         | 0         | 0          |
| Severe fatigue   | 21       | 75         | 0         | 0          |
| TOTAL            | 28       | 100        | 28        | 100        |

Based on the results of study, it was found out that the number of respondents suffering from moderate fatigue level before the intervention was 7 people (25%) and the number of respondent experiencing severe fatigue level was 21 people (75%). Subsequently, the number of respondents suffering from mild fatigue level after the intervention was 16 people (57.1%) and the number of respondent with no fatigue was 12 people (42.9%).

The bivariate analysis was employed to determine the relationship between two variables and to verify the research hypothesis. The bivariate analysis examined the correlation between the independent variables and the dependent variable, in addition to understanding the correlation between confounding factors of age, sex, occupation, education and the length of hemodialysis and fatigue levels using the chi square test.

TABLE 2. ANALYSIS of BREATHING EXERCISE and RANGE of MOTION EXERCISE in HEMODIALYSIS UNIT of Dr. ADJIDARMO HOSPITAL, BANTEN, 2016

| Fatigue Level | Post Test |      |       |      |          |   |        |   | Total | P Value |       |
|---------------|-----------|------|-------|------|----------|---|--------|---|-------|---------|-------|
|               | None      |      | Light |      | Moderate |   | Severe |   |       |         |       |
|               | n         | %    | n     | %    | n        | % | N      | % |       |         |       |
| None          | 0         | 0    | 0     | 0    | 0        | 0 | 0      | 0 | 0     | 0       | 0.001 |
| Light         | 0         | 0    | 0     | 0    | 0        | 0 | 0      | 0 | 0     | 0       |       |
| Moderate      | 7         | 100  | 0     | 0    | 0        | 0 | 0      | 0 | 7     | 25      |       |
| Severe        | 5         | 23.8 | 16    | 76.2 | 0        | 0 | 0      | 0 | 21    | 75      |       |
| Total         | 12        | 42.9 | 16    | 57.1 | 0        | 0 | 0      | 0 | 28    | 100     |       |

The results of the study, transpired that the number of respondents experiencing the change from moderate fatigue to no fatigue after being given an intervention was 7 people (25%). The number of respondents who experienced the change from severe fatigue to no fatigue was 5 people (23.8%) and those experiencing the change from severe fatigue to mild fatigue were 16 people (57.1%). From the results of the statistical test, a conclusion could be obtained that there were different fatigue levels before and after the intervention (p value = 0.001;  $\alpha$  0.05), meaning that there was a correlation between breathing exercise and Range of Motion (ROM) exercise as well as the decrease of intradialysis fatigue level.

TABLE 3. ANALYSIS of FATIGUE LEVEL BASED on THE AGE of RESPONDENTS in HEMODIALYSIS UNIT of RSUD Dr. ADJIDARMO, BANTEN (n = 28)

| Fatigue Level | Age             |      |                 |      | Total |     | P Value |
|---------------|-----------------|------|-----------------|------|-------|-----|---------|
|               | 20-40 years old |      | 41-60 years old |      | N     | %   |         |
|               | n               | %    | n               | %    |       |     |         |
| Not           | 1               | 8.3  | 11              | 91.7 | 12    | 100 | 0.032   |
| Light         | 2               | 12.5 | 14              | 87.5 | 16    | 100 |         |
| Moderate      | 0               | 0    | 0               | 0    | 0     | 0   |         |
| Severe        | 0               | 0    | 0               | 0    | 0     | 0   |         |
| Total         | 3               | 10.7 | 25              | 89.3 | 28    | 100 |         |

The results of the research indicated that the number of respondents who did not suffer from fatigue and whose age were between 41 to 60 years old, was 11 people (91.7%), where the number of respondents who suffered from mild fatigue and whose age were between 41 to 60 years old, was 14 people (87.5%). Based on the results of the statistical test, the conclusion was that there was a correlation between the age and level of fatigue (p value = 0.032;  $\alpha$  0.05).

TABLE 4. ANALYSIS of FATIGUE LEVEL DIFFERENCES BASED on THE HEMODIALYSIS LENGTH of RESPONDENTS in HEMODIALYSIS UNIT of RSUD Dr. ADJIDARMO, BANTEN (n = 28)

| Fatigue Level | Length of Hemodialysis |      |            |      | Total |     | P value |
|---------------|------------------------|------|------------|------|-------|-----|---------|
|               | < 6 months             |      | ≥ 6 months |      | N     | %   |         |
|               | n                      | %    | n          | %    |       |     |         |
| Not           | 9                      | 75   | 3          | 25   | 12    | 100 | 0,035   |
| Light         | 14                     | 87.5 | 2          | 12.5 | 16    | 100 |         |
| Moderate      | 0                      | 0    | 0          | 0    | 0     | 0   |         |
| Severe        | 0                      | 0    | 0          | 0    | 0     | 0   |         |
| Total         | 23                     | 82.1 | 5          | 17.9 | 28    | 100 |         |

The data obtained from the research results showed that the number of respondents who did not suffer from fatigue and had undergone hemodialysis < 6 months was 9 respondents (75%). However, the number of respondents who suffered from mild fatigue and had undergone hemodialysis ≥ 6 months was 14 people (87.5%). Based on the results of the statistical test, the conclusion was that there was a correlation between the duration of undergoing hemodialysis and the level of fatigue (p value = 0.035;  $\alpha$  0.05).

TABLE 5. ANALYSIS of FATIGUE LEVEL DIFFERENCES BASED on THE OCCUPATION of RESPONDENTS in HEMODIALYSIS UNIT of RSUD Dr. ADJIDARMO, BANTEN

| Fatigue Level | Occupation    |      |                  |      |              |      |        |      | Total | P value |       |
|---------------|---------------|------|------------------|------|--------------|------|--------|------|-------|---------|-------|
|               | Civil Servant |      | Private employee |      | Entrepreneur |      | Others |      |       |         |       |
|               | n             | %    | n                | %    | n            | %    | N      | %    |       |         |       |
| Not           | 2             | 16.7 | 0                | 0    | 5            | 41.7 | 5      | 41.7 | 12    | 100     | 0,109 |
| Light         | 2             | 12.5 | 6                | 37.5 | 5            | 31.3 | 3      | 18.8 | 16    | 100     |       |
| Moderate      | 0             | 0    | 0                | 0    | 0            | 0    | 0      | 0    | 0     | 0       |       |
| Severe        | 0             | 0    | 0                | 0    | 0            | 0    | 0      | 0    | 0     | 0       |       |
| Total         | 4             | 14.3 | 6                | 21.4 | 10           | 35.7 | 8      | 28.6 | 28    | 100     |       |

The data obtained from the research results showed that the occupation of most of the respondents not suffering from fatigue was entrepreneur, namely 5 respondents (41.7%). Furthermore, the number of respondents who suffered from mild fatigue and worked as employees of private companies, was 6 respondents (37.5%). Based on the results of the statistical test, the conclusion was that there was no correlation between occupation and the level of fatigue (p value = 0.109;  $\alpha$  0.05).

TABLE 6. ANALYSIS of FATIGUE LEVEL DIFFERENCES BASED on THE SEX of RESPONDENTS in HEMODIALYSIS UNIT of RSUD Dr. ADJIDARMO, BANTEN (n = 28)

| Fatigue Level | Sex  |      |        |      | Total |     | P value |
|---------------|------|------|--------|------|-------|-----|---------|
|               | Male |      | Female |      | N     | %   |         |
|               | n    | %    | n      | %    |       |     |         |
| Not           | 8    | 66.7 | 4      | 33.3 | 12    | 100 | 0,435   |
| Light         | 9    | 56.3 | 7      | 43.3 | 16    | 100 |         |
| Moderate      | 0    | 0    | 0      | 0    | 0     | 0   |         |
| Severe        | 0    | 0    | 0      | 0    | 0     | 0   |         |
| Total         | 17   | 60.7 | 11     | 39.3 | 28    | 100 |         |

The data obtained from the research results showed that most of the respondents not suffering from fatigue were males, namely 8 respondents (66.7%). The number of respondents who suffered from mild fatigue and who were males, was 9 respondents (56.3%). Based on the results of the statistical test, the conclusion was that there was no correlation between sex and level of fatigue (p value = 0.435;  $\alpha$  0.05).

TABLE 7. ANALYSIS of FATIGUE LEVEL DIFFERENCES BASED on THE EDUCATION LEVEL of RESPONDENTS in HEMODIALYSIS UNIT of RSUD Dr. ADJIDARMO, BANTEN (n = 28)

| Fatigue Level | Education Level     |   |                           |      |                               |      | Total | P Value |
|---------------|---------------------|---|---------------------------|------|-------------------------------|------|-------|---------|
|               | No formal education |   | Primary-Secondary Schools |      | Higher Education (D3, S1, S2) |      |       |         |
|               | n                   | % | n                         | %    | n                             | %    |       |         |
| Not           | 0                   | 0 | 3                         | 25   | 9                             | 75   | 12    | 0.021   |
| Light         | 0                   | 0 | 3                         | 18.8 | 13                            | 81.3 | 16    | 0       |
| Moderate      | 0                   | 0 | 0                         | 0    | 0                             | 0    | 0     | 0       |
| Severe        | 0                   | 0 | 0                         | 0    | 0                             | 0    | 0     | 0       |
| Total         | 0                   | 0 | 6                         | 21.4 | 22                            | 78.6 | 28    | 0       |

The results of the research indicated that the number of respondents who did not suffer from fatigue was 9 respondents (75%) and those with higher educational background (D3, S1, S2), was 13 respondents (81.3%). Based on the results of the statistical test, the conclusion was that there was a correlation between the educational background and the level of fatigue (*p value* = 0.021;  $\alpha$  0.05).

#### IV. DISCUSSION

There were 5 components mentioned in the instruments, namely: age, sex, education, occupation, and the length of Hemodialysis. I also employed pre and posttest in order to reveal the significance of Range of Motion (ROM) and breathing exercise towards patients' fatigue level. The study showed that age, education and the length of Hemodialysis gave correlative effect towards patients' fatigue.

The data obtained from the research showed that there was a change in fatigue levels of the respondents, namely from moderate fatigue to severe fatigue, from no fatigue to mild fatigue and from mild fatigue to no fatigue in 12 respondents (42.9%) and there was mild fatigue suffered by 16 respondents (57.1%). 0 respondents suffered from moderate fatigue and severe fatigue. This was in accordance with the research carried out by the previous researchers. As they get older, degenerative process will also occur in the respiratory and cardiovascular systems [11]. There was a change in the decrease of maximum respiratory capacity, cardiac output, maximum oxygen uptake and glomerular filtration rate [12]. In addition, respiratory changes will reduce oxygen supply and decrease the energy metabolism in cells [12].

In this research, the age data grouping was carried out based on the progress of young adults who were 20-40 years old and middle young adults who were 41-60 years old. This age grouping was based on Hurlock's human psychological development. Reference [13] was a research that young adults who suffered from a period of optimal physical development and who was emotionally motivated to achieve something huge. In this research, the data indicated that the age of respondents range from 20 - 60 years old,

most of the respondents were 41-60 years old and most of them suffered from severe fatigue. The age characteristic of the respondents was that the age range was not different from several relevant researches. Fatigue occurred in respondents who were 20-29 years old and respondents who were 70 years old suffered from higher levels of fatigue [4]. The results of previous researches were different from the results of this research that most of the respondents were males. Reference [14] was a research that female respondents were 51% and male respondents were 49%. The data obtained from this research showed that, the number of respondents, who did not suffer from fatigue and worked as entrepreneurs, was 5 respondents (41.7%). The number of respondents who suffered from mild fatigue and who worked as employees of private companies, was 6 respondents (37.5%). Reference [15] was a research that showed Hemodialysis patients who worked were more energetic than those who did not work, because working made them feel better.

The results of this research stated that the number of respondents not suffering from fatigue was 9 people (75%) and those suffering from mild fatigue who had higher education levels (D3, S1, S2), were 13 people (81.3%). Reference [6] stating that in Indonesia, physical exercise, long duration of hemodialysis, anemia, low income and education were the factors leading to fatigue in patients receiving hemodialysis therapy. Another research revealed that patients with higher education levels tended to be more able to manage fatigue better than those with lower education levels, since their ability in receiving the education given to them was better [15]. The researcher obtained the data stating that the number of respondents, who were not fatigued and who had undergone hemodialysis > 6 months, was 9 people (75%). Whereas, the number of respondents who suffered from mild fatigue and had undergone hemodialysis > 6 months was 14 people (87.5%). The results of this research were also supported by other researches indicating that the duration of hemodialysis that was less than 1 year undergone by 13.3% respondents suffering from severe fatigue and hemodialysis that was longer than 1 year by 86.7% undergone by 13.3% respondents suffering from mild fatigue [16]. Patients undergoing hemodialysis for less than 6 months suffered from severe fatigue due to the duration of the hemodialysis session 17. Concerning with the pre and posttests, the data showed that the Range of Motion and breathing exercise indeed lower patients fatigue level from middle to low that can be seen from its *p value* of 0.001

#### V. CONCLUSIONS AND RECOMMENDATIONS

The characteristics of respondents with chronic kidney failure undergoing hemodialysis in this research were that most of respondents were in 41-60 years old group and the age of respondents ranged from 32 to 60 years. Next most of the respondents were males. Then, most of respondents had higher educational background (D3, S1, S2). Moreover, most of the respondents worked as entrepreneurs. Lastly, most of the respondents underwent hemodialysis longer than 6 months and suffered from severe fatigue.

Based on the results of the research, there was a significant correlation between breathing exercise and Range of Motion (ROM) exercise in order to decrease the intradialysis fatigue level. There was a significant correlation between age, education, and the length of hemodialysis as the confounding of breathing exercise and Range of Motion (ROM) exercise to decrease the intradialysis fatigue level. Furthermore, there was also a significant correlation between sex and occupation as the confounding of breathing exercise and Range of Motion (ROM) exercise to decrease the intradialysis fatigue level.

Most of all, the results of the research may become the basis for improving the quality of hemodialysis nursing care. Breathing exercise and Range of Motion (ROM) exercise can be used as an alternative nursing treatment in reducing fatigue to a lower level. However, the procedures for the research should be improved.

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