

# Potential Sauna Bath and Eucalyptus Aromatherapy on Reducing Fatigue and Lactic Acid in Corona Virus Disease (COVID-19) Nurses

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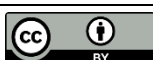
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## Abstract

**Background:** A high workload requires a lot of energy, so upgrading lactic acid raises fatigue. Complementary therapy was done to reduce fatigue and rate lactic acid. **Objective:** This study aims to analyze the potential action combination of bathing in a sauna and aromatherapy of eucalyptus to manage fatigue reduction and improve lactic acid levels among nurses with covid-19. **Method:** A quasi-experiment, pre-test, and post-test with a non-equivalent control group was applied in this study. Twenty-six nurses were selected using a purposive sampling technique. The intervention group received a combination bath, a sauna, and aromatherapy eucalyptus for 15 minutes and restful sleep at night for 8 hours. Whereas group control only rested at night for 8 hours. **Result:** The results showed a significant difference among interventions on fatigue ( $p=0.000$ ) and lactic acid ( $p=0.000$ ). The Cohen score of calculation of the results calculates the total sample and mean $\pm$ sd in the intervention group. The control group used an effect size calculator for the t-test. Variable fatigue values were obtained, with the value of Cohen's d effect in the medium effect size category, namely 0.32. Whereas, variable lactic acid got a score of Cohen's d effect 0.74, which shows the impact which sizes strong. **Conclusion:** The conclusion confirmed that a combination between sauna bathing and eucalyptus aromatherapy could affect fatigue and acid-level lactate among nurses with covid-19. **Recommendation:** Nursing interventions combining sauna bathing and eucalyptus aromatherapy could be used as a complementary therapy that could be applied at health centers or other health services to overcome fatigue and decrease lactic acid levels in coronavirus disease (covid-19). Further research needs to add the duration of the intervention to test the effectiveness of the intervention in reducing fatigue and levels of lactic acid.

**Keywords:** sauna bath, eucalyptus aromatherapy, fatigue, lactic acid



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## INTRODUCTION

The coronavirus disease - 19 was a massive infection which more than 38 million people worldwide in less than one year. On January 30th, 2020, they determined the public health emergency of international concern (PHEIC) event. On the date, March 11th, 2020, as covid-19 pandemic (1).

Covid-19 has a high transmission rate. Therefore, it is necessary to carry out comprehensive public health protection efforts. During the covid-19 pandemic, the government of Indonesia carried out various activities and efforts to use disconnect chain deployment covid-19. However, the policies provided by the government were only partially addressed with good by some societies. Thereby the spike occurred in cases of exposure to covid-19.

Based on data from the national agency for Mitigation, the Indonesian disaster in June 2021 saw a point in confirmed cases reaching 2,093,962. Temporary data case confirmation in the province central of Java was 244,241 cases(2).

The demand for health workers was high, providing health protection to the community to prevent transmission on a large scale. This condition was a massive burden on healthcare facilities. Health workers were required to provide priority services by considering the benefits and risks among nurses. Health workers should complete personal protective equipment, accompanied by the threats of danger because of frequent closed interactions with patients with Covid-19 (3).

A nurse was an influential front-line professional in handling emergencies and the consequences covid- 19. In addition, nurses also have a high risk of infection during conveying community awareness about disease prevention and reducing the spreading plague covid-19 (4).

Working with Covid conditions requires too much energy, which breaks down glycogen. If the physical load exceeds, improve oxygen intake to the muscles. Lactic acid with water also accumulates in the muscles, making them swollen and difficult to contract. This would cause symptoms flavor tired(5).

Two hospitals in Wuhan, China, conducted a study. The results showed that the front-line nurse had experienced various mental challenges, especially burnout, and fright. It was needed for attention and support from policymakers. The intervention was required to upgrade mental health during a pandemic(6).

Another study investigated mental health and staff burnout among front-line nurses to combat against covid-19. This study found that fatigue was highly correlated with depression and worry. Fatigue was the reason for the urgent decreased quality of life. This condition impacts health mentally and causes fatigue among front-line nurses during a pandemic. The best practical methods are needed immediately to improve mental health and fatigue on the front line(7).

A sauna bath is one strategy to reduce fatigue for improving physiological responses. A sauna bath was often used for relaxation, cleansing, pleasure, and stress released to improve the modulation activity system nerve hormonal and autonomous(8).

Sauna baths also enhance oxidative balance/antioxidants. It also improves nitric oxide production, which impacts the relaxation process, blood vessels, and blood flow(9). This therapy alternative also evaporates concentration extracted from a plant to boost physical, mental, and emotional (10). Plant eucalyptus could extract the essential oil. Its antimicrobial, antifungal, and anti-diabetic properties have been demonstrated as a herbal tea. It also has antioxidant properties and overcomes fatigue(11).

A study conducted by keiko amano et al. showed that waon therapy (sauna) significantly affects physical against chronic fatigue syndrome (CFS) and myalgic encephalomyelitis (me) (12). Another study also showed the positive effect of waon (sauna) on chronic syndrome fatigue after therapy (13).

The benefit pharmacological of leaf eucalyptus also confirmed that eucalyptus aromatherapy contains 1,8-cineole (eucalyptol), an antioxidant, anti-inflammatory, and anti-fatigue(11).

Ministry of the Health of the Republic of Indonesia, number hk. 01.

07/Menkes/413/2020 released the guidelines for preventing and controlling coronavirus disease (covid-19) in chapter VI. It has consisted of prevention and management strategies to improve the transmission of covid-19, including a clean and healthy lifestyle. They must bathe among health care workers after traveling for the community and treating patients. In addition, they recommend soaking as a complementary traditional health to increase endurance, decrease appetite, and solve insomnia and stress(14, 15).

The nursing complementary branch also recommends applying non-conventional treatment to address upgrading the level of health public to improve promotive, preventive, curative, and rehabilitative programs, which is supportive therapy for controlling symptoms, improving quality of life, and contributing to the management of a patient in a manner whole based on evidence-based. Model philosophy holistic and care (caring) in gift therapy complementary became aspect urgent in care. Nurse self alone was even more important in health care, where it was trained by nurses and professional health others (16).

## **OBJECTIVE**

This research aims to analyze the potential difference action combination between bathing sauna and eucalyptus aromatherapy, which could be used as a therapy complementary to fatigue reduction and rate sour lactate in nurses with coronavirus disease ( covid-19 ).

## **METHOD**

This study used a quasi-experiment design with a non-equivalent controlled group. The researchers divided into two groups, namely the intervention group, which received a combination of sauna bath and eucalyptus aromatherapy within 15 minutes after the end of service hours accompanied by 8 hours of sleep at night, while the group controlled gave a night's sleep rested for 8 hours.

The level of fatigue was measured using the unimma questionnaire worked fatigue instrument (UWFI)(17). The lactic acid levels

used checked instrument was carried out after working hours ended before intervention was given (pre-test in both groups) and checked again at h + 1 before service hours began (post-test in both groups).

This study included nurses who treat coronavirus disease (covid-19) patients. Samples were taken using a purposive sampling technique, following the inclusion and exclusion criteria. A total of 26 respondents who were relevant to this study were involved.

In this study, researchers collected data by observing, identifying, interviewing, and filling out observation sheets. The collected data were analyzed through a computer device. We analyzed the data using the paired t-test and independent t-test to determine the mean difference before and after receiving the intervention in the experimental and controlled groups.

## **RESULT**

### **Characteristics of respondents**

Table 1 shows that the intervention or control group typed sex was women (76. 9%) and (69. 2%). The education level in the intervention group (84.6%) and control group was Diploma level (92. 3%). Most civil servants (61. 5%) were in the intervention group, whereas in the control group, 76.9%. The duration of dealing with covid in the intervention group was 25.92 months, and the control group was 33. 31.

**The mean difference in fatigue before and after treatment between the intervention and control group**

Table 2 shows the mean difference in fatigue between the experimental and control groups. There was a significant difference in decreasing the fatigue level before and after the treatment between the experimental and control groups, with a p-value <0.05.

Group	Variable Lactic Acid			P*
	Pre-test	Post-Test	Delta	
Intervention	Mean±SD	Mean±SD		
	1.9846 ± 0.29957	1.5000 ± 0.21985	-0.4846 ± 0.25115	0.000
Control	Mean±SD	Mean±SD		
	1.9692 ± 0.22871	1.6769 ± 0.26190	-0.2923 ± 0.22159	0.001

**The mean difference in fatigue before and after treatment between the intervention and control group**

Table 3 shows the mean difference in lactate between the experimental and control groups. The findings showed a significant difference in the average lactic acid values before and after treatment in the experimental and control groups with a p-value <0.05

**Table 3 Mean difference of fatigue before and after treatment between intervention and control group**

Group	Variable Fatigue			P*
	Pre-test	Post-Test	Delta	
Intervention	Mean±SD	Mean±SD		
	12.92 ± 3.121	9.77 ± 2.891	-3.15 ± 0.689	0.000
Control	Mean±SD	Mean±SD		
	11.54 ± 2.570	10.85 ± 1.819	-0.69 ± 1.316	0.082

\*Paired t-test

**The mean difference of pre-lactid and post lactid in both intervention and control group**

Table 4 shows the two groups equally decreased. Still, the intervention group experienced a decrease in the average value of fatigue higher than the group control, which is as big as -3.15. In the group, the control difference declined only as significantly as -0.69.

characteristic	Intervention		Control		P
	N	%	N	%	
<b>Type sex</b>					
Woman	10	76.9	9	69.2	0.402
Man	3	23.1	4	30.2	
<b>Total</b>	13	100	13	100	
<b>Education</b>					
Postgraduate	0	0	0	0	0.235
News	2	15.4	1	7.7	
Diploma	11	84.6	12	92.3	
<b>Total</b>	13	100	13	100	
<b>Profession</b>					
Civil Servant	8	61.5	10	76.9	0.118
Contract worker	5	38.5	3	23.1	
Volunteer	0	0	0	0	
<b>Total</b>	13	100	13	100	
<b>Long handle Covid (Month)</b>	12.15 ± 0.555		11.62 ± 1.193		0.065
(Mean±SD)					
<b>Age</b>	29.92 ± 4.310		33.31 ± 2.780		0.401
(Mean±SD)					

**Table 4. The mean difference of pre-lactid and post lactid in both intervention and control group**

Variable	Intervention Group	Control Group	P*
	Mean±SD	Mean±SD	
Pre-lactic acid	1.9846 ± 0.29957	1.9692 ± 0.22871	0.884
Post-lactic acid	1.5000 ± 0.21985	1.6769 ± 0.26190	0.074
Δ post-pre	-0.4846 ± 0.25115	-0.2923 ± 0.22159	0.049

**Table 5 Differences in the average fatigue value before and after treatment between groups intervention and group control.**

Variable	Intervention Group	Control Group	P*
	Mean±SD	Mean±SD	
Pre-Fatigue	12.92 ± 3.121	11.54 ± 2.70	0.229
Post-Fatigue	9.77 ± 2.891	10.85 ± 1.819	0.267
Δ post-pre	-3.15 ± 0.689	-0.69 ± 1.316	0.000

\*Independent t-test

### Differences in mean lactic acid values between the intervention group and group controlled

Table 5 shows the group's intervention experienced a decline in an average mark of more excellent acidity than the control group, namely - 0. 4846. Meanwhile, n, on groups, controlled for the difference in the average decrease lactic acid value was only -0. 2923. Delta values statistical test results between the intervention and control groups obtained p valued = 0. 049, which means there was a significant difference in the mean acid-valued lactate between group intervention and group controlled.

### Effect size fatigue and lactic acid values in the intervention group and control

The value of the effect size in the intervention and control groups can be seen in the table in lowered this.

**Table 6 Effect size of fatigue and lactic acid values in groups intervention and control**

Variable	Sample	Mean±SD	Cohen , defect
Fatigue (Intervension)	13	9. 77 ± 2. 891	0. 32
Fatigue (Control)	13	10. 85 ± 1. 819	
Lactic Acid (Intervention)	13	1. 500 ± 0. 2198	0. 74
Lactic Acid (Control)	13	1. 677 ± 0. 2619	

The score of Cohen's d effect in the calculation of the results by calculating the total sample and mean±sd in the intervention group and the controlled group used an effect size calculator for t-test, fatigue variable values obtained, with the valued of Cohen's d effect in medium effect size category namely 0. 32. Whereas, on variable lactic acid received a score of Cohen's d effect 0. 74 which shows the impact which sizes strong.

## DISCUSSION

### The potential of sauna baths and eucalyptus aromatherapy against fatigue on nurse coronas virus disease (covid-19)

The study used a combination of bathe a sauna and eucalyptus aromatherapy dripped in stainless steel liners to give 15 minutes for overcoming fatigue nurses treating coronavirus disease (covid-19).

The results of the paired t-test test showed that the combination of sauna baths and eucalyptus aromatherapy could reduce fatigue in coronavirus disease nurses ( covid-19 ). From the independent t-test, the delta value was obtained p= 0. 000, which means there was a difference which significant mark exhausted on nurse corona a virus disease (covid-19) good on group intervention nor group controlled.

The study's results showed a decrease in the average fatigue value on the group experiment pre-test as extensive 12. 92 categories tall. They decreased to 9. 77 in the moderate category (post-test). The control group had an average pre-test fatigue score of 11. 54 in the high category, which decreased to 10. 85 and remained in the high category (post-tests). Both groups experienced a decrease in the experimental group difference in the reduction of -3. 15 with an effect size = 0. 30 in the medium category.

However, regarding the difference in decline, the intervention group experienced a much higher reduction than the control group, where the difference in reduction was only -0. 69. In the group's experiment, leveled fatigue nurses from the fatigue category leveled tall decreased became category fatigue on the leveled currently.

However, on group controlled, good moment pre-test or post-test, category leveled fatigue nurse permanent was at on category balanced fatigue tall. So, this could prove that bathing in a sauna and eucalyptus aromatherapy effectively reduced fatigue nurse coronas virus disease ( covid-19 ).

A sauna bath is a type of water therapy in which a person bathes in a warm steam room specially designed. The steam was from the water heated to evaporate and was pumped into a closed room to create hot wet(18, 19); however, in the study, this steam originates from mixing water, which dripped aroma therapy eucalyptus. Aromatherapy is a complementary medicine therapy that could

be used as a treatment alternative or modality which originates from extracted plant aromatic pure form plant fluids which quickly evaporate, as well as aromatic compound others from a plant(20).

Treatment is complementary to aroma therapy, which uses essential oils extracted from plants and is considered capable of reducing until it overcomes psychological distractions and disturbances like fatigue. The wrong type of plant which could be used in extraction became aromatherapy. Functions of the left eucalyptus, traditionally used for treating asthma and bronchitis, have been demonstrated as tea herbal, antimicrobial, antifungal, and anti-diabetic properties. Besides, this also has character antioxidants and resolves fatigue (11).

Elementary from aroma therapy was oil, a substance active chemically with a long history of safe and traditional use in a manner evidence base that developed to support aroma therapy's use in world health. Aroma therapy could be given in several ways: soaking, massaging, compressing, and inhaling or inhaling. These four ways of using aromatherapy were the most accessible and most efficient with aroma therapy inhalation(21).

In the study, this aroma therapy was also intervention nursing non-invasive for reducing fatigue in a nurse who handles coronas virus disease ( covid-19 ) and used aromatherapy eucalyptus dripped when given the sauna. Hence, it produces vapor and can be inhaled. Aromatherapy was used through inhalation, or inhalation would enter the limbic system, where it would later be processed so that smell essential oil could smell.

The limbic system constitutes a set of brain structures, including the hippocampus, amygdala, nucleus anterior thalamic, septum, limbic cortex, and fornix. The limbic system was located in the middle of the brain, wrapping the stem brain to distinguish it from external brain mapping. The limbic system is more responsible for various psychological functions of the brain, including emotion, behavior, and long-term memory. It could stimulate the physiological response of

nerves, endocrine or the immune system, which affects the pulsing heart, blood pressure, breathing, brain wave activity, and the release of various hormones all over the body, one of them is hormones the hormone endorphins which caused the respondent to felt relaxed and comfortable so that they changed feeling respondent became no felt fatigue. When fatigue decreases, respondents could enhance their daily activity (13, 20, 21).

It was supported by research conducted by Harini, 2021 shows that steam baths with Indonesian spices with a therapy time of 15 minutes for 30 respondents who were exposed to covid were effective in increasing the effect of relaxation, reducing the level of stress, and increasing body immunity so the body no exposed virus covid-19 with mark  $p < 0.005$ .(22)

Auliasari (2020) stated that aromatherapy was, by inhalation, able to reduce the level of fatigue in patients with renal failure undergoing therapy hemodialysis compared to action non-pharmacology other. In conclusion, the side effects of hemodialysis therapy could be significantly reduced in pharmacology or non-pharmacological, wrong only one with aroma therapy with a value of  $p = 0.000$ .

It was indicated that there is a positive effect of aromatherapy on fatigue levels (fatigue) in patients who fail kidney which undergoes therapy hemodialysis(21).

A study conducted by Khairunisa (2020) based on the results of statistical tests used a nonparametric test, Wilcoxon, obtained a p-value = 0.000, which shows that there was an effect of giving aromatherapy to decline caregiver fatigue clients with stroke(23).

### **Effect of bathing sauna and aromatherapy eucalyptus to lactate acid on nurse coronas virus disease ( covid-19 )**

The study results showed that a combination of bathes a sauna and aroma therapy eucalyptus potentially lowered lactate acid in coronavirus disease (covid-19 ) nurses, with the results of the paired t-test obtained p valued = 0.000 and the independent t-test results obtained  $p = 0.049$ , which means there was a significant difference

in the value of lactic acid on nurse coronas virus disease (covid-19) good on group intervention and group controlled

The results of the study before and after giving the combination treatment sauna bath and eucalyptus aromatherapy during 15 minutes on groups intervention obtained mark average decline in sour lactate from pre-test as big 1. 9846 high levels to 1. 500 (post-test) normal levels with a difference a decrease of -0. 4846. In the controlled group, the average value of lactic acid experienced a reduction from 1. 9692 high levels (pre-test) to 1. 6769 levels remaining high (post-test) with a decrease difference of -0. 2923. In terms of decrease difference, the intervention group experienced a more significant difference in reduction tall with mark effect sizes 0. 74, which included in category strong, than the control group. On group intervention, an average decline of lactate acid was in the normal category, compared to the group controlled, which still needed to be included in the average category of normal lactic acid values. So, it could be proven that the combination of sauna baths and aromatherapy eucalyptus effectively lowered sour lactate in a nurse handling a coronas virus disease (covid-19).

Bathe sauna, which dripped aromatherapy eucalyptus, could give affect relaxation. Besides that, several studies showed that bathing sauna could cause substantial physiological effects. The heat exposure period was short, which intensely increases the temperature skin and temperature core body and enables tracking thermoregulation through the hypothalamus for facilitating temperature homeostasis through sweating, generating evaporation from surface skin, and earning cooling(24, 25).

Bathe steam would raise circulation peripheral  $5 \pm 10\%$  by widening the vessel's blood (vasodilation). 4 8 Matter occurs because the skin receives the ambient temperature heat as a stimulus hot to the center settings temperature body, the hypothalamus. Hip o thalamus continued by nerve efferent and until a produced response from vasodilation. Changes in blood vessel

size were regulated by the vasomotor center on the medulla oblongata from the stalk of the brain, under the influence hypothalamic part anterior, so vasodilation occurs (22, 26).

Vasodilation could promote local blood circulation, upgrade muscle elasticity, and reduce spasms muscle. The enhancement in blood circulation would affect the smooth supply of oxygen bound by hemoglobin in the blood. Process this caused exists availability of oxygen in the blood so that subtraction of lactate acid as substance remainder metabolism which caused fatigue would the faster reduce because the presence of oxygen could help to recycle sour lactate became source energy through process cycle Krebs that changes sour lactate was converted to pyruvic acid and then converted into energy Krebs cycle. Thus, lactic acid was formed during the process of glycolysis.

Anaerobic no was lost from the body because when oxygen was available to return, lactic acid could be oxidized to form ATP or glucose and glycogen. The availability of energy backed by acid lactate would restore fatigue, impacting produced quality worked by respondents(27).

This was supported by research conducted by Wisnuaji (2017), which stated that giving treatment contrast bath was a practical effect on declining sour lactate in blood post-practice intensity maximum with mark  $p=0.000$ .(28)

## CONCLUSION

The combination of a sauna bath and eucalyptus aromatherapy for 15 minutes accompanied by sleeping for 8 hours at night shows a positive effect on fatigue levels and lactic acid among nurses with covid-19 between the intervention and control groups. Thereby, this therapy could reduce the level of fatigue in corona nurses with viral disease (covid-19)

## RECOMMENDATION

Nursing interventions combining sauna bathing and eucalyptus aromatherapy could be a complementary therapy applied at health centers or other health services to reduce fatigue and decrease lactic acid levels among

nurses with covid-19. This study could be used as a reference for further research by adding the duration for giving combination therapy to a combination of sauna bathing and eucalyptus aromatherapy so that results were obtained with reduced fatigue and higher levels of lactic acid.

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