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The Effect of Foot Massage Relaxation Techniques To Reduce Pain Level In Patients With Ventilator In ICU Cengkareng Hospital In 2022

Helena Lasria Parhusip[1], Maria Astrid[2], Wilhelmus Hary Susilo[3]
[1,2] STIK Sint Carolus, Indonesia
[3] Universitas Persada Indonesia
Email: helenaparhusip@gmail.com

* Correspondence: helenaparhusip@gmail.com

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ABSTRACT
Pain is usually experienced by patients on ventilator in the ICU. Efforts to reduce pain with foot massage done independently on the patient. Foot massage safe complementary therapy, providing relaxing effect, feeling comfortable and reducing pain. This study used quasi experiment research design with pre and post test control group design. The total sample of 40 respondents was divided into an intervention group 30 respondents were given foot massage once a day for 2 consecutive days, the control group was 10 respondents given analgesic therapy for 2 consecutive days. Post test pain scores 30 minutes after getting treatment on first and second days. Results showed that majority of the age group 46-55 years 30%, majority male 57%, 65% were suctioned, and body position changes 82%, there was difference in pre-test (p = 0.001) and post-test (p=0.007) the intervention group, there was difference in the level of pain after foot massage in the intervention group and the administration of analgesics the control group (p=0.000), there was effect of suctioning mucus (p=0.003), there was effect of changes in body position (p=0.008). This means that foot massage has effect reducing pain levels in patients. This study recommends the need for further research and foot massage one of independent nurse interventions in nursing care for patients with ventilatory pain.

Introduction

Intensive Care Unit (ICU) treatment is a treatment for patients who need special care. According to the Indonesian Ministry of Health (2012) ICU is a facility for treating patients in an unstable condition after severe surgery or not due to major surgery that requires intensive, close monitoring or immediate action. The use of a ventilator is intended to meet oxygen needs, reduce the work of breathing, increase oxygenation to the tissues or correct respiratory acidosis. According to Goldsworthy and Graham (2014), the

impact that can occur in using a ventilator is an increase in ICP (Intra-Cranial Pressure), gastric disorders, VAP (Ventilator Associated Pneumonia), aspiration, pneumothorax, and tracheal necrosis. According to (Harianja & Astrid, 2020)states that VAP is a frequent cause of Associated Infection (HAI) cases.

Another impact on patients who are attached to a ventilator is the effect of pain due to insertion of an endotracheal mucous tube and the act of suctioning mucus (Aktas et al., 2020; Fatemeh Khayer et al., 2020; Hidayat et al.,2020). According to research Aktas & Yilmaz, (2020); Dale et al., (2020); Kia et al., (2021); Shahiri et al., (2020), states that procedural actions such as changes in body position, suction mucus, wound care and medical procedures such as intubation, surgery, use of drains, as well as disease pathophysiology and side effects of therapy performed on sick patients Critical patients with ventilators reported moderate to severe pain with a score range of 4-6.

Based on research Waladani et al., (2021) data from the American Association of Cultural Care Nurses, 50% of patients experience pain during routine care with a ventilator attached. Data obtained from the Cengkareng Regional General Hospital, patients who were treated in the ICU room in 2020-2021 recorded 34.54% of patients using ventilators. Patients on ventilators have an average of 40% have moderate pain and an average of 20% have severe pain. Phenomena in the ICU room from observations of patients who are attached to ventilators that patients experience pain when suctioning mucus, ETT treatment, and changing body position and wound care, thus making the patient uncomfortable. Of the several routine actions given to patients using ventilators, the most painful observation results and the most frequent actions are performed, especially in the act of suctioning mucus and changing body position, which are often performed on patients. This is in line with related theories and research journals such as research on Oshvandi et al., (2020).

Pain that is often experienced by critically ill patients, namely nociceptive pain, can be influenced by the patient's clinical condition, tracheal intubation or treatment such as analgesia (Ito et al., 2022). Nociceptive pain isprocessing of potentially harmful stimuli via a normally functioning nervous system. Nociceptive pain includes transduction, transmission, perception, and modulation (Kathryn L. McCance, 2019).

To find out the pain assessment score in critically ill patients using a ventilator requires a tool that is validated to detect non-verbal pain. According to Arroyo-Novoa et al., (2020), one of the pain observation tools for critical patients in the ICU using a ventilator is the Critical Care Pain Observation Tool (CPOT). The CPOT is used to assess the pain scale of patients on ventilators with assessments including facial expressions, body movements, compliance with the ventilator, muscle tension (Gelinas et al., 2021). Each of these behavioral responses has a categorical description that can be scored from 0 to 2, with a total score ranging from 0 to 8 (Arroyo-Novoa et al., 2020).

Providing nursing care to patients who use ventilators needs to pay attention to the patient's comfort which is carried out since the patient is attached to the ventilator, as is the case in dealing with patient pain problems. In nursing theory, namely comfort theory according to Katharine Kolcaba, providing comfort is a principle of nursing action aimed at achieving the comfort needs of care recipients, including physiological, social, cultural, economic, psychological, spiritual, environmental and physical interventions (Alligood, 2014). Comfort theory (Kolcaba, 2003) in Alligood (2014) states that there are 4 contexts of comfort, namely physical, psychospiritual, sociocultural, and environmental then juxtaposed withease, and transcendence, givetaxonomic structure (matrix) as a result of complex convenience.

Pain management in critical patients is as multidimensional as assessment, pain control can be pharmacological, non-pharmacological, or a combination of the two therapies (Urden et al., 2016). Pain relievers are generally divided into three categories: non-opioids, opioids, and adjuvant drugs (Harding, MM, & Kwong, J. 2020). In ICU patients, opioid drugs are the first-line drugs, this is important for relieving pain in ICU patients.

In research Warren et al., (2020) said that non-pharmacological interventions function as complementary therapies, can reduce dependence on opioids for pain management for example, massage and brief touch, guided imagery and visualization, music-based interventions, hot and cold therapy, relaxation exercises, and Reiki, have proven useful in treating pain. acute pain.

In PMK Number 26 of 2019 article 22 nurses can take complementary actions. Based on research Hartatic & Sari, (2021). Massage therapy has been used by people for thousands of years. Just like in research Momeni et al., (2020a), stated that massage therapy is one of the complementary therapies, the benefits of stimulating nerves, tactile receptors and sending nerve impulses to the brain, and can reduce blood pressure and heart rate of patients and make patients feel comfortable and relaxed.

Foot massage therapy according to Lindquist, (2018) strokes used in doing massage include effleurage, friction, pressure, petrissage, vibration, and percussion. According to Oshvandi et al., (2020) that according to the theory of pain control during stimulation the areas of the hands and feet have the highest concentration of mechanical receptors that block pain, therefore, these areas are often selected for appropriate and timely massage to maximize the effect. On research David & Sari, (2020) said that the benefits of foot massage can provide physical and mental relaxation, foot massage can cause vasomotor activity in the medulla, so that it can reduce peripheral resistance and stimulate parasympathetic nerves to reduce heart rate which can then increase cardiac output so as to make the delivery and use of oxygen by the tissues adequate .

Foot massage therapy at the Cengkareng Regional General Hospital has not been studied to treat patient pain using a ventilator.Nurses manage patient pain by providing nursing care, conducting assessments using observation sheets Critical Care Pain Observation Tool *(CPOT)*, intervene and carry out the implementation by providing analgesic therapy to reduce the patient's pain level so that the patient can get comfort by using a ventilator.

Research Methods

This research is a quantitative research, using a quasi experiment with pre-post test control group design. This research was conducted in the ICU room of Cengkareng Hospital, West Jakarta. The sample in this study were patients using a ventilator in the ICU Cengkareng Hospital. The intervention group consisted of 30 respondents and the control group consisted of 10 respondents using the consecutive sampling technique. The intervention group was given foot massage therapy performed 1x per day for 2 consecutive days with a duration of 20 minutes (10 minutes right leg and 10 minutes left leg). Providing foot massage with friction, tapotemant and effleurage techniques with left and right oblique positions (sim position) and supine position. The control group was only given analgesics, namely morphine injection. The data collection tool uses the CPOT observation sheet (Critical-Care Pain Observation Tool), which is recommended to assess

pain levels in patients on ventilators in the ICU. Statistical tests carried out were univariate tests, paired difference tests, independent different tests and multivariate tests with nominal logistic regression tests, using SPSS.

Results and Discussions

The results in the study were presented in the results of univariate test, paired difference test, independent difference test and multivariate test. The results of the analysis of respondent characteristics describe the distribution of respondents based on age, gender, mucus suction and changes in body position which are confounding factors in this study.

Table 1. Frequency Distribution of Respondents age, gender, act of suctioning mucus, changes in position in the ICU Cengkareng Hospital in 2022

Variable		Group				Total	
		Control		Intervention			
		n	%	n	%	n	%
Age	17-25 years	2	5.0	1	2,5	3	7,5
	26-35 years	1	2,5	4	10.0	5	12.5
	36-45 years	0	0	4	10.0	4	10.0
	46-55 years	2	5.0	10	25.0	12	30.0
	56-65 years	3	7,5	8	20.0	11	27.5
	> 66 years	2	5.0	3	7,5	5	12.5
Gender	Man	6	15.0	17	42.5	23	57.5
	Woman	4	10.0	13	32.5	17	42.5
Mucus suction	Are not done	6	15.0	8	20.0	14	35.0
	Done	4	10.0	22	55.0	26	65.0
Position change	Are not done	6	15.0	1	2,5	7	17.5
	Done	4	10.0	29	72.5	33	82.5

Source: Primary Data 2022

Table 1. shows that the characteristics of the intervention group for the majority of respondents were based on age in the age range 46-55 years, namely 10 respondents (25%), male sex 17 respondents (42.5%), 22 respondents (55%) were sucked), 29 respondents (72.5%) changed their body position. Whereas in the control group the majority of respondents based on age between 46-65 years were 2 respondents (5%), male sex, namely 6 respondents (15%), suctioning of mucus was carried out by 4 respondents (10%), the majority did not change position body 4 (10 %).

Table 2. Differences in pre-test and post-test pain levels in the intervention group in patients with ventilators in the ICU room at Cengkareng Hospital in 2022

Pain Level		N	P-values
Pre 1 Pain	Negative	14a	
Pre 2 pain	Ranks		0.001
	Positive Ranks	1b	
	ties	15c	

	Total	30	
Post pain 1	Negative	10d	
Post pain 2	Ranks		
	Positive Ranks	1e	0.007
	ties	19f	
	Total	30	

Source: Primary Data 2022

Based on table 2 above, it can be explained that the results of the pre-test pain level on day 1 and day 2, namely the P value of 0.001 and the results of the post test pain level on day 1 and day 2, namely the P value of 0.007, means that there is a difference in pain level between the pre test and post test in the intervention group.

Table 3. Differences in pain levels after foot massage in the intervention group and administration of analgesics in the control group in patients with ventilators in the ICU room of Cengkareng Hospital in 2022

Group	N	Pain level	P-values
intervention group	30	16.80	
control group	10	31.73	0.000

Source: Primary Data 2022

Based on table 3 above, it can be explained that the pain level was lower in the intervention group (16.80) compared to the control group (31.73), with a P value of 0.000 (<0.05). This means that there is a difference in the level of pain after foot massage in the intervention group and administration of analgesics in the control group in patients with ventilators.

Table 4. The effect of suctioning mucus and partially changing body position on reducing pain levels in patients with ventilators in the ICU room at Cengkareng Hospital in 2022

Variable	N	P-Value	Exp (B)
Mucus suction			
Are not done	14	0.003	9,900
Done	26		
Position change		0.008	22,286
Are not done	7		
Done	33	0.008	
			22,286

Source: Primary Data 2022

Based on table 4. above, it can be explained the effect of suctioning mucus on reducing pain intensity where there is an effect of suctioning mucus on pain intensity in

both the intervention and control groups, where a p-value of 0.003 (<0.05) is obtained, the effect of changing position on decreasing intensity pain where there is an effect of changing position on pain intensity in both the intervention and control groups, where a p-value of 0.008 (<0.05) is obtained.

Table 5. Results of Nominal Logistic Regression Test Analysis of Foot Massage Variables, Gender, Age, Mucus Sucking, Changes in Position, on Pain Intensity of Ventilator Patients at Cengkareng Hospital 2022

Variable	B	OR	p-value
foot massage	3,674	39,416	0.028
Gender	0.076	1,079	0.952
Age	0.902	2,465	0.094
Mucus suction	2,476	11,889	0.056
Position Change	2,740	15,482	0.162

Source: Primary Data 2022

Based on the analysis from table 5 it can be explained that the variables gender, age, change of position have a p value > 0.05 so they cannot be included in multivariate modeling. However, these four variables are substantially important in influencing pain intensity, so these variables are included in the multivariate modeling. Meanwhile, foot massage therapy (group) has a p value 0.028 (<0.05), which means that foot massage therapy has an effect on pain intensity, so it is included in the modeling. The second step is to determine the logistic regression modeling. This was done by means of logistic regression analysis which was performed on the variables of foot massage therapy (group), mucus suction, position change, gender, and age. A variable is said to be valid if it has a p value <0.05.

Table. 6 Results of Nominal Logistic Regression Test Analysis on group variables, mucus suction, on pain intensity of ventilator patients at the Cengkareng Hospital in 2022

Variable	B	OR	p-value	Nagelkerke R Square
foot massage	4,421	83,159	0.002	0.745
Mucus suction	2,716	15,118	0.025	

Source: Primary Data 2022

Based on the table above, it shows that after 15 foot massages were carried out in simultaneous mucus suctioning, a decrease in pain was obtained by 0.745 compared to respondents who did not perform foot massage with a p-value of 0.025. Then the F table and F count tests are carried out to conclude that the hypothesis is accepted or not with the condition that F count: F table = 1. In this study the results of a comparison of F count with F table = 2.3 are obtained, so it can be concluded that there is an effect of foot massage on reduction in pain levels in respondents who performed mucus suctioning.

DISCUSSION

The results of the effect of foot massage on pain with a ventilator at Cengkareng Hospital in 2022 were obtained for the most age factor in the age range 46-55 years, the majority of 12 respondents (30%) and the average age of patients using ventilators in this study > 46 years, namely 28 respondents (70.0%). According to Mulyani, et al (2019) in Purnawan Iwan et al's research (2020), that at this age it is vulnerable to experiencing various health problems. According to the researchers in this study there is a relationship between age and patients being treated in the ICU and using ventilators because disease factors contribute to the age factor. The average age is > 46 years in patients treated in the ICU such as neurological disorders, DM, heart, kidney which require intensive care. This is in accordance with the theory according to Potter & Perry (2020), that between the ages of 40 and 65 years there are physiological changes, diseases and acute conditions require a longer recovery period because the healing process slows down and is more likely to become a chronic condition, stress levels also increase because they balance work-related responsibilities, family life, care of children, and care of aging parents while in recovery.

In terms of gender, the majority were men in the intervention group with 17 respondents (42.5%) and the control group with 6 respondents (15.0%). The results of this study are in line with the research of Momeni, M. et al., (2020), and Oshvandi.et al., (2020), on average the majority of respondents are male. According to research by Purnawan Iwan et al, (2020) that the majority of men are treated in the ICU room can be associated with certain types of diseases such as coronary heart disease where men suffer more.

Characteristics of mucus suctioning in the intervention group was performed by suctioning of mucus by 22 respondents (55.0%), and in the control group by suctioning of mucus by 6 respondents (10%). According to the researchers, patients treated in the ICU using a ventilator must often be suctioned with mucus because to maintain the patient's airway patency so that oxygenation needs are met and saturation is achieved> 95%. This is in accordance with the theory of Kathleen M. Stacy, (2021) in Linda et al., (2021) which states that suctioning of mucus is often necessary to maintain a patent airway in patients with endotracheal or tracheostomy. Mucus suctioning is a sterile procedure performed only when the patient needs it and not on a regular schedule. Indications for suctioning mucus are coughing, discharge in the airway, respiratory distress, crackles on auscultation, increased peak airway pressure on the ventilator, and decreased oxygen saturation. Characteristics of changes in body position for the intervention group was carried out by 29 respondents (72.5%), and for the control group, changes in body position were carried out by 4 (10%). According to the researchers, changes in body position in patients using ventilators must often be done by changing the supine position, left side and right side according to the patient's disease condition, except for patients with contraindicated side positions. This is in line with the theory of Kathleen M. Stacy (2016) in Linda et al., (2016) stated that body position change therapy can improve oxygenation through ventilation adjustments with better perfusion and to prevent pulmonary complications associated with bed rest and mechanical ventilation (ventilators). Position change therapy can also reduce the incidence of VAP.

Differences in pre-test and post-test pain levels in the intervention group in patients with ventilators

The statistical test results for differences in pain levels showed that the pre test P value was 0.001 (<0.05), the post test P value was 0.007 (<0.05), meaning that there were differences in pre test and post test in the intervention group in patients with put on a ventilator. The results of these data indicate that foot massage therapy has an effect on reducing pain intensity in patients on ventilators. This is in accordance with the theory which explains that massage therapy can provide physical effects such as stimulation of nociceptive receptors to the CNS which can be inhibited, activating large A-Beta fibers in the periphery, which are caused by the effects of touch and pressure during foot massage (Linda. et al., 2016). Physical impact can then have a calming effect, increasing the ability to rest and heal due to a decrease in pain intensity in patients, this is in line with the results of research by Kukimoto et al., (2017) and research by Oshvandi et al., (2020). According to Alameri Rana et al., (2020), the hypothetical mechanism where *massage* produce comfort guided by Melzack's theory of pain (Gate Control Theory). Massage inhibits the transmission of anxious stimuli by blocking the flow of nerve impulses from the peripheral nerves to the spinal cord, a process known as gate closing (Melzack, 1987; Melzack & Casey, 1968; Melzack & Katz, 2013 Stimulation of large diameter fibers through rubbing and massage inhibits small-diameter fibers transmit pain signals (Fritz, Chaitow, & Hymel, 2008; Melzack & Casey, 1968) and increase the release of relaxation hormones, beta endorphins, serotonin, dopamine, and enkephalins, and reduce cortisol secretion. pain by modulating the transmission of pain impulses in the central nervous system. Assessing the patient's pain level in this study, the pre-test and post-test were carried out by foot massage and analgesic administration using the CPOT observation sheet. Assessment begins with the value of calm, assessment of the act of sucking mucus and changes in body position. Then the result set is the result of the highest score of all actions.

Differences in pain levels after foot massage in the intervention group and administration of analgesics in the control group in patients with ventilators

Based on the results of the study it can be explained that the pain level after foot massage in the intervention group was smaller (16.80) compared to the control group (31.73), the results of the statistical test were P value 0.000 (<0.05). This means that there is a difference in the level of pain after foot massage in the intervention group and administration of analgesics in the control group in patients with ventilators. This study is in accordance with the theory that giving foo massage can reduce pain intensity in patients using ventilators. Foot massage is given with the movement techniques of friction, tapotement, effleurage, according to Fritz's theory, (2015). To reduce the patient's pain level, non-pharmacological (complementary) therapy is needed in addition to pharmacological therapy. Giving foot massage begins with a frictional motion by pressing gently while rotating in a spiral shape with the aim of breaking down excess lactic acid due to muscle tension, tapotament with a tapping/punching motion with the aim of stimulating and moving the body's stressed muscles and increasing blood circulation as well as helping to facilitate the release of toxins from tissues, effleurage with cetripetal rubbing movements towards the heart aims to increase blood circulation and increase relaxation (Fritz, 2015). According to the researchers, giving foot massage can reduce pain in patients using ventilators, so that the results of the post-test intervention of providing foot massage intervention decrease pain intensity. From the results of

observations of respondents, they said that after getting a foot massage, they felt less pain when suctioning of mucus was performed and changes in body position, patients felt more comfortable, and their ability to rest increased. This is in line with Alligood's theory of comfort. (2014), Kolcaba's theory explains that comfort is the status expressed or felt by recipients of the comfort intervention they get. It is a holistic experience and provides strength when one needs comfort. The type of comfort according to Kolcaba is relief: in this case the patient's sense of comfort is fulfilled, subsides: in this case the patient feels calm and satisfied after being given a foot massage, transcendence: in this case the situation where the patient can overcome the problem of pain that is felt during the procedural action. In research (Rustam et al., 2021) said it was important to provide greater comfort to patients on ventilators which could reduce the need for sedation. According to the researchers in this study, by providing foot massage interventions, the hope is that the patient's comfort needs are met.

The effect of suctioning mucus and changing body position partially on reducing pain levels in patients on ventilators

The results of this study explain the effect of mucus suction on reducing pain levels where there was a decrease of 26 respondents (65%). This explains that there is an effect of suctioning of mucus on the level of pain, the results of the statistical test have a P-value of 0.003 (<0.05). Patients who are on a ventilator at rest or during routine procedures will experience pain regularly (Thikom et al., 2021). One of the procedures that often involves suctioning of mucus is by suctioning through the endotracheal and through the mouth causing considerable pain for the patient, this is in line with the research of Waladani et al., (2021).

The results of the research on the effect of changes in body position on reducing pain intensity explained that there was a decrease in pain by 33 respondents (82.50%). The results of further analysis explained that there was an effect of changing position on pain intensity, the results of the statistical test were P-value 0.008 (<0.05). This is in line with the research of Oshvandi et al., (2020) after foot massage was carried out and then changes in body position showed a significant difference in results between the average pain intensity after changing position and the results of the study with a p-value of 0.001. Changing the patient's position is considered a major treatment measure, especially in the intensive care unit which is carried out routinely and periodically on average every two hours (Jalali Amir et al., 2022).

According to the researchers, after the patient gets a foot massage, it provides relaxation to the patient so that when the mucus suction is performed and changes in body position, the post test pain score does not increase or stay the same from the pre test pain score. This was conveyed by the patient during observation, the patient said the pain was reduced after getting a foot massage. From the results of the pain score, the average pain score decreased by 1 to 2 points after doing foot massage.

Results of Analysis of Nominal Logistic Regression Test on group variables, mucus suction, on pain intensity of ventilator patients at Cengkareng Hospital 2022

Simultaneous effect, where all factors (age, gender, mucus suction, changes in body position, foot massage therapy and analgesic therapy) have an effect on reducing pain levels in patients on ventilators in the ICU room of Cengkareng Hospital.

From the research it was found that the respondents who had the action of suctioning mucus and getting the action of foot massage would experience a decrease in pain by 83 times higher than the respondents who did not have action of foot massage, with a p-value of 0.002 meaning that the respondent was attached to a ventilator with action of suctioning mucus and done foot massage has 4x reduction in pain levels.

According to the researchers, the decrease in pain was higher in the action of suctioning mucus with ventilator patients after receiving foot massage therapy because when the massage was performed, the pain felt by the patient scored higher. The results of direct observation to patients, that the act of suctioning mucus is the most painful of the other procedures, with moderate to severe pain scores. After getting foot massage therapy combined with administering analgesic therapy it has a calming and relaxing effect on the patient so that the pain score drops 1 to 2 points. According to Kathleen M. Stacy's theory, (2021) in Linda et al., (2021) states that mucus suction is often necessary to maintain a patent airway in patients with endotracheal tubes or tracheostomy tubes. Mucus suctioning is a sterile procedure performed only when the patient needs it and not on a regular schedule. Indications for suctioning mucus are coughing, secretions in the airway, respiratory distress, crackles on auscultation, increased peak airway pressure on the ventilator, and decreased oxygen saturation. Because mucus suctioning is often done to maintain airway patency, patients need non-pharmacological and pharmacological therapies to fulfill the patient's comfort needs.

Conclusion

Based on the results of research on the effect of foot massage relaxation techniques on reducing pain levels in patients on ventilators at Cengkareng Hospital, the variable studied that most dominantly influences pain in patients on ventilators is the variable suctioning of mucus with a statistical test result of p value 0.025. Mucus suctioning is the most frequently performed and most painful procedure for patients on ventilators, but the pain score can decrease after foot massage. It is expected that nurses are able to provide complementary therapy to provide patient comfort while being treated in the ICU by using a ventilator, one of which is by providing foot massage therapy. Nurses are able to apply Kolcaba nursing theory to increase patient comfort while being treated.

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