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Effect of Position Changes on Oxygenation Level for Mechanically Ventilated Patients

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Abstract: **Body positioning is one of the general kinds of nursing actions during care for the patients and body position changes have an effect on the optimal transport of blood and oxygen. The aim of this study: To determine the effect of position changes on oxygenation for mechanically ventilated patients. Design: A quasi experimental research design was utilized in the study. Sample : A purposive of 60 adult patients aged 18 years or more from both genders who was admitted during the study period on mechanical ventilation and newly admitted (less than 3 days from admission to the ICU) were selected. Setting: Data were collected from the medical Intensive Care Unit at Fayoum University Hospital. Tools: Data was collected utilizing two designed tools (1) assessment sheet which includes Socio demographic data for mechanically ventilated patients with lung diseases and health - relevant information (2) Invasive and non-invasive measurements** to assess oxygenation level **twice immediately and after two hours from each position which include ABG and vital signs. The results revealed that, Patients who have received change position protocol have had oxygenation level better than those patients who were on the routine position (fowler position).Conclusion: the implementation of changing position protocol among the study group according to the results of basic assessment has been successful and got an effective significant improvement in oxygenation level for mechanically ventilated patients that had respiratory failure. Recommendation: Change position protocol program should be implemented in ICUs for mechanically ventilated patients with lung disease and replication this study in a large sample and different settings.**

Keywords: **body positioning, mechanical ventilation, oxygenation.**

1. INTRODUCTION

Body positioning refers to optimize oxygen transport, primarily by manipulating the effect of gravity, on cardiopulmonary and cardiovascular function. Changing a patient's posture may not seem a dramatic technique, but this simple action often prevents recourse to more time consuming or tiring techniques. Positioning should be an integral part of all respiratory care, especially when prophylaxis is the aim **(1).**

Patient position is one of the general kinds of nursing actions during care for the patients. Body positioning may contribute to increasing lung volume and might improve oxygenation and hemodynamic status of patient with hypoxemia. This study demonstrated that using oxygen therapy for these patients may lead to oxygen toxicity while using positioning as an alternative line of treatment may improve oxygenation as well as decrease the need to oxygen therapy **(2).**

Nurses change the body position of critically ill patients as frequently as every two hours to prevent bed sores and other complications associated **with** immobility. Turning from side to side may also help loosen and drain secretions accumulated within the lungs. Routine lateral repositioning is a relatively safe standard practice **(3).**

The observation of physiologic parameters of the cardiovascular system. The purpose of the cardio vascular system is to transport substrates and oxygen to the cells throughout the body and to ensure adequate cellular function. Inadequate tissue perfusion and oxygenation is a common definition of shock. Eventually, without resuscitation, the shock state leads to multiple-organ dysfunction syndrome and death. The purpose of hemodynamic monitoring is to observe that adequate mean arterial pressure, tissue perfusion, and oxygen delivery remain adequate **(4).**

Significance of the study

All adult patients received mechanical ventilation at EL-Mahalla Chest Hospital ICU between July 2013 and June 2014 were prospectively recruited. Out of the 412 patients admitted to the ICU , 130 patients received MV, either invasive MV (40%), non-invasive MV (50.7%) and 9.2% of the patients showed non-invasive failure and needed invasive ventilation .The commonest indication of MV was acute on top of chronic respiratory failure (77.7%). Invasive MV was associated with low Glasgow coma scale, high APACHE II score , low admission PH, Po_2 and high Pco_2 higher morbidity and mortality rates compared to non-invasive MV **(5).**

2. AIM OF THE STUDY

The aim of the study was to determine the effect of change position on the oxygenation among mechanically ventilated patients through the following objectives:-

1. Assess patient's oxygenation.
2. Implement change position protocol among the study group, according to the results of basic assessment
3. Evaluate the effect of applying change position protocol on the occurrence of any changes on the study group.

3. THE RESEARCH HYPOTHESIS

This study hypothesized that:

Patients who will receive change position protocol will have oxygenation level better than those patients who were in the routine care. (Fowler position).

Design:

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

Setting:

The present study was carried out at the medical Intensive care unit at fayoum University Hospital

Subjects:

A purposive sample of (60) adult patients aged 18 years or more from both genders who was admitted during the study period on mechanical ventilation and newly admitted (less than 3 days from admission to the ICU).

Exclusion criteria:

Patients with complication such as Low hemoglobin ,Arrhythmia, Skeletal deformity ,obesity, hyperthermia**,** Abdominal distension , Facial surgery, Head or spine injury , Carbon monoxide poisoning, pulmonary hemorrhage, pulmonary abscess.

Tools for Data Collection:

Two tools were used for data collection from patients according to the following:

Tool I:Assessment sheet:

It was developed by the investigator based on the review of the literature **(6)** and consists of the following two parts that was filled by the investigator.

Part 1- Socio demographic data for mechanically ventilated patients with lung diseases:

It was used to assess the socio-demographic characteristics for the studied patients which include data about patient' age, gender, marital status, educational level, occupation, height, weight and body mass index (BMI).

Part 2- Health Relevant Information:

It was used to assess causes related to respiratory failure , lung disease, number of days of respiratory failure , smoking , length of ICU stay, initial assessment of Vital signs, initial assessment mode of mechanical ventilator, initial assessment Parameter of mechanical ventilator , past medical history and level of conscious according to G.C.S which classify to Fully conscious 15, Drowsy 13:14 , Lethargy 11:12 , Stupor 8:10 , Coma 7 or less and Deep coma 3

Tool II: Invasive and noninvasive measurement to assess oxygenation level :

It was developed by the investigator based on the review of the literature **(6)** and used to assess oxygenation level for patients through ABG (PH , Pao2 , Paco2 , Hco3,Spo2%) after 2hrs from change patient position , vital signs (HR, RR, BP ,Temp ,Spo2 by pulse oximeter). ventilator mode and parameter (Fio2 setting , Exhaled TV, TV Setting , R.R setting , PEEP) immediately following change position and after 2hr from the same position.

2- Operational Design

The operational design for this study includes preparatory phase, content validity, reliability, ethical consideration, pilot study, field work and limitation of study.

a. Preparatory phase

It included reviewing of related literature, and theoretical knowledge of various aspects of the study using books, articles, internet periodicals magazines. This review was helpful in developing the tools for data collection.

b. Content validity:

It used to modify the tools and ascertained by a jury of 5 experts from Medical and Nursing Staff as the following; two lecturer of medical- surgical nursing in the faculty of nursing, at Fayoum University and one lecture in the faculty of nursing, Ain shams University. One professor of medical surgical nursing in the faculty of nursing at Cairo University. One lecture of Anesthesia department in the faculty of medicine at Cairo University to review the tools for clarity, relevancy, comprehensiveness, understanding and applicability. According to their opinions, minor modifications were done and the final form was developed. Content validations of the studied tools were according to opinions of the experts.

c. Tool reliability:

Reliability of the developed tools (Socio-demographic data sheet, Health relevant information and invasive and noninvasive measurement to assess oxygenation level) was done. Tools were tested for its reliability by test- retest measurement. It was applied on 60 patients. The Cronbach's alpha model, which is a model of internal consistency, was used to test tool reliability. Its result was 0.851 which indicates an accepted reliability of the tools (more than 0.7) denote acceptable reliability.

d.Ethical Consideration

The ethical research considerations in this study include the following:

- Approval of the study protocol was obtained from scientific research ethical committee in faculty of nursing at Helwan University before starting the study.

- The purpose of the study was explained to the patient relative and oral consent was obtained from relative to participate their patients in this study. They were given an opportunity to withdraw from the study without giving a reason and they were assured that anonymity and confidentiality of information was protected. Ethics, values, culture, and beliefs were respected.

- Confidentiality was maintained on data collection forms by using codes to identify participants instead of names or any other personal identifiers.

- The study facilitation letter to conduct the study was received from the Department of postgraduate studies at Faculty of Nursing - Helwan University and was sent to director of critical care department at Fayoum University Hospital

- An official permission was obtained from the administrative authorities and the nurse supervisor of intensive care units of the selected hospital to the current study.

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e. Pilot study

A Pilot study was conducted on 10% approximately (6) patients of the sample under study to test the applicability, clarity and efficiency of the tools; required modifications were done in the form of adding or omission of some points. The patients involved in the pilot study were excluded from the main study subjects.

f. Field Work: According to the selected theoretical framework:

- Meeting and discussion were held between the Investigator and the nursing administrative personnel to explain the objectives and the nature of the study to gain their cooperation during the implementation phase of the study.
- Sampling was started and completed within six months from May (2018) to the end of October (2018).
- Patients' medical records were used to obtain the past and present medical history.
- Initial assessment was done by the investigator for all study subjects and takes their approval from relative to participate in the study prior to any data collection.

The data was collected throughout three phase for patients

-First phase (Assessment phase)

-Second phase (Implementation phase)

-Third phase (Evaluation phase)

-First Phase (Assessment Phase).

During this stage each patient was assessed individually and data collection was filled by the investigator in the shifts .Patient Assessment sheet was filled for the study group by the investigator before change position it took around (5-10) minutes for each patient .

-Second Phase (Implementation Phase)

Implement the change position protocol for each patient in (4) positions (fowler position degree 30-45 routine care, left lateral position, right lateral position, prone position) every position continue for two hour that the investigator assess the patient immediately then after two hour from each position through invasive and non-invasive measurements .The data collection was done on 2 days for each patient in afternoon shifts that include 2 positions in the first day (fowler position degree 30-45 routine care and left lateral position) then 2 positions (right lateral position, and prone position) in the second day as following:

A- First day:

During this day, the investigator assesses the effect of position changes on oxygenation level immediately then after 2hours from the same position, the investigator put each patient into two positions, each position around two hours fowler position degree 30-45 (routine care) and left lateral position at the first and at the end of the time for each position (vital signs, spo2, mode of ventilator, parameter of ventilator and ABG) were assessed

B- Second day:

During this day, the investigator assesses the effect of position changes on oxygenation level immediately then after 2hours from the same position, the investigator put each patient into two positions, each position around two hours right lateral position, and prone position at the first and at the end of the time for each position (vital signs, spo2, mode of ventilator, parameter of ventilator and ABG) were assessed

-Third Phase (Evaluation Phase)

The evaluation occurred through two phases:

1. First phase: During the first day the 1st evaluation was done immediately of position then after the end of each position to evaluate the effect of applying of position changes on oxygenation level on the sample.

2. Second phase: During the Second day the 2nd evaluation was done immediately of position, then after the end of each position to evaluate the effect of applying of position changes on oxygenation level on the sample.

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Administrative Design

Formal letter was issued from the faculty of nursing at Helwan University to hospital director and nursing director of Fayoum University's Hospital. The letter included the title and setting where the study would be conduct

Consent form was issued from the head of adult health nursing department, faculty of nursing at Helwan University to change the setting from Intensive Care Units in 185 Kasr Aleny hospital for accident and burn at Cairo University Hospitals to the medical Intensive Care Unit at Fayoum University Hospital

Consent form was issued from the head of adult health nursing department, faculty of nursing at Helwan University to change the research sample from convenience to purposive sample

Statistical Design

The collected data were organized, categories, tabulated and statistically analyzed using the Statistical Package for Social Sciences (SPSS), version 20. Data were presented using descriptive statistics in the form of frequencies and percentages for qualitative variables, and means and standard deviations for quantitative variables. Qualitative categorical variables were compared using chi-square test.

The observed differences and associations were considered as follows:

P value > 0.05 significant difference was considered at Collected data were statistically analyzed presented in tables & graphs and used appropriate reliable, valid statistical methods & tests. Graphs were done for data visualization and using Microsoft Excel.

$P \leq 0.05$ significance difference.

$p \leq 0.01$ moderate significance difference.

$P \leq 0.001$ highly significance difference.

* $\overline{X}$, SD, for quantitative data: age.

* Frequency and percentage for qualitative data: gender, level of education, marital status, smoking and occupation.

4. RESULTS

Table (1): Socio demographic data for mechanically ventilated patients with lung diseases (N=60)

Socio demographic data	Bilateral Lung disease		Right Lung disease		Left Lung disease		Total	
	N	%	N	%	N	%	N	%
Age								
20<30	1	3.0	0	0.0	0	0.0	1	1.7
30<40	10	30.3	3	15.8	3	37.5	16	26.7
40<50	3	9.1	1	5.3	1	12.5	5	8.3
>50	19	57.6	15	78.9	4	50.0	38	63.3
Mean±SD	47.11±5.64		50.27±4.29		47.68±5.08		48.34±4.6	
Gender								
Male	21	63.6	12	63.2	6	75.0	39	65.0
Female	12	36.4	7	36.8	2	25.0	21	35.0
Marital status								
Married	21	63.6	14	73.7	4	50.0	39	65.0

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Widow	10	30.3	3	15.8	3	37.5	16	26.7
Divorced	2	6.1	2	10.5	1	12.5	5	8.3
Educational level								
Illiterate	12	36.3	7	36.8	2	25.0	21	35.0
Primary	5	15.2	4	21.1	2	25.0	11	18.3
Secondary	11	33.3	6	31.6	2	25.0	19	31.7
high qualified	5	15.2	2	10.5	2	25.0	9	15.0
Occupation								
Worker	22	66.7	5	26.4	4	50.0	31	51.7
un employee	6	18.1	7	36.8	2	25.0	15	25.0
House wife	5	15.2	7	36.8	2	25.0	14	23.3

Table (1): shows that; the mean age of the patients with bilateral lung disease in the present study were 47.11±5.64 while the patients with right lung disease were 50.27±4.29 and the patients with left lung disease were 47.68±5.08, Respectively (65%) of them were male majority of them (65%) were married, (26.7) from them were widow and (8.3) from them were divorced. As well as one third of sample (35 %) of the studied subjects had illiterate. As the other third of sample (31.7%) had secondary. Regarding occupation one half of sample was workers (51.7 %), one quadrant had un employee (25 %) and other were house wife (23.3%)

Table (2): Causes related to respiratory failure with mechanically ventilated patients and past medical history in the mechanically ventilated patients with lung diseases (N=60)

Variable	Bilateral Lung disease		Right Lung disease		Left Lung disease		Total	
	N	%	N	%	N	%	N	%
Causes related to respiratory failure								
ARDS	14	42.4	0	0.0	0	0.0	14	23.3
bronchial asthma	10	30.3	5	26.3	3	37.5	18	30.0
Pneumonia	2	6.1	12	63.2	3	37.5	17	28.3
Intra pulmonary fibrosis	7	21.2	0	0.0	0	0.0	7	11.7
Other	0	0.0	2	10.5	2	25.0	4	6.7
past medical history								
Intra pulmonary fibrosis	11	33.3	0	0.0	0	0.0	11	18.3
ARDS	6	18.2	0	0.0	0	0.0	6	10.0
Bronchial asthma	12	36.4	3	15.8	3	37.5	18	30.0
Pneumonia	4	12.1	14	73.7	3	37.5	21	35.0
Other	0	0.0	2	10.5	2	25.0	4	6.7

Table (2): shows that; approximately (30%) from patients had bronchial asthma related to respiratory failure,(23.3%) of patients had ARDS, (28.3 %) of patients were pneumonia, (11.7 %) of patients were Intra pulmonary fibrosis and (6.7 %) of patients were other disease , as past medical history (18.3%) of patients were Intra pulmonary fibrosis, (10 %) of patients were ARDS, (30 %) of patients were bronchial asthma , (35 %) of patients were pneumonia and (6.7 %) of patients were other disease .

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Figure (1): Level of conscious among mechanically ventilated patients with lung diseases (N=60)

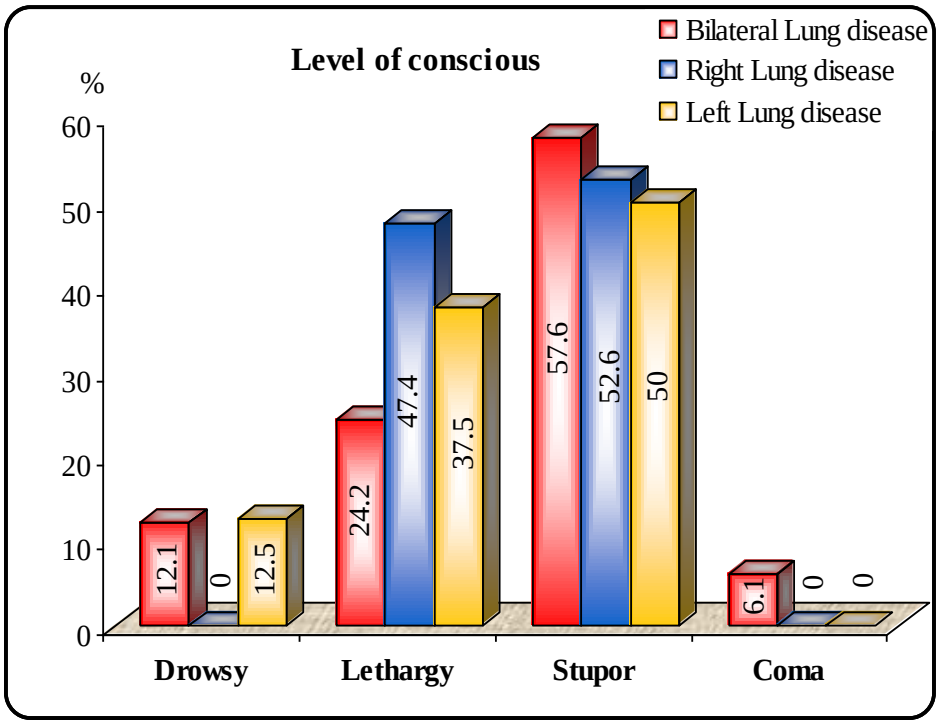

Figure (1)

Figure (1): shows that; one half of patients were stupor (55 %) while (8.3%) from patients were Drowsy, (33.3%) of patients were Lethargy and (3.3 %) of patients were Coma.

Table (3): Number of days of mechanically ventilated patients with respiratory failure, length of ICU stay and smoking among mechanically ventilated patients with lung diseases (N=60)

Variables	Bilateral Lung disease		Right Lung disease		Left Lung disease		Total	
	N	%	N	%	N	%	N	%
Number of days of respiratory failure								
1 – 3 day	15	45.5	10	52.6	4	50.0	29	48.3
4 – 6 day	15	45.5	7	36.8	4	50.0	26	43.4
6 – 9 day	3	9.00	2	10.6	0	0.0	5	8.3
Smoking								
Yes	16	48.5	6	31.6	5	62.5	27	45.0
No	17	51.5	13	68.4	3	37.5	33	55.0
Length of ICU stay								
One day	15	45.5	6	31.6	4	50.0	25	41.7
Two day	10	30.3	9	47.3	3	37.5	22	36.6
Three day	8	24.2	4	21.1	1	12.5	13	21.7

Table (3): shows that; one half of mechanically ventilated patients with respiratory failure were suffer from respiratory failure from 1-3 days (48.3%) while (43.3 %) of them were 4 – 6 day and (8.3%) of them were 6 – 9 day. Relevant smoking (45%) of mechanically ventilated patients with respiratory failure were smokers, while (41.7%) of mechanically ventilated patients with respiratory failure were stay in ICU one day , (36.7 %) of mechanically ventilated patients with respiratory failure were stay two day and (21.7 %) of them were stay three day.

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Table (4): BMI among mechanically ventilated patients with lung diseases (N=60)

BMI	Bilateral Lung disease		Right Lung disease		Left Lung disease		Total	
	N	%	N	%	N	%	N	%
Normal	17	51.5	9	47.4	7	87.5	33	55.0
Low Weight	4	12.1	4	21.00	0	0.0	8	13.3
Over Weight	12	36.4	6	31.6	1	12.5	19	31.7

Table (4): shows that; one half of patients were normal BMI (55%), while (13.3 %) of patients were low weight and (31.7 %) of patients were overweight.

Table (5): Comparison between effect of routine position (Fowler position) and other positions on the oxygenation level for mechanically ventilated patients with lung diseases through invasive measurement (SPO2 in ABG after 2 hour from same position (N=60)

SPO2 in ABG	Routine care (Fowler position)		Left		Right		Prone		ANOVA	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	F	P-value
Bilateral Lung disease	92.21	1.45	93.39	1.85	97.15	1.54	99.45	0.71	175.338	<0.001**
Right Lung disease	94.05	1.72	98.79	0.79	91.05	1.27	94.58	1.71	95.261	<0.001**
Left Lung disease	95.75	2.19	89.00	1.20	99.25	0.71	98.75	1.67	75.000	<0.001**

Non-Significant >0.05 Significant <0.05* High Significant <0.001**

Table (5): shows that; there is highly statistically significant improvement in SPO2 in ABG with right lung disease in left position , at ($p \leq 0.001$**), highly statistically significant improvement in SPO2 in ABG with left Lung disease in right position , at ($p \leq 0.001$**) and highly statistically significant improvement in SPO2 in ABG with bilateral lung disease in prone position , at ($p \leq 0.001$**).

Figure (2): Comparison between effect of routine position (Fowler position) and other positions on the oxygenation level for mechanically ventilated patients with lung diseases through invasive measurement (Pao2 after 2 hour from same position) (N=60)

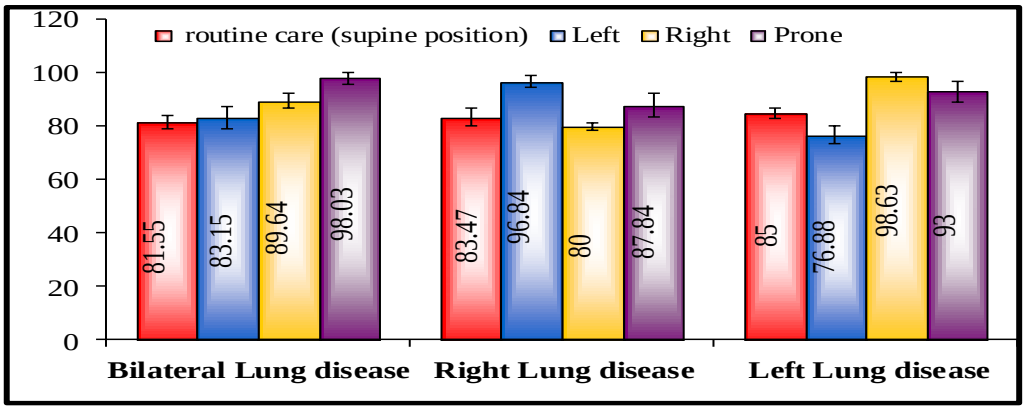

Figure (2)

Figure (2): shows that; there is increase in percentage of PaO2 in ABG with right lung disease in left position, there is increase in percentage of PaO2 in ABG with left Lung disease in right position, and there is increase in percentage of PaO2 in ABG with bilateral Lung disease in prone position

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Table (6): Comparison between effect of routine position (Fowler position) and other positions on the oxygenation level for mechanically ventilated patients with lung diseases through noninvasive measurement (SPo2 by pulse oximeter immediately of position then after 2 hour from same position) (N=60)

SPo2 by pulse oximeter	Routine care (Fowler position)		Left		Right		Prone		ANOVA	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	F	P-value
Immediately										
Bilateral Lung disease	92.30	1.07	92.88	1.62	96.18	1.70	98.52	1.12	141.682	<0.001**
Right Lung disease	92.95	1.68	96.00	2.16	93.63	1.12	93.16	1.74	12.773	<0.001**
Left Lung disease	94.25	2.12	93.38	2.50	91.88	1.25	98.50	1.77	16.705	<0.001**
After 2hr										
Bilateral Lung disease	92.27	1.51	93.58	2.22	97.15	1.54	99.45	0.71	141.363	<0.001**
Right Lung disease	94.16	1.68	98.89	0.57	91.05	1.27	94.68	1.57	109.950	<0.001**
Left Lung disease	95.88	2.36	89.00	1.20	99.25	0.71	98.75	1.67	69.420	<0.001**

Non-Significant >0.05 Significant <0.05* High Significant <0.001**

Table (6): shows that; there is highly statistically significant improvement in SPo2 by pulse oximeter immediately and after 2 hrs in patients with bilateral lung disease in prone position at ($p<0.001$**) , there is highly statistically significant improvement SPo2 by pulse oximeter immediately and after 2 hrs in patients with Right Lung disease in left position at ($p<0.001$**) , there is highly statistically improvement SPo2 by pulse oximeter immediately in patients with left lung disease in prone position at ($p<0.001$**) and there is highly statistically improvement SPo2 by pulse oximeter After 2 hrs in patients with left lung disease in right position at ($p<0.001$**).

Table (7): Relation between lung disease (bilateral, left, right) and Smoking among mechanically ventilated patients (N=60)

Lung disease	Smoking					
	Yes		No		Chi-square	
	N	%	N	%	X^2	P-value
Bilateral Lung disease	16	48.5	17	51.5	15.569	<0.001**
Right Lung disease	6	31.6	13	68.4	12.691	0.002*
Left Lung disease	5	62.5	3	37.5	14.068	<0.001**

Non-Significant >0.05 Significant <0.05* High Significant <0.001**

Table (7): shows that; there is highly statistically significant relation between smoking and bilateral, left lung disease at ($p <0.001$**) while statistically significant relation between smoking and right lung disease at ($p =0.002$*).

5. DISCUSSION

Regarding patients' sociodemographic characteristics results showed that, most of studied subjects were in age group more than 50 years. Regarding the gender two third of sample were male and married. Regarding level of education, this table revealed that one third of the sample of the studied subjects was Illiterate. Regarding occupation one half of sample was worker and one quadrant was un employee**.** These findings were in accordance with **(7)** who studied Timing of noninvasive ventilation failure: causes, risk factors, clarified that the mean age of all the studied patients was 58.47 ± 8.2 years, majority were males and resident in rural areas and most of them had a positive smoking history.

Section (I): Health relavent information:

The present study illustrated that causes related to respiratory failure were near quarter of the studied subjects were ARDS, less than one third of them were bronchial asthma, more than one quarter of them were pneumonia and minimum of them were Intra pulmonary fibrosis and other disease**.** This was in agreement with **(5)**,study of the characteristics and outcomes of patients on mechanical ventilation in the intensive care unit of EL-Mahalla Chest Hospital, Egypt, reported that, the most prevalent causes was related to respiratory failure, COPD followed by interstitial lung disease , bronchial asthma and the lowest were obesity hypoventilation.

Also **(8)** who studied, mechanical ventilation in ICUS in Poland reported that, multi-center point-prevalence study showed the commonest etiology of respiratory failure leading to mechanical ventilators was COPD followed by ARDS, pneumonia, cardiogenic pulmonary edema and others in IMV mode .

In relation to past medical history less than quarter of studied subjects were Intra pulmonary fibrosis, minority of them were ARDS, more than quarter of them were bronchial asthma and about one third of them were pneumonia**.** In this respect **(9)** who studied, effect of application of endotracheal suction guidelines on cardiorespiratory parameters of mechanically ventilated patients in Egypt, found that one third of mechanical ventilated patients had Presence of history of respiratory disease

The present study illustrated that Level of conscious more than half of studied subjects were Stupor**.** In this respect **(5)** confirmed that, the G.C.S was significantly lower patient for Mechanically Ventilated Patients.

The present study illustrated that, near half of studied subjects was smokers**.** This finding was in the same line with **(10)** who studied, clinical definition of COPD exacerbation and classification of their severity" southern medical journal, Bangalore. The major risk factor for developing respiratory failure is cigarette smoking. It is still a major public health concern among people. Clinically significant airway obstruction develops in 15% of smokers, and majority of COPD death in the United States are related to tobacco smoking.

The longest period of staying the patients on the ICU was one day. **(11)** who studied, cardiac rhythm during mechanical ventilation and weaning from ventilation, USA, showed that, patients were mechanically ventilated an average of 11.6 ± 8.4 days and stayed in ICU an average of 15.6 ± 9.2 days.

Concerning BMI among study subject showed that BMI near half of subjects were normal, majority of them aged more than 50 years not associated with overweight. This is in agreement with a study done by **(7)** who studied, Timing of noninvasive ventilation failure: causes, risk factors, and potential remedies demonstrated the need for mechanical ventilation in the older age. This caused be the old age is associated with poor nutritional status manifested by low body mass index (BMI) and decreased muscle power with weak cough reflex and retained excessive secretions which are additional risk factors for the need for invasive MV.

There is highly statistically significant improvement in SPO2 in ABG with right lung disease in left position, highly statistically significant improvement in SPO2 in ABG with left Lung disease in right position and highly statistically significant improvement in SPO2 in ABG with bilateral lung disease in prone position.

From the investigator view point when lung pathology is bilateral, arterial blood gases are improved, when patients lie on the right side compared with the left. This can be explained by the greater size of the right lung and reduced compression of the height on lung in this position compared with left lying. Thus increased regional ventilation under the influence of gravity with an overall improvement in ventilation/ perfusion ratio appears to be main mechanism of position induced improvement in oxygenation according to **(1).**

In this respect **(12)** who studied Influence of different degrees of head elevation on respiratory mechanics in mechanically ventilated patients, Brazil, confirmed that oxygen saturation did not differ significantly when the zero degree and 60 degree positions were compared.

On the same line **(13)** who studied, the effects of the semi recumbent position on hemodynamic status in patients on invasive mechanical ventilation, Germany, showed that, Moreover, the semi recumbent position appears to cause significant falls in central venous oxygen saturation(ScvO2). This suggests that the recommended semi-upright (30°) and upright (45°) positions may not be feasible in some mechanically ventilated patients. Increasing the elevation of the head of the bed induces a gravitational transfer of blood from the upper body and central circulatory compartment towards the abdomen and lower limbs. This pooling of blood in the extremities reduces systemic venous return to the right heart and reduces cardiac output.

There is highly statistically significant improvement in SPo2 by pulse oximeter immediately after 2 hrs in patients with bilateral lung disease in prone position , there is highly statistically significant improvement SPo2 by pulse oximeter immediately after 2 hrs in patients with right lung disease in left position, there is highly statistically improvement SPo2 by pulse oximeter immediately in patients with left lung disease in prone position and there is highly statistically improvement SPo2 by pulse oximeter after 2 hrs in patients with left lung disease in right position .

From the investigator view point that lung expansion is also more uniform in prone than in supine because the heart is supported by sternum and there is less parenchymal distortion by opening previously deflated lung, oxygenation may improve to such an extent that PEEP and FiO2 can be reduced according to **(1).**

The previous result was in agreement with **(12).** Reported that supine position (lying flat) or lateral positions do not seem beneficial for critically ill patients in terms of respiratory mechanics. The sitting position (with thorax angulation >30° from the horizontal plane) is associated with improvement of oxygenation (SPo2) and reduction of work of breathing with statistically Significant improvement SPo2 both sitting and prone positions.

Relation between lung disease (bilateral, left, right) and Smoking

Concerning relation between lung disease and smoking among patients there were highly statistically Significant relation between smoking and bilateral, left lung disease while statistically Significant relation between smoking and right lung disease**.** This result supported by **(14)** that studied for smoking-related interstitial lung diseases: a concise review, USA, concluded that, Available evidence suggests most cases of desquamate interstitial pneumonia, respiratory bronchiolitis-associated interstitial lung disease, and pulmonary Langerhans' cell histiocytosis are caused by cigarette smoking in susceptible individuals.

6. CONCLUSION

Patients with bilateral lung disease have statistical improvement in oxygenation level in prone position and side lying position as compared to Fowler position. But this improvement is highly significant in prone position as compared to side lying. As well as Patients with left lung disease will have statistical improvement in oxygenation level in right position and prone position as compared to fowler position. But this improvement is highly significant in right position as compared to prone position and Patients with right lung disease will have statistical improvement in oxygenation level in left position and prone position as compared to fowler position. But this improvement is highly significant in left position as compared to prone position.

7. RECOMMENDATIONS

To improve oxygenation level regarding caring of respiratory failure patient:

- Change position protocol should be implemented by all staff nurses working in ICUs as on essential care needed for such group of patients to improve the oxygenation level among mechanically ventilated patients.

Other research:

Replication the study in large sample and different settings

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