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"Differences in The Effect of Deep Breathing and Prone Position on The Oxygen Saturation Value Among Covid-19 Survivors in a Sub District of East Java Province"

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ABSTRACT

Background. *To date, the COVID-19 pandemic has become a major problem in all countries of the world. Indonesia registered as a country with a significant drop in cases. The highest percentage of outcomes in COVID-19 survivors were fatigue and shortness of breath. Medical rehabilitation therapy for COVID-19 survivors is critically needed to maintain and improve quality of life by preventing or reducing the development of functional impairment and disability and by ameliorating and reducing complications.*
Methods. *Quasi-experimental research design with pretest-posttest design on COVID-19 survivors. The sample is 120 respondents consisting of 60 respondents in the Deep Breathing group and 60 respondents in the Prone position group.*
Results. *The study showed that there was a significant difference in oxygen saturation value (ρ value 0.004 < 0.05) between the Deep Breathing and the Prone in COVID-19 survivors.*
Conclusion. *There is a significant difference (ρ 0.004) in oxygen saturation values in COVID-19 survivors who are given Deep Breathing and Prone position.*

KEYWORDS
Deep breathing, prone position, oxygen saturation, COVID-19 survivors

INTRODUCTION

To this day, the COVID-19 pandemic remains a major problem in all countries around the world. According to COVID-19 Task Force data, Indonesia has been recorded as a country with a significant drop in cases, with a positive rate of just 0.2% as of December 31, 2021, set by WER. Baseline, or 5%. (Satgas Covid-19, 2021). Based on the previouse literatur review study conducted by Kholilah & Hamid (2021) showed that The highest percentage of outcomes in COVID-19 survivors were fatigue (25.3-87%) and shortness of breath (2.6-71%). Fatigue and shortness of breath are quite high in COVID-19 survivors, a condition caused by fibrosis caused by a decrease in the ability of lung function to expand completely and can cause diffusion disorders, namely the function of gas exchange of oxygen and carbon dioxide between the lungs and surrounding blood vessels (Cahyadi & Suhardi, 2021).

Medical rehabilitation therapy for COVID-19 survivors is very necessary to maintain and improve the quality of life by preventing or reducing the occurrence of functional impairment and disability as well as improving and reducing complications. Burhan, et al, (2021) states that more effective treatment is needed in increasing oxygen saturation in reducing complaints. Medical rehabilitation therapy for COVID-19 survivors may include positional management, breathing exercises and physical therapy. During the current pandemic, position management, namely the Prone position and breathing exercises such as Deep Breathing, is very popular to increase oxygen saturation in COVID-19 survivors.

The prone position is also a position that is becoming very popular during the current pandemic, and it is also a positioning maneuver that can safely increase oxygenation (Caputo, et al., 2020). The prone position, or prone position,

is the position that results from good perfusion ventilation, in which the lung pressure is reduced through the abdominal cavity, and in the prone position, the dorsal side of the lung is open, so the lungs themselves load is reduced. More gas exchange is fairly evenly distributed within the alveoli (Anand, et al., 2021).

Age	DBE		PP	
	n	(%)	n	(%)
18-24	9	15	6	10
25-31	5	8,3	9	16,7
32-38	5	8,3	7	11,7
39-45	10	16,7	6	10,0
46-52	8	13,3	11	16,7
53-59	9	15	8	13,3
60-66	8	13,3	8	13,3
67-73	6	10	5	8,3
Total	60	100	60	100

RESEARCH METHODOLOGY

This type of research is quantitative research using quasi-experimental and pretest-posttest research design with control group. The sample in this study will be doing deep breathing exercises and the Prone position with a purposive sampling technique of 120 respondents, then divided into 2 groups, namely 60 people in the Deep Breathing group and 60 people in the Prone position. The research was carried out in the working area of the Bubakan Health Center Pacitan in February-March 2022. The inclusion criteria are COVID-19 survivors from July-December 2021, willing to be a respondent, able to follow instructions and tolerating positions with the exclusion criteria being a history of heart disease, asthma (currently having an attack), pregnant women, having abnormalities of the sternum, spine and pelvic bone, there are conditions or diseases that interfere with the measurement or interpretation of the results, unable to participate in the study as a whole. Data collection tools used pulse oximetry and stop watch. In the Deep Breathing group it was done for 10 minutes a day and the Prone position group was done for 30 minutes a day. Data analysis using Wilxocon and Mann Whitney test using a computer program.

Sex	DBE		PP	
	n	(%)	n	(%)
Male	26	43,3	21	35
Female	34	56,7	39	65
Total	60	100	60	100

RESULTS AND DISCUSSION

1. Characteristic of respondents

Table 1. Comparison of sex with the incidence of COVID-19 (n=120)

Gejala pasca COVID-19	DBE		PP	
	n	(%)	n	(%)
None	47	78,3	48	80,0
Cough	3	5,0	2	3,3
Fatigue	10	16,7	10	16,7
Total	60	100	60	100

Based on table 1 above, it was found that the gender who experienced COVID-19 in the Deep Breathing group and the Prone position was mostly female.

Table 2. Comparison of age groups with the incidence of COVID-19 (n=120)

Based on table 2 above, it was found that the majority of respondents who were given Deep Breathing treatment (16.7%) were 39-45 years old and in the Prone position treatment most (16.7%) were 46-52 years old.

Table 3. Comparison of type of work with the incidence of COVID-19 (n=120).

Pekerjaan	DBE		PP	
	n	(%)	n	(%)
Un-employed	0	0	1	1,7
Farmer	18	30	19	31,7
Self-employed	19	31,7	21	35

Caring	DBE		PP	
	n	(%)	n	(%)
Self Isolation	42	70	39	65
hopitalized	18	30	21	35
Total	60	100	60	100

Family members exposed COVID-19	DBE		PP	
	n	(%)	n	(%)
Yes	46	76,7	44	73,3
None	14	23,3	16	26,7
Total	60	100	60	100
Civil servant	0	0	3	5
Family mother	8	13,3	9	15
Retired	2	3,3	0	0
Student	4	6,7	1	1,7
Private sector	9	15	4	6,7
Others	0	0	2	3,3
Total	60	100	60	100

Based on table 3 above, it was found that the work of respondents who were given Deep Breathing treatment and the Prone position mostly worked as entrepreneurs.

Table 4. Comparison of post-COVID-19 symptoms (n=120)

Based on table 4 above, it was found that post-COVID-19 symptoms were no longer felt by COVID-19 survivors but there were some symptoms that still appeared, such as in the Deep Breathing treatment group, 3 people had coughing and 10 people experienced fatigue, and in the Prone position treatment group. as many as 2 people have cough and 11 people experience fatigue.

Table 5. Comparison of comorbidities with the incidence of COVID-19 (n=120)

Based on table 5 above, it was found that the majority (63.3%) had comorbidities in the respondents who were given Deep Breathing treatment and in the Prone position treatment group most (48.3%) did not have comorbidities.

Table 6. Comparison of types of care with the incidence of COVID-19 (n=120)

Based on table 6 above, it was found that most of the Deep Breathing and Prone position treatment groups underwent independent isolation.

Table 7. Comparison of family members exposed to COVID-19 (n=120)

Based on table 7 above, it was found that most of the Deep Breathing treatment groups and the position of the family members were also exposed to COVID-19.

2. The effect before and after being given the Deep Breathing intervention and prone position on the oxygen saturation value of COVID-19 survivors

Table 8. Average difference in oxygen saturation

Comorbid	DBE		PP	
	n	(%)	n	(%)
Yes	38	63,3	29	51,7
No	22	36,7	31	48,3
Total	60	100	60	100

before and after Deep Breathing (DBE) and Prone position (PP)

		Median	*Min-max*	ρ value
DBE	Pre	96,00	94-99	0,000
	Post	98,00	96-99	
PP	Pre	97,00	94-99	0,000
	Post	99,00	96-99	

Based on table 2 above, the results using the Wilcoxon test showed that in the intervention group Deep Breathing value 0.000 and Prone position value 0.000, which means that there is an effect of Deep Breathing action and Prone position on increasing oxygen saturation values in COVID-19 survivors, this shows the value of value < 0.05.

2. Differences in oxygen saturation values in deep breathing interventions and prone position

Table 9. Differences in oxygen saturation values in the Deep Breathing intervention and the Prone position

Intervention	*Mean*	*Std.dv*	*n*	ρ value
Post				
DBE	97,93	0,918	60	0,004
PP	98,40	0,764	60	

Based on table 3 above, the results of the Mann Whitney test showed that = 0.004 (<0.05) which means Ho is rejected and Ha is accepted, it can be seen that there is a difference between the Deep Breathing group and the Prone position seen from the average value (mean), so it can be concluded that there is a difference in the value of oxygen saturation in the Deep Breathing exercise and the Prone position for COVID-19 survivors in the Bubakan Pacitan Health Center Work area in 2022.

DISCUSSION

The results showed that most of the respondents were female. In the Deep Breathing intervention group, 26 respondents (43.3%) were male and 34 respondents (56.7%) were female for the Prone position intervention group, namely 34 respondents (35%) male and 21 respondents (65 %) woman. Although the results of the study show that women are the most infected with the COVID-19 virus than men, this difference is not significant because this is not in accordance with the literature which says that men are more likely to be infected with COVID-19 than women. This is supported by research conducted by Putri, et al, (2021) that statistical analysis was obtained with a value of 0.485 > 0.05 so that it was obtained that there was no relationship between gender and the incidence of COVID-19. Based on Gemmati et al (2020), men have higher ACE 2 expression than women, this is related to sex hormones that cause men to be more at risk for infection with SARS-Cov-2. ACE 2 expression is encoded by a gene located on the X chromosome that plays an important role in innate and adaptive immunity, females are heterozygous while males are homozygous, thus potentially increasing ACE 2 expressor. SARS-Cov-2 infection and some clinical symptoms can be neutralized due to females carry the heterozygous X allele which is called sexual dimorphism. In addition, according to Illah (2021) men are at high risk of being exposed to the COVID-19 virus due to biological and lifestyle factors. Biologically, the immunity level of men is lower than that of women.

The results of the study are not in accordance with the literature because of the imbalance in the number of samples between the male and female sexes involved in this study. Because based on the data, the number of men who were the sample of the study was less than that of women (Putri, et. al, 2021).

The results showed that the respondents in the Deep Breathing intervention were 39-45 years old and in the Prone position intervention, they were 46-52 years old. The results of this study are in accordance with the results of research conducted Sonyorini & Sulastri, (2021) that the results showed that the most respondents were aged 40-60 years as many as 32 (55%). Based on Illah (2021) the vulnerable age for exposure to COVID-19 ranges from 45-60 years. COVID-19 infects all age groups but the risk of infection increases when a person reaches the age of 40. This is because the condition of a person's immunity tends to decrease so that the susceptibility to pathogens is higher. In addition, 45-60 years old have a very high level of productivity and mobility outside the

home. The frequency and social interaction of productive groups is also higher. That way, this condition makes it possible for that age to be vulnerable to being infected with the COVID-19 virus.

The results showed that most of the COVID-19 survivors worked as entrepreneurs. Where in the Deep Breathing intervention there are 19 respondents and in the Prone position intervention there are 21 respondents. This is in accordance with what was stated by Mamat, et al, (2021) that the positive cases of workers reached 272 cases with a total of 20 clusters. Based on Mamat, et al, (2021) exposure can occur at work, while traveling to work, during travel and from work. The risk of exposure to COVID-19 in the workplace depends on the possibility of coming within 1 meter of other people, frequent physical contact with people who may be infected with COVID-19, and through contact with contaminated surfaces and objects.

The results showed that most respondents did not have further symptoms after being declared negative for COVID-19. In the Deep Breathing intervention group as many as 47 respondents and in the Prone intervention group as many as 48 respondents did not feel symptoms. However, there are some symptoms that appear on respondents, such as in the Deep Breathing intervention group, there are 3 respondents who have cough symptoms and 10 respondents fatigue and in the Prone position intervention group, 2 respondents have cough symptoms and 10 respondents are tired. This is in accordance with research conducted by Batubara & Siregar (2021) that there are 35% of COVID-19 survivors who have not returned to their initial health condition after the examination, so that 65% of COVID-19 survivors have been able to recover without any complaints. Based on Jacobs (2021) long covid is a term used to describe a disease experienced by COVID-19 survivors where they still feel the long-term effects of the corona virus far longer than expected.

The results showed that the majority of respondents in the Deep Breathing intervention group were COVID-19 survivors who had comorbidities of 38 respondents. In the intervention group Prone position, the most COVID-19 survivors did not have comorbidities as many as 31 respondents, only a slight difference in COVID-19 survivors who had comorbidities or did not have comorbidities. Comorbidity is a risk factor that can increase the severity and duration of COVID-19. Sanyaolu, et al, (2020) states that Comorbidities that are often found in COVID-19 patients are diabetes mellitus, hypertension and obesity. Based on Alkautsar (2021) nn patients with comorbid obesity, hypertension, and diabetes mellitus, there is an increase in ACE-2 which acts as a SARS-Cov-2 receptor. ACE-2 receptors, apart from being found in the respiratory tract, are also found in adipose tissue, heart, and pancreas. In COVID-19 patients who have comorbid hypertension can increase the risk of severity through increased viral binding to ACE-2 which causes vascular endothelial dysfunction. (Alkautsar, 2021).

The results showed that most respondents in the Deep Breathing intervention group and the Prone position were COVID-19 survivors who underwent self-isolation when tested positive for COVID-19. In the Deep Breathing intervention group there were 42 respondents and in the Prone position intervention group there were 39 respondents. This is in accordance with what was conveyed by the communication team of the COVID-19 handling committee and the national economic recovery where in 2021 Indonesia experienced a spike in cases in July. So there were several problems that arose in the referral hospital environment due to the spike in COVID-19, such as limited infrastructure in dealing with the surge in cases (Ermalina, 2021). So that there are limited hospital facilities for isolation, it is recommended to isolate independently at their respective homes. Because it can lighten the burden of the hospital which is increasing every day for COVID-19 patients (Widodo, et al., 2021). Several considerations indicate that the patient is isolated, among others, the patient can be monitored or there is a family who can care for him, there are no comorbidities such as heart, lung, kidney, or immune disorders,

there are no factors that increase the risk of experiencing complications, or inpatient facilities are not available or not. adequate (Susilo, et al., 2020). Patients with moderate, severe and critical symptoms should be treated at the hospital because they need the help of tools and monitoring from health workers. Patients without symptoms or mild symptoms are still allowed to self-isolate either in a centralized isolation area or isolation at home. Self-isolation (isoman) is an effort to separate or limit the movement of people infected with COVID-19 so they don't interact with their families and surrounding communities. (Benny, et al., 2021).

The results showed that there were family members who had a history of exposure to COVID-19. In the Deep Breathing intervention group, 46 respondents (76.7%) and in the Prone position intervention group, 44 respondents (73.3%) were exposed to COVID-19. This is in accordance with research conducted by Kaddi, et al, (2020) that the transmission of the spread of COVID-19 has entered the smallest unit, namely the family.

People who are most at risk of contracting COVID-19 are people who are in close contact with COVID-19 patients, including those who care for COVID-19 patients (Juhaina, 2021). Exposure to COVID-19 can also occur at work, while traveling to work, during travel and from work so that it can transmit to family members (Mamat, et al., 2021). Another reason why the transmission of COVID-19 transmission has entered the family sphere, is because Indonesia strongly applies a culture of friendship. Where this can increase the transmission of the spread of COVID-19 from one family to other families. In addition, some people who have symptoms of COVID-19 are also reluctant to carry out a rapid test or swab test because they are afraid that if a positive result is found they will be ostracized by the local community (Kaddi, et al., 2020).

The results showed that there were differences in oxygen saturation values between respondents who had done Deep Breathing and respondents who had done the Prone position. The results of the Mann Whitney post-Deep Breathing oxygen saturation test for the post Prone position on 120 respondents showed a sig (2-tailed) value of 0.004 or <0.05, it means that there is a difference in oxygen saturation values between Deep Breathing and the Prone position. Both interventions were equally influential in increasing oxygen saturation values, but there were differences in the range of increases in oxygen saturation before and after the intervention. In the Deep Breathing intervention group the average saturation value before the intervention was 96.45% and after the intervention the average oxygen saturation value increased to 97.93%, which means there was an increase of 1.48%. While in the intervention group the Prone position the average saturation value before the intervention was 96.97% and after the intervention in the Prone position the average saturation value became 98.40%, which means there was an increase of 1.43%. Judging from the increase in the two interventions carried out, there was no big difference between the two actions.

Based on Destanta, et al, (2019) Deep Breathing exercise is an exercise that focuses on optimizing the expansion of the accessory muscles of respiration, especially the diaphragm, during the inspiration phase which results in an increase in the volume of alveolar ventilation. Deep Breathing exercises cause inhibition of the Hering-Breuer reflex which causes a delay in the expiration process. Voluntary stretching of the chest wall results in an increase in lung tidal volume and stimulates the production of surfactant which will reduce the alveolar resistance to incoming air. The expansion of the alveolar sacs becomes more effective because of the increase in the volume of the inspiratory capacity that occurs. The larger the surface area of the alveoli, which actively affects and improves the gas exchange process. In the Prone position, it can improve respiratory physiology and cardiovascular stability by reducing abdominal compression. The prone or prone position is a position that results from good perfusion ventilation where when prone there is a decrease in lung pressure by the abdominal cavity and when prone the back of the lungs is open so

that the load from the lungs itself is fairly evenly distributed as a result, there is more gas exchange in the pulmonary alveoli. (Anand, et al., 2021).

SUMMARY

There is a difference in oxygen saturation value between respondents who have done Deep Breathing and respondents who have been given the Prone position with a difference in the saturation increase of 0.05 and a sig (2-tailed) value of 0.004, where <0.05 which indicates that Ho is rejected and Ha accepted. It can be concluded that in this study, Deep Breathing and the prone position can be used either because they have the same effectiveness in influencing oxygen saturation values.

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