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Effect of Aromatherapy on Physiological Parameters and Mechanical Ventilation Weaning Outcomes among Critically Ill Patients

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***Abstract: Background*: In the intensive care unit, weaning off of a mechanical ventilator is regarded as a critical issue. Critical Care Nurses play a crucial role in providing care to patients on mechanical ventilation by customizing various intervention. Aroma therapy using lavender essential oil is considered one of the complementary therapy and was reported to be effective in facilitating weaning process. *The aim of the study* was to assess the effect of aromatherapy on physiological parameters and mechanical ventilation weaning outcomes among critically ill Patients. *Design*: a quasi-experimental study. Setting: the study was carried out at general ICUs of Tanta University Emergency Hospital. *Subjects*: a purposive sample of 60 adult patients from both genders newly admitted attached with mechanical ventilator was involved in this study divided randomly into equal groups 30 patient for each group. *Data collection tool:* Integrated Nursing Practice & weaning trial assessment tool was used to collect data. *Results*: There was statistically significant difference between control and study groups from the start to the end of the study period regarding (HR, RR,SPO_2,SBP,DBP and fio_2). There was statically significant relation between aroma therapy using lavender oil and the mean values of GCS and duration of weaning from mechanical ventilation. *Conclusion:* It has been demonstrated that using lavender oil in aromatherapy can improve the outcomes for mechanically ventilated patients. It is linked to a notable improvement in oxygenation, mean arterial blood pressure, and vital signs. . *Recommendation:* this study recommends the importance of implementation of aroma therapy for mechanically ventilated patients. Also, in-service educational programs and workshops should be conducted to raise CCNs' awareness regarding the safe use of different types of the aroma therapy nursing practices using essential oils for mechanically ventilated patients.**

***Keywords:* Aromatherapy, Lavender oil, Mechanical ventilation, Weaning process.**

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1. INTRODUCTION

Around the world, critical illness affect around six million adults each year. A large number of these patients in the intensive care unit (ICU) need mechanical ventilation (MV) in order to preserve appropriate oxygenation and airway protection. MV is a major factor in the care of patients in critical conditions that is used to create better conditions for gas exchange at the alveolar surface and tissue through improvement and facilitating the entry and exit of the air. On the other hand, MV brings different experiences of physical and psychological stress for the patient as well. Thus, once the patient was put on MV, the plan of weaning must be considered ***(Ahmed, et al.,2023)***.

Aromatherapy is one of the treatments that has been used significantly more recently in most countries to treat critically ill patients when compared to other alternative medicine treatments. The State Board of America has now included this treatment in its list of holistic nursing practices regards mechanically ventilated patients. (**Avazah, Khosh Fetrat and Rahimi Bashar., 2019)**.

While a lot of claims have been made about the advantages of aromatherapy, the majority of studies have concentrated on its application in the treatment of pain, nausea, anxiety, melancholy, muscle tension, and sleep disturbance. According to recent research, aromatherapy using oil of lavender can immediately reduce pain and alter physiological parameters like blood pressure, heart rate, skin temperature, and brain activity. **(Mohammad pourhodki, et al., 2021)**.

Due to its quick skin absorption, lavender oil has dual uses in aromatherapy massage and inhalation therapy. It has been discovered that lavender oil has a significant impact on brain plasticity, well-being, and agitation suppression. ***(Allemeie., et al, 2017)***.

For critical care professionals, keeping mechanically ventilated patients as comfortable and safe as possible is a main objective.. Weaning from MV is an essential and universal element in the care of critically ill patients. Weaning covers the entire process of liberating the patient from mechanical support and from endotracheal tube. Successful weaning represents a great achievement in patient's critical course in the ICU. During this process, oxygen demand increases and the body must have the ability to sustain this demand. If the body failed to achieve balance between the oxygen demand and supply, ***weaning failure*** occurred **(Windisch, et al., 2020)**.

Complementary therapies are administered in addition to medical therapy in order to support care of patients and enhance their quality of life. Aromatherapy with lavender oil was found to have a direct effect in controlling or preventing intensive care-related complications including sleep disorder, pain and anxiety and also affect physiological parameters **(Cooke, et al., 2020)**.

Significance of the study

Recent studies in Egypt revealed that complimentary therapy using olfactory stimulation with essential oils produce positive outcomes for mechanically ventilated patients. Essential oils are non-invasive and simple to use and were chosen for this study based on their potential ability to reduce stress related complications. The results revealed that lavender oil caused significant effect on vital signs which indicated a decrease of autonomic arousal and moreever facilitated weaning process **(Mohamed,et al 2019)**.

2. AIM OF THE STUDY

This study was aimed to evaluate the effect of aromatherapy on physiologic parameters and mechanical ventilation weaning outcomes among critically ill patients through:

1. Assessing studied patients clinical data.
2. Implementing aroma therapy using lavender essential oil for mechanically ventilated patients.
3. Evaluating the physiological parameters and weaning outcomes for studied patients after aromatherapy.

Research Hypothesis

The mechanically ventilated patients who will be exposed to the aroma therapy will have less duration on mechanical ventilator and will achieve improvement in clinical outcomes than those patients whom will have routine care in the ICU.

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Research design:

A quasi-experimental research design was utilized in this study.

Study Setting:
This study was carried out at general ICUs of Tanta University Emergency Hospital (TUHICU). These ICUs are equipped with necessary equipment to meet the critically ill patients' needs. TUHICU consists of two main halls with eleven beds. It receives approximately 30 patients per month with multiple body system alteration.

Sampling:

A purposive sample of 60 adult patients from both genders newly admitted attached with MV was involved in this study, based on Epi-Info program .

Tools for data collection:

Data was collected using the following one tool:

Tool: Integrated Nursing Practice & weaning trial assessment

It was developed by the researcher after reviewing the relevant literature**(Pham et al., 2023)**.

Part I: **Patient's Demographic Characteristics and Clinical Data**

This part was used by the researcher to record patient's demographic and clinical data. Patients demographic data including (age and gender) and clinical data (diagnosis, days of MV before starting weaning trial, level of consciousness, initial ventilator parameters (mode, FiO_2, Vt, PEEP, PSV, f), number of weaning trials, and ABGs values on admission (PH, $PaCO_2$, PaO_2, HCo_3, SaO_2).

Part II: The Acute Physiology and Chronic Health Evaluation(APACHE II) Scoring System. It was used to select populaion acoording to their APACHE score **(Knaus., Draper., Wagner &Zimmerman.,1985).**

Part III: Hemodynamic Responses Recording during Intervention.

This part was developed by researcher based on related literature. It was used to record and follow up of changes in heamodynamic parameters in both groups. It included physiological responses as heart rate, rhythm, respiratory rate, SpO_2, systolic and diastolic blood pressure and body temperature **(Papathanassoglou & Park.,2016)** .

Part IV : weaning outcomes assessment: This part was developed by researcher based on related literature. It was used by the researcher to record the weaning outcomes. It included the weaning trial duration, weaning success and weaning failure **(Tejerina et al., 2022)**.

Operational Item:

It included preparatory phase, content validity and reliability, pilot study and field work.

A. Preparatory phase:

Prepare the study tool based on related literature review and develop the study tool and test its content validity and reliability.

Pilot study:
A pilot study was carried out on 6 patients (10% of the study subjects) in order to assess feasibility of the study and applicability of the tool. The necessary modifications was done accordingly**.**

Content validity:

Validity ascertained by a panel of experts in branch of critical care nursing, who review the tool for the format,layout, consistency, accuracy, and relevance**.**

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Tool Reliability:

Reliability tested statistically using the appropriate statistical tests to assure that the tools are reliable before data collection. The correlation coefficient was (0.885) which was good.

Field work:

- An informed consent was obtained from patient's legal guardians'. It included the aim of the study, potential benefits, risks and discomforts, associated with participation.

- Tool was developed after reviewing recent relevant literatures.

- To get their participation during the implementation phase, the researcher met and spoke with the nursing administration staff, outlining the goals and nature of the study.

- Recently admitted patients on mechanical ventilation who satisfied the inclusion criteria were divided into equal groups at random using the coin toss method. Data was collected over a period of six consecutive months. The data collection started at the beginning of December 2022 and was completed by May 2023. All the eligible patients was assigned to two studied groups. Those assigned to the control group received the conventional nursing care for mechanically ventilated patients provided by the CCNs (n = 30), while those in the study group received the aroma therapy(inhalation& massage therapy (n = 30).

- The clinical and demographic data for study patients was gathered from the patient chart and documented.

- Using study tool part I, the baseline measurement of ventilator parameters was collected on the first day of the study.

- Using tool part IV, the baseline data of LOC, vital signs, and weaning criteria were evaluated from the first day of the trial. The researcher observed the conventional nursing stimulation practices that may affect the patients' hemodynamic status using tool part III.

- The study group received aromatherapy massages for ninety minutes every day for four consecutive days. The patients in the study group received aromatherapy massage while lying in a lateral position. After administering 2% lavender essential oil, the patients' four limbs and back were stroked for five minutes. The patient was subsequently placed back in a comfortable posture after spending five minutes in a supine position. Physiological responses (HR and rhythm, SpO2, RR, BP, body temperature, and FiO2) were measured during intervention before and after weaning had been started.

- Weaning duration was recorded by hours from time of switching controlled mode of MV to assisted breathing until extubation or disconnection (if tracheostomy)

Ethical considerations:

An official permission to conduct the proposed study was obtained from the Scientific Research Ethics Committee faculty of nursing-helwan university. Participation in the study was voluntary and subjects relatives was given complete full information about the study and their role before signing the informed consent. The ethical considerations included explaining the purpose and nature of the study, stating the possibility to withdraw at any time, confidentiality of the information where it could not be accessed by any other party without taking permission of the participants. Ethics, values, culture and beliefs was respected.

III- Administrative Item:

After explanation of the study aim and objectives, an official permission was obtained from the Dean of faculty of nursing Helwan university and the general manager of Tanta University Hospital asking for cooperation and permission to conduct the study.

IV-Statistical Item:

Upon completion of data collection, data was computed and analyzed using Statistical Package for the Social Science (SPSS), version 24 for analysis. For quantitative data, numbers, percentage, mean, and standard deviation (SD) were used to describe the results. For qualitative data which describe categorical set of data by frequency, percentage of each category was calculated. The following statistical tests were used:

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1. Chi-square test was used for categorical variables to compare between different groups.
2. Fisher's Exact or Monte Carlo correction Monte Carlo correction: correction for chi-square when more than 20% of the cells have expected count less than 5.
3. Student t-test: for normally distributed quantitative variables, to compare between two studied groups.
4. Degrees of Significance of the results were:
5. Non-Significant (NS) if $p > 0.05$.
6. Significant (S) if $p < 0.05$.
7. High Significant (HS) if $p < 0.01$.

3. RESULTS

Table (1): Distribution of the studied groups according to demographic and clinical characteristics

	Control (n = 30)		Study (n = 30)		χ^2	P
	No.	%	No.	%		
Age						
18 > 30	1	3.3	4	13.3	8.451*	$^{MC}p=0.029^{*}$ (S)
30 > 40	0	0.0	5	16.7		
40 > 50	7	23.3	3	10.0		
50 > 60	22	73.3	18	60.0		
Mean age	52.30± 11.54		51.06 ± 13.88			
Gender						
Male	17	56.7	14	46.7	0.601	0.438 (NS)
Female	13	43.3	16	53.3		
Diagnosis						
Respiratory disorders	1	3.3	3	10.0	6.769	$^{MC}p=0.451$ (NS)
Cardiovascular disorders	0	0.0	1	3.3		
Nervous disorders	10	33.3	8	26.7		
Gastrointestinal disorders	7	23.3	4	13.3		
Renal disorders	8	26.7	8	26.7		
Endocrine disorders	1	3.3	5	16.7		
Immiune disorders	1	3.3	0	0.0		
Others	2	6.7	1	3.3		
Mode of ventilator						
SIMV	29	96.7	30	100.0	1.017	$^{FE}p=1.000$ (NS)
CPAP	1	3.3	0	0.0		
PSV	0	0.0	0	0.0		
Numbers of weaning trials						
1	25	83.3	21	70.0	1.963	$^{MC}p=0.368$ (NS)
2	5	16.7	8	26.7		
3	0	0.0	1	3.3		
Level of consciousness (GCS)						
High GCS ≥7 T or ≥10	24	80.0	20	66.7	1.364	0.243
Low GCS < 7 T or <10	6	20.0	10	33.3		

χ^2: Chi square test, FE: Fisher's exact test, MC: Monte Carlo test, NS: Not Significant

S: Significant p: p value for comparing between the studied groups

*: Statistically significant at $p \leq 0.05$

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Table (1) shows that more than half (60% , 73.3%) of the patients in the study and control group were between 50– 60 years, respectively. The mean age was 52.30 ± 11.54 and 51.06 ± 13.88 year for the control and study groups of patients respectively. Concerning patients' gender, this table shows that 56.7% of the control group of patients were males compared to 53.3% of the study group of female patients.

As regards the diagnosis, the highest percentages of patients in both groups were nervous and renal disorders representing 33.3% , 26.7% for the control group and 26.7% for the study group, respectively. Concerning the mode of ventilator, it was found that the majority of control group represented by 96.7% was on SIMV and all patient of the study group(100%) was on SIMV.

In relation to the numbers of weaning trials, it can be noted that the highest percent represented by 83.3% and 70% in both control and study groups of patients respectively had only one weaning trial. This table also presents that the least percentage of the study group (3.3%) passed three weaning trials. Concerning Glasgow coma scale, it was found that the majority of patients in the control group (80%) and more than half of patients in the study group (66.7%) had high GCS. It can be noted from the same table that there was no significant difference between patients in the studied groups regarding patients' gender and clinical characteristics.

Table (2): Comparison between the control and study groups according to the mean differences of hemodynamic responses throughout the study period (n = 60)

Autonomic response	Time	Groups		T	P
		Control (n = 30)	Study (n = 30)		
Heart rate(beat/min)	**Start**	96.27±11.09	97.80±20.88	0.355	0.724
	End	102.73±11.92	95.50±16.50	1.947	0.046*
Respiratory rate (breath/min)	**Start**	19.50±3.92	22.70±7.44	2.084	0.43
	End	24.33±5.88	21.87±14.48	0.864	0.039*
Spo2(%)	**Start**	96.80±2.30	97.17±2.88	0.258	0.194
	End	93.07±3.42	97.80±2.64	6.518	<0.001*
Temperature (°C)	**Start**	37.38±0.58	37.60±0.71	0.584	0.562
	End	37.38±0.31	37.29±1.07	1.258	0.215
SBP	**Start**	130.67±15.52	120.0±13.65	2.827*	0.006*
	End	134.0±17.34	118.50±11.97	4.029*	<0.001*
DBP	**Start**	77.67±12.51	75.00±9.38	0.934	0.354
	End	83.67±14.97	77.83±8.48	1.857	0.020*
Fio2	**Start**	52.67±7.28	60.0±9.83	3.285*	0.002*
	End	48.67±6.15	50.83±12.04	0.878	0.385

Quantitative data was expressed by Mean ± SD. (Standard division),

SBP: Systolic blood Pressure **DBP**: Systolic blood Pressure

t: Student t-test

p_1: p value for **paired t–test** for comparing between **1st day** and **4th day** for the same group

p_2 : p value for comparing between the studied groups in each day throughout the study period

***:** Statistically significant at $p \leq 0.05$

As illustrated in table (2), the mean value of **Heart rate** was 96.27±11.09 for the control group compared to 97.80±20.88 for the study group at the start of the study with no significant difference between the two groups (P=0.724). At the end of the study the mean values of heart rate significantly (P=0.046) decreased to 95.50±16.50 among patients in the study group after application of aroma therapy and increased to 102.73±11.92 among patients in the control group.

The current table presents that the mean values of **Respiratory Rate (RR)** for study and control groups at the start of study were 22.70±7.44vs. 19.50±3.92respectively with no significance difference between both groups (P = 0.430). Mean value of RR after commencing aroma therapy for the study group were significantly lower than that of control group (21.87±14.48 vs. 24.33±5.88 respectively, p= 0.039).

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The same table represents that the mean values of **SPO_2** at the start of the study in control and study groups were relatively convergent (96.80±2.30 vs. 97.17±2.88 respectively); with no significance difference between the two groups (P = 0.194). Documented **SPO_2** at the end of the study showed that patients' **SPO_2** in study group was significantly increased following the intervention while decreased in control group 97.80±2.64 vs. 93.07±3.42 respectively (P <0.001).

As regards ***body temperature***, although this table depicts that the mean values of body temperature did not change dramatically among patients in the study and control groups from the start to the end of the study. It can be observed that the mean value of body temperature among patients in the study group was lower than patients in the control group at the end of the study (37.29±1.07vs. 37.38±0.31 respectively) with no significant difference between the studied groups (P2= 0.215).

The same table represents the increasing trend in the mean values of **SBP** from the start to end of the study for patients in the control group(130.67±15.52 vs 134.0±17.34 respectively). For the study group the mean value of SBP was significantly (P<0.001) decreased from 120.0±13.65at the start of the study to 118.50±11.97at the end of the study. Concerning **DBP,** this table show that there was a decrease in the mean of DBP at the start to the end of this study among control group(77.67±12.51vs 83.67±14.97 respectively).

In the study group, it was found that was an increase of the mean value of **DBP** from the start to the end of the study(75.00±9.38 vs 77.83±8.48, respectively) with a significant difference between the study& control groups (P= 0.020).

As regards FIO_2, it can be noted from the same table that mean values of FIO_2 for the control group and the study group were relatively different (52.67±7.28 vs. 60.0±9.83 respectively) at the start of the study. While, upon the completion of the study and after application aroma therapy the mean values of FIO_2 for patients in the study group at the start was significantly lower than that at the end of study (60.0±9.83 vs. 50.83±12.04 respectively, p<0.002).

Table (3): Comparison between the two studied groups according to weaning outcomes through the study period.

Weaning data	Groups					
	Control (n = 30))		Study (n = 30)		t	P
ABGs after weaning Mean ± SD.						
PH	7.38 ± 0.03		7.38 ± 0.04		1.385	0.172
$PaCo_2$	36.99 ± 3.51		36.63 ± 3.44		0.715	0.477
PaO_2	89.83 ± 22.54		84.61 ± 17.68		0.999	0.322
HCo_3	25.17 ± 2.50		26.68 ± 13.67		0.595	0.554
SaO_2	95.88 ± 1.83		98.17 ± 0.88		0.782	0.041*
Weaning outcomes (n) %						
* Successful	19	63.3	22	73.3		
* Failed	11	36.7	8	26.7		
***Weaning duration (hours) Mean ± SD	6.59 ± 3.79		6.14 ± 2.18			
Weaning Classification (n) %						
Simple	14	46.7	18	60.0		
Difficult	5	16.7	4	13.3		
Prolonged	3	10.0	1	3.3		
χ^2= 1.678 P = 0.710						
Incidence of mortality (n) %						
Yes	8	26.7	7	23.3		
No	22	73.3	23	76.7		
χ^2= 1.678 P = 0.710						

χ^2: Chi square test, **t:** Student t-test

S: Significant p: p value for comparing between the studied groups

*: Statistically significant at p ≤ 0.05

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This table illustrates that there was no significant difference in the mean scores of PH, Paco2, Po2, and HCO3 after weaning trial between the control and study group during the study periods. Moreover, this table shows that the total mean of **Sao_2** increased from 95.88 ± 1.83 in the control group to 98.17 ± 0.88 in the study group who had received aroma therapy, there was significant difference in the total mean of **Sao_2**between the two groups (P = 0.041).

Regarding weaning outcomes, it was founded that near to four quarter of the studied patients who received aroma therapy (73.3%) were successfully weaned and only (26.7%) were not. In control group, it can founded from the same table that 63.3% of the studied patients were successfully weaned and (36.7%) were not. Most of the patients in control group (72.7%) who failed weaning trial were re-ventilated and (27.3%) re-intubated. All the patients who failed weaning trial in study group who received aromatherapy were re- ventilated. Concerning weaning duration it can be noted that the mean duration of weaning in study group is less than in control group.

As regards weaning classification, it was found that more than half of patients in study group had simple weaning (60%) compared to (46.7%) in control group who had simply weaned. Only 13.3% had difficult weaning, and 3.3% prolonged weaning. In the same table it can be found that the incidence of mortality in control group was 26.7% compared to 23.3% in the study group who received the aroma therapy.

Table (4): Distribution of studied patients according to weaning failure criteria.

Weaning failure criteria	groups			
	Control (n=11)		Study (n=8)	
	No.	%	No.	%
Objective criteria				
Tachycardia	11	100.0	8	100.0
Tachypnea	11	100.0	8	100.0
Hypertension	8	72.7	2	25.0
Hypotension	0	0.0	0	0.0
Hypoxemia	10	90.9	3	37.5
Subjective criteria				
Agitation	10	90.9	4	50.0
Decreased level of mental status	0	0.0	0	0.0
Diaphoresis	5	45.6	0	0.0
Paradoxical movement	1	9.1	0	0.0

Table (4) shows distribution of studied patients according to weaning failure criteria. It was found that all (100%) studied patients had objective criteria (tachycardia, tachypnea) among study and control groups. In relation to hypertension, near to three quarter(72.7%) of control group compared to only (25%) of patient who received aroma therapy had hypertension. It also can be observed that (90.9%, 37.5%) in control and study group, respectively had hypoxemia as an objective criterion. Most of patients had subjective criteria as agitation (90.9%) in control group compared to 50% among study group.

4. DISCUSSION

Weaning from mechanical ventilation is an essential and universal element in the care of critically ill patients. Weaning from MV could be described as the process of suddenly or regularly removing ventilator support. Successful weaning represents a great achievement in patient's critical course in the ICU.

Sixty critically ill patients were included in the current study; more than half of the study sample was males. Most of the studied patients aged fifty years old or more.Measurements of hemodynamic responses (vital signs, SPO_2, SBP, DBP and MAP) in relation to application of aromatherapy nursing practices (olfactory and massage with lavender oil) are helpful in assessing patients readiness for weaning from MV. It can provide an insight into central nervous system activity related to the perception and processing of environmental stimulation caused by using these practices, even in the absence of observable behavior (**Sattayakhom, Wichit, & Koomhin., 2023).**

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Regarding **HR, and RR** results of the current study depicted that the mean values of HR, and RR decreased significantly among patients in the study group after application of aromatherapy nursing practices compared to patients in the control group. Regarding SPO2, the current study approved that the mean values of SPO2 in the study group were significantly higher than the mean values of SPO2 in the control group. This may be attributed to the calming and relaxation effects of implementing aromatherapy massage using lavender oil. Relaxation and calmness of critically ill patients in the ICU are strongly linked to decreasing of oxygen consumption, and oxygen demand and thus increasing the mean values of SPO2 **(Donelli, et al.,2019).**

The results of the current study were in agreement with **Kim et al., (2021)** . They revealed that O2 saturation of patients in the study group who received lavender massage was significantly higher than the O2 saturation of patients in the control group. Findings of **Emami-Sigaroudi et al., (2021)** were in the same line of findings of the present study. They conducted a study to compare between the effect of aromatherapy with lavender and damask rose in patients undergoing coronary artery bypass graft. Where they reported that lavender oil had a significant effect on patients' SPO2 in the study group who received lavender compared to patients in the damask rose group.

In addition, in **Hedigan, Sheridan and Sasse., (2023)** study to determine the benefit of inhalation aromatherapy as a complementary treatment for stress and anxiety in a clinical setting. They reported that there was a significant increase in the mean values of SPO2 among patients in the study group compared to control group. Another study conducted by **Bolhasani et al., (2017)**, noted that SPO2 was significantly higher among agitated mechanically ventilated patients after implementing massage than the control group.

On the other hand, **Davari, Ebrahimian, Rezayei, & Tourdeh.,(2021)** found that there were no significant changes in the mean values of SPO2 between the study group who received aromatherapy with lavender oil and the control group. While regarding **body temperature**, it can be observed that the mean value of body temperature among patients in the study group wasn't changed dramatically compared to patients in the control group at the end of the study with no significant difference between the studied groups.

The current study's findings may be explained by the relaxing effects of lavender oil, which can be applied topically or through inhalation. Lavender oil is linked to a decrease in ANS stimulation and an increase in parasympathetic nervous system activity, which balances out sympathetic storming that occurs after stress related to hospitalization and critical illness. Additionally, research has shown that utilizing complementary strategies to lessen the harsh tech ICU environment helps lessen the physical and psychological stress associated with ICU admission. (**Ghavami, Kazeminia, & Rajati., 2022).**

In relation to the SBP and DBP, the present study found that the mean values of SBP and DBP in the study group were significantly lower than its values in the control group. These Findings may be attributed to that the odorant molecule of lavender oil binds the receptor and sends a signal to the brain, which is the center controlling body function. The major components of lavender oil are linalool and linalyl acetate. These substances affect the central nervous system, resulting in relaxation and stress reduction and have a positive association with hypertension therapy(**Seong, Hong ,Hur & Lee., 2023).**

Also, findings of **Napavichayanun, et al., (2023)** were in line with the current study findings. They explored the effect of aroma inhalation effects on blood pressure in young men with essential hypertension. They noted that the mean values of systolic and diastolic blood pressure were reduced significantly after inhalation of lavender oil.

Regarding weaning outcomes, findings of the current study revealed that there were significant increase in successful weaning trials among patients in the study group compared to patients in the control group. This finding may be attributed to hemodynamic stability and higher cognitive functions among patients in the study group that were reflected on patients' ability to preserve spontaneous breathing and protect airway as well. This explanation is supported by **Baptistella.et. al (2018)** who found that patient's physiological parameters and LOC affects the duration of mechanical ventilation (MV), as improvement in the vital signs, FIO2 lower than 0.4, PEEP of 5 , patient's ability to initiate an inspiratory effort, a normal acid-base equilibrium and higher LOC was associated with a decreased duration of MV and successful waning trials.

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Aromatherapy has a great effect on weaning outcomes that include weaning success, weaning failure, weaning duration and mortality rate. The results of the current study revealed that the majority of the studied patients were successfully weaned during the first trial. During the second trial, it was founded that about third of the patients who continued second trial were successfully weaned. The mean weaning duration was about six hours. These results may be related to characteristics of the patients, severity of illness, the presence or absence of comorbid conditions, nutritional status, muscle strength and lung mechanics, the reasons for initiation of MV and may be related to the effect of aromatherapy which results in significant changes in vital signs.

The results of this study was in the same line with the study conducted by **Saiphoklang and Auttajaroon., (2018)** which have shown that bout forty six percentage of mechanically ventilated patients can be successfully extubated. In approximately twenty percentage of mechanically ventilated patients, the weaning and extubation process can be failed.

According to the results of the current study, aromatherapy must be viewed as a complementary nursing intervention associated with improvement in critically ill patient hemodynamic status and enhancement of mechanically ventilated patient condition especially during weaning process. It is the nurses' role to pay more attention in assessing risks and physiological abnormalities and weaning failure criteria, planning and realization of integrative nursing practice.

5. CONCLUSION

Based on the findings of the current study, it was concluded that:

- Implementation of aromatherapy using lavender oil has been shown to enhance mechanically ventilated patients outcomes. It is associated with significant improvement of vital signs, oxygenation and mean arterial blood pressure
- Implementation of aromatherapy using lavender oil is effective in decreasing ICU length of stay and promoting successful weaning from MV and decrease mortality rate.

6. RECOMMENDATIONS

- Aroma therapy with lavender oil should be incorporated into CCNS' daily routine care of mechanically ventilated patients.
- Vital signs, SBP, DBP, Sao_2 and GCS should be assessed routinely in ICU before and after each application of aroma therapy nursing practices to monitor patients' response and readiness for successful weaning.
- An educational handout about evidence-based nursing practices for mechanically ventilated patients must be provided to the CCNs to be used as a reference guide in their practice.
- In-service educational programs and workshops should be conducted to raise CCNs' awareness regarding the safe use of different types of the aroma therapy nursing practices using essential oils for critically ill patients on MV.
- Replication of this study on large sample is needed for to allow generalization of the findings and confirm the effect of the intervention.

REFERENCES

[1] Ahmed, O., Mohammed, W., Abd Elnaeem, M., Mohamed, S. (2023). Weaning Outcomes among Mechanically Ventilated Patients: Burn's Wean Assessment Program Versus Routine Method. Assiut Scientific Nursing Journal, 11(36), 21-31. doi: 10.21608/asnj.2023.178590.1463

[2] Allemeier, A.; Grefsrud, A.; Hensley, A.; Ferris, L.; & Silvers, W. M., (2017): Effects of Lavender Oil Inhalation on Heart Rate, Speed, And Accuracy During Timed Cognitive Testing," International Journal of Exercise Science: Conference Proceedings: (8): 5, 79.

[3] Avazah, A., Khosh Fetrat, M., & Rahimi Bashar, F.,(2019): Effect of progressive muscle relaxation on the vital signs and oxygenation indexes in patients under coronary artery bypass graft surgery: A triple blinded randomized clinical trial, 21(3),423–436.

[4] Baptistella, A. R., Sarmento, F. J., da Silva, K. R., Baptistella, S. F., Taglietti, M., Zuquello, R. Á., & Nunes Filho, J. R., (2018).:Predictive factors of weaning from mechanical ventilation and extubation outcome: A systematic review. *Journal of critical care*, *48*, 56–62. Available at https://doi.org/10.1016/j.jcrc.2018.08.023

[5] Bolhasani, M., Lakie, A.S., Noubahar, M., Movahedi, A.F., & Mahmoudi, S., (2017): The effect of touch on the arterial blood oxygen saturation in agitated patients undergoing mechanical ventilation. Iranian Journal of Critical Care Nursing, 5(3), 125-132.

[6] *Cooke, M., Ritmala-Castren, M., Dwan, T., & Mitchell, M. (2020).* Effectiveness of complementary and alternative medicine interventions for sleep quality in adult intensive care patients: A systematic review. International Journal of Nursing Studies, 107, 103,582.

[7] Davari, H., Ebrahimian, A., Rezayei, S., & Tourdeh, M., (2021):Effect of Lavender Aromatherapy on Sleep Quality and Physiological Indicators in Patients after CABG Surgery: A Clinical Trial Study. Indian journal of critical care medicine : peer-reviewed, official publication of Indian Society of Critical Care Medicine, 25(4), 429–434. Available at: https://doi.org/10.5005/jp-journals-10071-23785

[8] Donelli, D., Antonelli, M., Bellinazzi, C., Gensini, G. F., & Firenzuoli, F., (2019): Effects of lavender on anxiety: A systematic review and meta-analysis. Phytomedicine : international journal of phytotherapy and phytopharmacology, 65(1),153099. Available at: https://doi.org/10.1016/j.phymed.2019.153099

[9] Emami-Sigaroudi, A., Salari, A., Nourisaeed, A., Ahmadnia, Z., Ashouri, A., Modallalkar, S. S., Javadzadeh-Moghtader, A., Parvinroo, S., & Dadkhah-Tirani, H., (2021): Comparison between the effect of aromatherapy with lavender and damask rose on sleep quality in patients undergoing coronary artery bypass graft surgery: A randomized clinical trial. ARYA atherosclerosis, 17(1), 1–9. Available at: https://doi.org/10.22122/arya.v17i0.2064

[10] Ghavami, T., Kazeminia, M., & Rajati, F. (2022): The effect of lavender on stress in individuals: A systematic review and meta-analysis. Complementary therapies in medicine, 68, 102832. https://doi.org/10.1016/j.ctim.2022.102832

[11] Hedigan, F., Sheridan, H., & Sasse, A. (2023):Benefit of inhalation aromatherapy as a complementary treatment for stress and anxiety in a clinical setting - A systematic review. Complementary therapies in clinicalpractice,52,101750. Available at https://doi.org/10.1016/j.ctcp.2023.101750

[12] Kim, M., Nam, E. S., Lee, Y., & Kang, H. J.,(2021):Effects of Lavender on Anxiety, Depression, and Physiological Parameters: Systematic Review and Meta-Analysis. Asian nursing research, 15(5), 279–290. Available at https://doi.org/10.1016/j.anr.2021.11.001

[13] Knaus WA, Draper EA, Wagner DP, Zimmerman JE (1985). "APACHE II: a severity of disease classification system". Critical Care Medicine. 13 (10): 818–29. Available at doi:10.1097/00003246-198510000-00009. PMID 3928249

[14] Melnyk, B. M., & Fineout-Overhold, E. (2022):Evidence-based practice in nursing & healthcare: A guide to best practice. Lippincott Williams & Wilkins.

[15] Mohamed , A,M. , El-Soussi , A., Othman, S. , El -Monaem , S. & Ahmed, F.(2019). Effect of Music Therapy and Aromatherapy Massage on Autonomic Nervous System Response among Severe Traumatic Brain Injury Patients. Journal of Nursing and Health Science (IOSR-JNHS),8(1),51-59.

[16] Mohammadpourhodki, R., Sadeghnezhad, H., Ebrahimi, H., Basirinezhad, M. H., Maleki, M., & Bossola, M. (2021):The effect of aromatherapy massage with lavender and citrus aurantium essential oil on quality of life of patients on chronic hemodialysis: a parallel randomized clinical trial study. Journal of pain and symptom management, 61(3), 456-463.

[17] Napavichayanun , S., Sujarit , A,S., Pienpinijtham, P.,Sarikaphuti e, A., & Aramwit, P. (2023):Effect of Lavandula angustifolia and Cananga odorata on decrease of blood pressure in high blood pressure volunteers: A randomized controlled trial,20(4), 520-526. Available at: https://doi.org/10.1016/j.explore.2023.11.013

International Journal of Novel Research in Healthcare and Nursing
Vol. 11, Issue 3, pp: (39-50), Month: September - December 2024, Available at: www.noveltyjournals.com

[18] Papathanassoglou, E., &Park, T. (2016):To put the patient in the best condition: integrating integrative therapies in critical care. Nursing in critical care: British Association of Critical Care Nurses, 21(3), 123-126

[19] Pham, T., Heunks, L., Bellani, G., Madotto, F., Aragao, I., Beduneau, G., Goligher, E. C., Grasselli, G., Laake, J. H., Mancebo, J., Peñuelas, O., Piquilloud, L., Pesenti, A., Wunsch, H., van Haren, F., Brochard, L., Laffey, J. G., & WEAN SAFE Investigators (2023). Weaning from mechanical ventilation in intensive care units across 50 countries (WEAN SAFE): a multicentre, prospective, observational cohort study. The Lancet. Respiratory medicine, 11(5), 465–476. Available at: https://doi.org/10.1016/S2213-2600(22)00449-0

[20] Saiphoklang, N., & Auttajaroon, J. (2018):Incidence and outcome of weaning from mechanical ventilation in medical wards at Thammasat University Hospital. PloS one, 13(10), e0205106. Available at: https://doi.org/10.1371/journal. pone.0205106

[21] Sattayakhom, A., Wichit, S., & Koomhin, P. (2023): The Effects of Essential Oils on the Nervous System: A Scoping Review. Molecules, 28(9), 3771.

[22] Seong , K., Hong , GH., Hur, MH., & Lee, M,S.(2023): Two-week aroma inhalation effects on blood pressure in young men with essential hypertension. European Journal of Integrative Medicine, 5(3), 254-260

[23] Tejerina, E. E., Robba, C., del Campo-Albendea, L., Pelosi, P., Muriel, A., Peñuelas, O.,& Esteban, A. (2022): Weaning Outcomes in Patients with Brain Injury. Neurocritical Care, 1-11.

[24] Windisch, W., Dellweg, D., Geiseler, J., Westhoff, M., Pfeifer, M., Suchi, S., & Schönhofer, B. (2020):Prolonged Weaning from Mechanical Ventilation. Deutsches Arzteblatt international, 117(12), 197–204. https://doi.org/10.3238/ arztebl.2020.0197