Effect of Autogenic Drainage &Acupressure on the Respiratory Outcomes of Non-Invasive ventilated Chronic Obstructive Pulmonary Disease Patients

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Abstract

Dyspnea and a higher volume of secretions are common complaints among chronic obstructive pulmonary disease patients. As a result, there is a current tendency to adopt non-pharmacological approaches to help clear secretions, improve lung function, and relieve dyspnea. **So, the aim of this research** was to evaluate the effect of autogenic drainage and acupressure on the respiratory outcomes of non-invasive mechanically ventilated COPD patients. A quasi-experimental design was used. **Setting**: chest and general intensive care units at Assuit University Hospitals. Sixty non-invasive mechanically ventilated COPD patients recently admitted were included. Data was collected using **two tools:** tool I: patient assessment sheet, tool II respiratory outcome assessment sheet. **Results**: There was a highly significant reduction in the respiratory rate in study group after application of autogenic drainage and acupressure at 3rd and 7th day ($p<0.001$), significance differences were found regarding PaO_2, SaO_2 before and after intervention between study and control groups at 7th day with P. value (0.004, 0.029and 0.005&0.005)respectively. Moreover, there was highly significance increase in the amount of sputum clearance at 7th day ($p<0.001$), improvement with highly significance in dyspnea measures among study group patients 7th day ($p<0.005$) after extubation and ($p<0.001$) before discharge. **Conclusion**: applying autogenic drainage and acupressure had statistically significant positive effect on respiratory parameters outcomes on non invasive mechanically ventilated COPD **Recommendations**: provide educational program for nurses about AD and acupressure.

Keywords: Autogenic Drainage, Acupressure, COPD, Outcomes.

Introduction:

Chronic obstructive pulmonary disease (COPD) is one of the leading causes of disease and death worldwide **Celli & Wedzicha, (2019).** COPD is a disease characterized by airway obstruction combined with systemic and airway inflammation. **Albitar& Iyer, (2019).**The main symptoms of this disease are progressive dyspnoea, chronic cough, sputum production and recurrent respiratory infections. Those symptoms get worse as the disease evolves, with many effects on exercise capacity and quality of life. **Miravitlles et al., (2014)**Patients with excessively thick sputum may suffer frequent attacks or be prone to more serious disease**. Hastie et al., (2017)**

Non-invasive ventilation (NIV) is recommended as the gold-standard therapy for COPD patients complicated by hypercapnic acute respiratory failure. The use of bi-level (NIV) in patients suffering from an acute exacerbation of COPD complicated by hypercapnic respiratory failure is widespread, supported by a strong scientific evidence and from clinician consensus on its value and benefits. **Shah et al., (2018)**. The utility of NIV in acute hypercapnic respiratory failure in COPD is well-established and currently, it is a standard component of the management of these patients and is included in the most recent international guidelines. **Scala & Pisani, (2018)**.

Pharmacological treatment in COPD includes the use of corticosteroids and bronchodilators to reduce airway inflammation and obstruction, and non-pharmacological treatment such as pulmonary rehabilitation are used to improve perceived dyspnea, exercise capacity and quality of life. **Vogelmeier et al., (2017)**

Different alternatives for advanced airway clearance techniques have been developed to improve the efficiency of airway clearance and

encourage patient autonomy. One of these is Autogenic drainage (AD) which is characterized by controlled breathing using expiratory airflow to mobilize secretions from distal to proximal airways, without causing dynamic airway collapse.**(McCormack et al., 2019).**

The AD consists of controlled tidal breathing that is practiced at different levels of lung volume. In this, the patient self-adjusts the force or velocity of the expiratory airflow at different levels of inspiration in order to reach the maximum possible airflow generated in the bronchi, without resulting in airway collapses during coughing. **(McCormack et al., 2017)**

There are several traditional Chinese medicines, which uses different techniques to stimulate specific areas of the body surface as heat stimulation (moxibustion), electricity (electroacupuncture or acupoint transcutaneous electrical nerve stimulation (AcuTENS), and digital pressure (acupressure). These techniques have been traditionally used to treat all kinds of health problems including respiratory diseases like COPD. **(Fernández-Jané et al, 2020)**

Acupressure is a noninvasive treatment accepted by patients; this treatment is characterized by pressing on acupoints with the hands to achieve clinical efficacy. In addition, exercises have also been widely used in lung rehabilitation training **(Wu et al., 2018).**

It is applied by pressure using hand, fingers or thumb with a non-invasive and non-pharmacological intervention. It can learn easily by nurses and apply in clinical practice. Acupressure can produce deep relaxation and positive mental persuasion, improve tonicity of the muscles, Ease the flow of blood and lymph in the tissues and reinforce the nervous system in the body **(Robinson et al. 2011).** This method promotes secretion of neurotransmitters and modulates adrenocorticotropic hormones releasing.**(Maa et al., 2003).** Acupressure technique improves oxygenation of lungs, reinforces the pulmonary function and palliates cough and pain and the signs of asthma in the lungs. **(Maaetal, 2013)**

Significance of the study:

Chronic obstructive pulmonary disease is a severe respiratory disease that is responsible for significant morbidity and mortality globally. **(Rosenberg et al., 2015)**. Mortality rates ranged from 1.8 to 20.4% within three months after a hospitalization, and from 18.8 to 45.4% for the period from three to 24 months after a hospitalization.**(Singanayagam et al., 2013)**

This disease characterized by symptoms of breathlessness, chronic cough and sputum production. **(Vogelmeier et al, 2017).**The conversion from healthy to pathologic mucus occurs which change its properties including increased mucus production, infiltration with inflammatory cells, and the increase of bronchovascular permeability. The accumulation of mucus results from secretion overproduction and decreased clearance, promoting inflammation and recurrent respiratory exacerbations. **(Fahy & Dickey, 2010)**

Aim of the study:

This research was aimed to evaluate the effect of autogenic drainage and acupressure on the respiratory outcomes of non invasive mechanically ventilated COPD patients. This aim was achieved through the following:

- Assessing non invasive mechanically ventilated COPD patients regarding dyspnea, ABG, sputum amount, respiratory rate.
- Applying autogenic drainage and acupressure on for non invasive mechanically ventilated COPD patients
- Evaluating the effect of autogenic drainage and acupressure on dyspnea, ABG, sputum amount, respiratory rate among non invasive mechanically ventilated COPD patients

Hypotheses:

Hypotheses of the this research were:

- Non invasive mechanically ventilated COPD patients who received autogenic drainage and acupressure had better respiratory outcomes than control group.
- Non invasive mechanically ventilated COPD patients who received autogenic drainage and acupressure had significant improvement in arterial blood gases, dyspnea, sputum volume than control group.

Patients and Method

Research design:

Quasi experimental research design was utilized to conduct this study. This is an empirical study that uses a non-random assignment to estimate the causal influence of an intervention on its target population. **(Craig et al., 2017).**

Study Variables:

Dependent variables: (patients' outcomes) dyspnea, ABG, sputum level and respiratory parameters.

Independent variables: autogenic drainage and acupressure

Setting:

The study was performed in chest and general intensive care units at Assiut University Hospitals where the acute exacerbation of chronic obstructive pulmonary disease was the most frequent admission diagnosis. This hospital received patient from different governorates.

Sample:

Purposive sample of sixty patients of both gender who were admitted with COPD and were attached to a noninvasive mechanical ventilator. They were randomly assigned into two equal groups (study and control), thirty patients for each.

$$n = \frac{NZ^2 \quad ^2}{Z^2 \quad ^2 + Ne^2}$$

$$n = \frac{420 \times (1.96)^2 \times (0.223)^2}{(1.96)^2 \times (0.223)^2 + 420 \times (0.05)^2} = 60$$

Where:
$Z = 1.96[standardscores]$
$e = 0.05[error]$
$= 0.223[SD]$
$N = 420[population]$
$n = 60[sample]$

They were enrolled according to the following criteria: recently admitted within 24hrs,alert, mentally competent and able to communicate, hemodynamically stable, and free from diseases that lead to fatigue as; anemia, heart disease, musculoskeletal or neurological disorders.

Tools of the study: Two tools were used to collect data for the study after review the local and international scientific journals **Dangers et al 2018; Çınar and Eser, 2015; Al Ameri 2006;Wilson and, Jones 1989)**

Tool 1: patient assessment sheet: This tool included personal and clinical date as, age, sex and co-morbidities.**Çınar and Eser, (2015), reliability** of data the adapted first tool had been tested using Cronbach´s coefficient alpha (0.78**)**

Tool II: Respiratory outcomes assessment sheet: in terms of the following

1) Arterial blood gases, respiratory rate.
2) Sputum volume
3) Modified Borg Dyspnea Scale (MBS) adopted from **Wilson and, Jones (1989)** and reused by **Dangers et al., (2018)**is a numerical score used to assess dyspnea and consisted of verbal descriptors linked to specific numbers ranging from 0 to 10 where zero, representing "no dyspnoea", while 10,representing" maximal dyspnoea". It is commonly used during six-minute walk testing (6MWT).

   MBS consisted of 10 items including (no shortness of breath, no oxygen use was 0... very slight shortness of breath was 0.5….very slight shortness of breath with usual oxygen was 1…slight shortness of breath, able to accomplish normal activities with baseline oxygen use was 2…Moderate shortness of breath was 3… Somewhat severe shortness of breath was 4….Severe shortness of breath was 5… Very severe shortness of breath was (6-7)…very, very severe shortness of breath (8-9)…Maximal breathlessness was 10. **Reliability** of MBS: alpha cronbachfor demonstrated high internal consistency reliability 0.92 **Reychler et al. (2021).**
4) The six-minute walk test (6MWT) is a basic submaximal exercise test used to assess exercise tolerance, track therapy, and predict prognosis in patients with respiratory disease **Al Ameri (2006).**

Method:

Preparatory phase:

Preparation of the data collection tools was developed by the researchers based on

reviewing the relevant literature**.** Official permission was obtained from the chairman of intensive care units at Assuit university hospital**s.**

Content validity: A jury of five academic professionals in the four experts of critical care nursing at Assiut and Sohag university and one intensivist at Assuit university hospital assessed the study tools and made any necessary adjustments.

A pilot study: Prior to data collection, a pilot research was conducted with 10% of the study subjects to check that the study tools were clear and understandable, as well as to make any necessary revisions. This pilot sample was intended to determine how long the study tools would take to complete. The pilot study was excluded from the study sample.

Ethical considerations: The research proposal was approved by the nursing faculty's ethical committee. There was no risk to the study participants during the execution of the study. The investigation was conducted in accordance with conventional clinical research ethics guidelines. After being briefed about the study's nature and goal, patients obtained their oral consent. The secrecy and anonymity of the process were ensured. Patients in the research had the option to refuse to participate and/or withdraw at any time for any reason.

Fieldwork

Actual data was collected over a six-month period, beginning in "September 2021" and ending in "February 2022."

Researchers collected data at the previously described location twice everyday for seven days, in the morning at 10 a.m. and in the evening at 4 p.m. The study's implementation was divided into three phases: assessment, implementation, and evaluation.

First phase: Assessment phases

All patients in both group were assessed on admission to determine their eligibility for enrollment in the study . The researcher explaining to them the purpose of the study.

The average time required for the completion of tool II was around 60 minutes for each patient because data were collecting before and after intervention in both group. In the case of more than one patient in the day, the researchers resorted to the help of nurses to assist them collect the data after the researchers finish applying intervention.

Second phase: Implementation phase

Control group: was received routine hospital care of postural drainage and active cycle of breathing technique(ACBT). Postural drainage is done in different positions with chest mobilization techniques (percussion & vibration) twice a day. ACBT was done one session each day, each session consisted of 3 courses and each course lasts for 10 minutes with 15 minutes of rest between those courses.

Study group: each patient in the study group received routine hospital care in addition to the following session which was required 30-35 minutes for acupressure and 10-15 minutes for AD it was given twice daily, for one week.

- Before starting intervention, the researchers were aware that patient not eats at least 2 hours before the sessions as practicing acupressure within a full stomach can inhibit the blood flow and may cause nausea. Investigator's hands were kept warm and nails short.
- Applying acupressure was performed through massaging critical areas in a slow, rhythmic manner with circular anti clockwise at five acupoints figure(1) (LU1, LU7, LU9, LI 4, and LI11).

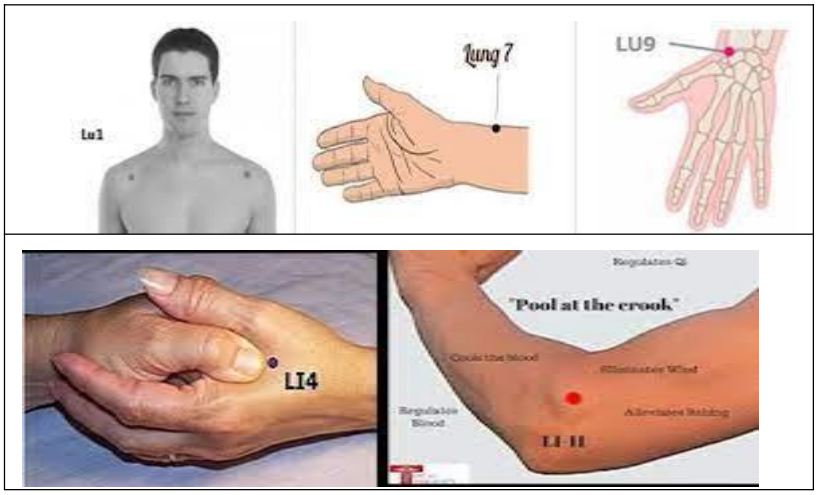

Figure (1): Acupressure points used in this study **(Maharem et al., 2021)**

- After completing acupressure and while patient in breathing trail, AD was performed .The participants were asked to sit upright or supine. Three phases of AD were applied as following: The initial phase of unsticking involves breathing at a low lung volume to mobilize or loosen secretions in the peripheral airways, followed by the collecting phase, in which the individual took a deeper breath but did not go very deep into the expiratory reserve volume. They were instructed to take very deep breaths to reach the inspiratory reserve volume and enter finally the evacuation phase in order to collect secretions from the peripheral airways and to cough out the sputum in order to remove the secretions from the central airways.
- After extubation, once patient able to move from bed six minute walk test was performed. Patient stand and rate their dyspnea using the Borg scale , Set the stop watch to zero and the timer to 6 minutes, the patient reported to follow these instructions "you will walk back and forth in this hallway for six minute and you may feel exertion and get out of breath or become exhausted. You could slow down, stop, and rest as necessary but resume walking as soon as you were able"
- Post-test: Borg dyspnea was recorded according to patients report. Record the number of laps from the counter and the distant through six minute calculate

Third phase: Evaluation phase

- ABG, respiratory rate, dyspnea were monitor before and after intervention on the first, 3rd and 7th day for both groups
- Sputum volume was observed after intervention on the first, 3rd and 7th day for both groups
- Dyspnea was measured during 6MWD test and distance were measures for both groups after extubation and before discharge.

Statistical analysis

All data were recorded in a special chart for every patient. The collected data were coded, analyzed and tabulated .Data entry and analysis were done using SPSS 20.0 statistical software package. Data were presented using descriptive statistics in the form of frequencies and percentages for qualitative variables, and means and standard deviations for quantitative variables. Quantitative continuous data were compared using analysis of variance test in case of comparisons between two independent groups. Using independent T-test and chi-square test to determine significant, it considered significant when $P \leq 0.05$ significant and non- significant when $P > 0.05$.

Results:

Table (1) displays distribution of personal and clinical data in the study and control groups. The study group's mean age was 47.80±10.97 years compared to 47.40 ± 7.53 years in the control group, with no statistically significant difference (p=0.780). In addition, in

both groups, more than half of the patient were male (76.7%& 70% respectively). Furthermore, 70% of study participants respectively in both groups had no previous medical history.

Table (2) shows comparison between the study and control groups regarding arterial blood gases' mean. There were significant variations in sao_2 and pao_2 before intervention on the seventh day between the two groups.

Table (3) shows comparison between the study and control groups regarding arterial blood gases' mean after intervention. On the third day, sao2 levels in the study group showed considerable improvements after intervention. Also, there were significant variations in sao_2 and pao_2 before and after intervention on the seventh day between the two groups.

Table (4) illustrates comparison between the study & control groups as regard respiratory rate's mean. There were significant difference before and after intervention between the study & control groups on the 3rd and 7th days with p value (0.001 & 0.000 respectively). Also, it was observed reduction in the respiratory rate after intervention in the study group

Table (5) presents comparison between the study and control groups as regard Sputum volume after intervention. It was observed that large amount of sputum removed after applying AD and acupressure in the study group than control with significant difference 3rd and 7th days.

Table (6) Shows comparison between the study & control groups as regard dyspnea intensity' mean score, it was observed that there was decrease in the dyspnea level after intervention in study group. During 6MWD test there was significant decrease in the dyspnea intensity in the study group after extubation and before discharge than control group with p value (0.001&0.000 respectively)

Table (7) Shows comparison between the study & control groups as regard 6MWD. There was significant increase in the 6MWD in the study group after extubation and before discharge than control group with p value (0.000&0.010 respectively).

Table (1): Comparison between the study & control groups as regard personal and clinical data (n=60)

Personal and clinical data	Study (n= 30)		Control (n= 30)		P-value
	No.	%	No.	%	
Age (Mean ± SD**)**	47.80± 10.97		47.40± 7.53		0.780
Gender					
- Male	23	76.7%	21	70.0%	0.386
- Female	7	23.3%	9	30.0%	
$\mathbf{X^2}$ = 0.341					
Past medical history					
- No Past medical history	21	70.0%	21	70.0%	0.135
- Hypertension	5	16.7%	1	3.3%	
- Diabetes mellitus	4	13.3%	8	26.7%	
$\mathbf{X^2}$ = 4.000					

* significant ($p<0.05$)

Table (2): Comparison between the study & control groups as regard arterial blood gases before intervention(n=60)

Arterial blood gases		Before intervention		t	P-value
		Study (n= 30)	Control (n= 30)		
		Mean ± SD	Mean ± SD		
1st day	PaO_2	66.67±6.27	65.20±7.47	0.824	0.414
	$PaCO_2$	64.27±10.58	61.77±8.91	0.990	0.326
	SaO_2	84.23±6.37	81.20±6.04	0.044	0.965
3rd day	PaO_2	82.93 ±6.21	82.93 ±6.21	1.095	0.278
	$PaCO_2$	51.60±6.98	53.67±13.15	-0.760	0.450
	SaO_2	89.17±2.57	88.03±3.42	1.448	0.153
7th day	PaO_2	92.87±8.14	86.63±7.84	4.218	**0.004***
	$PaCO_2$	50.67±12.04	53.10±11.02	-0.618	0.418
	SaO_2	91.40±3.74	88.90±3.16	2.910	**0.005***

significant (p<0.05) **ABG** :arterial blood gas. **Pao2** :partial pressure of arterial oxygen **paco2**:-partial pressure of arterial carbon dioxide **Sao2** :arterial oxygen saturation

Table (3): Comparison between the study & control groups as regard arterial blood gases after intervention(n=60)

Arterial blood gases		After intervention		t	P-value
		Study (n= 30)	Control (n= 30)		
		Mean ± SD	Mean ± SD		
1st day	PaO_2	68.67±8.18	65.77±7.88	1.334	0.187
	$PaCO_2$	61.73±12.91	61.20±9.65	0.181	0.852
	SaO_2	85.40±6.56	85.03±4.95	0.244	0.808
3rd day	PaO_2	84.63±6.20	82.33±7.15	1.331	0. 189
	$PaCO_2$	49.63±6.85	53.33±11.93	-1.472	0.146
	SaO_2	91.17 ±2.57	88.56±3.65	3.136	**0. 003***
7th day	PaO_2	98.80±13.87	86.63±15.07	5.309	**0.029***
	$PaCO_2$	48.97±10.90	50.90±9.52	-.0635	0. 468
	SaO_2	93.13±3.74	90.43±3.44	2.906	**0.005***

Significant (p< 0.05) **ABG** :arterial blood gas. **Pao2** :partial pressure of arterial oxygen **paco2**:-partial pressure of arterial carbon dioxide **Sao2** :arterial oxygen saturation

Table (4): Comparison between the study & control groups as regard respiratory rate (n=60)

Respiratory rate	Study (n= 30)	Control (n= 30)	t	P-value
	Mean ± SD	Mean ± SD		
First day (baseline)				
- Before intervention	29.83 ± 5.40	29.37 ± 4.28	0.371	0.712
- After intervention	29.27 ± 5.89	29.30 ± 4.54	-0.025	0.981
3rd day				
- Before intervention	21.10 ± 2.31	24.03 ± 3.96	-3.504	**0.001***
- After intervention	20.23 ± 2.09	24.43 ± 4.13	-4.964	**0.000***
7th day				
- Before intervention	19.90 ± 2.56	23.47 ± 4.29	-3.904	**0.000***
- After intervention	18.70 ± 2.43	23.53 ± 4.18	-5.468	**0.000***

* highly significant difference (p<0.001)

Table (5): Comparison between the study & control groups as regard Sputum volume after intervention (n=60)

Sputum volume	Study (n= 30)		Control (n= 30)		X^2	P-value
	No.	%	No.	%		
First day (baseline)					0.635	**0.298**
- Moderate	13	43.3%	10	33.3%		
- Large	17	56.7%	20	66.7%		
3rd day					6.696	**0.010**
- Moderate	9	30.0%	19	63.3%		
- Large	21	70.0%	11	36.7%		
7th day					4.593	**0.019***
- Moderate	7	23.3%	15	50.0%		
- Large	23	76.7%	15	50.0%		

Chi-square test* highly significant difference ($p<0.05$)

Table (6): Comparison between the study & control groups as regard Modified Borg Dyspnea Scale(n=60)

Modified Borg Dyspnea Scale	Study(n= 30)	Control (n=30)	t	P-value
	Mean ± SD	Mean ± SD		
First day				
- Before intervention	6.00 ± 2.00	6.47 ± 1.57	-1.005	0.319
- after intervention	5.23± 1.56	5.93 ± 2.01	-1.501	0.139
3rd day				
- Before intervention	5.33± 1.49	6.07 ± 2.19	-1.512	0.136
- after intervention	5.17± 1.39	6.23± 1.92	-1.887	0.065
7th day				
- Before intervention	4.37± 1.29	4.97± 2.15	-2.002	**0.048***
- after intervention	4.23± 1.22	5.37± 1.75	-2.906	**0.005***
During 6MWD test				
- After extubation	3.53 ± 1.43	5.10 ± 1.86	-3.651	**0.001***
- Before discharge	1.37 ± 1.32	3.60 ± 1.94	-5.205	**0.000***

Independent samples t-test. * Statistical significant difference ($p<0.05$) ; 6MWD**:** 6 minutes walk distance

Table (7): Comparison between the study & control groups as regard 6MWD(n=60)

six-minute distance walk	Study(n= 30)	Control (n=30)	t	P-value 1
	Mean ± SD	Mean ± SD		
6MWD				
After extubation	109.33 ± 13.88	94.33 ± 8.85	5.034	0.000*
Before discharge	112.33 ± 17.35	96.002 ± 28.59	2.674	0.010*

Independent samples t-test. * highly significant difference ($p<0.001$) ;6MWD: 6 minutes walk distance

Discussion:

Chronic obstructive pulmonary disease is characterized by changes in the airways and lung parenchyma, resulting in increased breathing workload **Wang et al.,(2018).** The NIV has become a care guideline in the management of acute exacerbations of COPD, despite the fact that it's a stressful experience, patients exhibit high levels of dyspnea, which, when combined with anxiety, interferes with weaning protocols and should not be overlooked by nurses**. Tuxen, and Hew (2019)**.

The AD is an airway clearance procedure characterized by breathing control, in which the person controls the rate, depth, and position of respiration inside the thoracic cavity to clear the chest of secretions on their own**. McCormack et al (2017).** Acupressure is a noninvasive therapy that involves pressing points in the body with the hands to gain clinical success**. Zhang et al., (2020)**

In terms of arterial blood gases, the current study showed that considerable improvements sao_2 levels in the study group

after intervention started at third day. Also, there were significant variations in sao_2 and pao_2 before and after intervention on the seventh day between both groups.

The result of current study came in support with the result of **Moustafa et al (2019**) who evaluated AD effect on Blood Gases, they stated that AD improve oxygen saturation and partial pressure of PCO_2 as showed. Moreover, **Agostini and Knowles (2007)** found that AD group showed significant improvement in partial pressure of arterial CO_2, 6-minute walk test, and increased O2 saturation level during and after AD. Also, **Taha et al., (2021)**. In their study about "Adding autogenic drainage to chest physiotherapy after upper abdominal surgery: effect on blood gases and pulmonary complications prevention" reported that both intervention and control group revealed significant improvements in SaO_2 and PaO_2 but with higher percentages in the intervention group.

In contrast, the current study is not consistence with the finding of the study about " Effectiveness of Active Cycle of Breathing Technique along with Postural Drainage Versus AD in Patients with Chronic Bronchitis" conducted by **Singh et al., (2019).**They reported that, applying active cycle of breathing technique with postural drainage and AD are effective individually, but there is no significant difference between both groups. Possible explanation for the current result due to the relaxing of respiratory muscles caused by acupressure, as well as the enhancement of the breathing process after the evacuation of secretions, could be contributing to the increase in O_2 saturation.

Regarding sputum volume, The current study observed that large amount of sputum removed after applying AD and acupressure in the study group than control with significant difference on the 3rd and 7th days which comes in line with finding of **Hamza (2019),** In the study "Effects of AD in Patients with Abdominal Surgery," who found that AD, which involves a gradual rise in inspiratory and expiratory reserve volumes from functional residual capacity, improved breathing and mobilized secretions. On the other side this study finding is not consistence with the finding claimed by **Melam et al., (2012)** who concluded that AD is as effective as ACBT in clearing secretions and improving lung function. Also, **Kiran et al (2014)** reported that mean amount of secretion removal by postural drainage techniques was more effective than AD despite drop in oxygen saturation accompanied postural drainage

Researchers suggest that large volume of secretions removal in the study group may be due to applying a variety of airway clearance techniques (AD, in addition to ACBT, postural Drainage) which speed mobilization of secretions by shearing them from the bronchial walls and transferring them from the periphery to the central airways.

Regarding respiratory rate, the current study findings showed that there was significant difference before and after intervention between the study & control groups on the 3rdand 7th days. Also, it was observed reduction in the respiratory rate after intervention in the study group.

The decrease in respiratory rate is consistent with those of **Aliha et al., (2019**) who evaluated the effect of acupressure on respiratory indices in patients undergoing mechanical ventilation and declared that implementing 4 sessions of acupressure twice a day for two consecutive days could enhance breathing rate. **Tsay** et al., **(2005)**who investigated the effect of acupressure on the respiratory rate of patients undergoing mechanical ventilation, they reported that respiratory rate significantly decreased in acupressure group. **Also, Kiran et al., (2014)** who compared the effects of AD and postural drainage found a marginally significant decrease in respiratory rate in both groups after the intervention, indicating that both therapies did not produce a rise in respiratory rate and hence may be safe in COPD.

But present study's finding not congruent with **Maa et al. (2013)** who investigated the influence of acupressure on pulmonary measures in patients on mechanical ventilation, they reported that acupressure treatment with one or two sessions failed to reduce the respiratory rate of these patients.

Regarding modified Borg dyspnea scale, it was observed that there was decrease in the dyspnea level after intervention in study group. Also, during 6MWD test there was significant decrease in the dyspnea intensity in the study group after extubation and before discharge than control group which is congruent with findings of **Liu et al., (2015**) in the study titled "Clinical effect observation on acupuncture for COPD". They claimed that significant improvement in the dyspnea level was observed in treatment group rather than control group. **Tsay et al., (2005**) who investigated the effect of acupressure on the respiratory rate of patients undergoing mechanical ventilation reported that acupressure therapy group experienced a statistically significant improvement in perceived dyspnoea. Moreover **Suzuki,et al., (2012).** In the study titled "A Randomized, Placebo-Controlled Trial of Acupuncture in Patients With COPD " claimed that the Borg scale score after the 6MWT improved in acupressure therapy group, compared with control group.

Researchers hypothesize that acupressure therapy is to enhance the release of neurotransmitters and adrenocorticotropic hormones, as well as relaxation and anxiety reduction, which may relieve the sense of breathlessness.

Regarding the 6-MWT distance, the current study shows that there was significant increase in the 6MWD in the study group after extubation and before discharge than control group with p value (0.000&0.010 respectively). Which in the line with **Liu et al., (2015)** in the study titled "Clinical effect observation on acupuncture for COPD". They claimed that significant increase in the significantly improved in the 6-MWT distance among the treatment group than those in the control group. Also, **Suzuki, et al**., (2012). Also, In the study titled "A Randomized, Placebo-Controlled Trial of Acupuncture in Patients with COPD" claimed that 6MWT distance increased in acupressure therapy group, compared with control group.

Conclusion:

Based on the results, this study proved that combined techniques of autogenic drainage and acupressure reducing respiratory rate, relieving dyspnea, improving saturation and facilitating sputum clearance among non invasive mechanically ventilated COPD patients.

Recommendations:

- Provide educational program for nurses about applying AD and acupressure and considering it as a routine care in the respiratory intensive care unit as one of the non-pharmacological methods;
- Future studies should be replicated with a bigger sample size and a longitudinal strategy.
- Future studies will look at the effects of autogenic pressure and acupressure therapy on the outcomes of mechanically ventilated patients.

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