

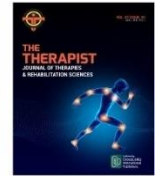


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Effects of Ankle Pumping Exercises on Limb Edema in Critically ill Patients with Acute Respiratory Distress Syndrome

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ABSTRACT

Acute Respiratory Distress Syndrome (ARDS) is an acute respiratory disease in which the respiratory activity of the lungs is compromised due to secretion of fluid in the alveoli of lungs and thus depriving the blood stream with optimal oxygen supply. **Objective:** To determine the effects of ankle pumping exercises on limb edema in critically ill patients with acute respiratory distress syndrome **Methods:** A sample of 67 patients was selected by using non-probability convenient sampling from different hospital settings. Ventilated patients or those having endotracheal tube, age between 40-65 years, and either gender was included in the study. **Results:** The effect of Range of Motion (ROM) on ARDS patients was as high as 91 %. There were 61(91.0) responders who experienced edema reduced by ankle pumping 54(80.6) found prone position and 13(19.4) found supine position effective 53(79.1) having resonant sound and 14(20.9) with hyper stony dullness 24(35.8) person having added sound and 43(64.2) crepitus sound in this study. In this study, 20 out of 67 patients who were admitted to the intensive care unit (ICU) developed acute onset of severe dyspnea, hypoxemia, and cyanosis and decreased respiratory system compliance, despite supplemental oxygen and mechanical ventilation. Edema had been reduced by ankle pumping in 61 subjects. **Conclusions:** Patients with ARDS report improvement in symptoms with physiotherapy treatment, ROM exercises had remarkable effects on such patients.

INTRODUCTION

A condition characterized by respiratory failure called acute respiratory distress syndrome (ARDS), which is deliberated as speedy onset of significant irritation within the lungs. ARDS is a form of respiratory failure due to which the fast-extensive swelling occurs within the lungs. It gives rise the lungs due to which the interchange of oxygen and carbon dioxide also increase. Basically, the ARDS occurs due to the liquid builds up and due to the flexible air bags, which is present in the lungs [1]. The fluid holds lungs since thick with bounty air, which resort inconvenience oxygen dining experiences to circulatory system. This expels organs of the oxygen they basic to work. However due to this, the risk of death also increased. The death risk increased more with the severity of illness and age. Very few people get recover from the ARDS, while the mostly people experience from lasting damage to their lungs [2]. ARDS have three main stages through which it progresses in the body. These stages are exudative, proliferative and fibrotic. The Exudative phase is the inflammatory stage of ARDS and this is released by the pro inflammatory cytokines, impaired endothelial cells and influx of neutrophils. During the exudative phase the failure of respiration take place. Although this is due to storage of fluid (rich protein) with in airspaces. This is also reduced the production of surfactant with the help of type II epithelial cells [3].

When the disorder increases then the proliferative phase get progress and enter into fibrotic stage. In the fibrotic stage the deposition of collagen gets increased due to which delayed time of ventilation perfusion befuddling, and decreased consistency of the lungs. The clinical disorder of ARDS results in different way physiological changes with increased respiratory abnormality [4]. ARDS is highly changeable as it is consisting between 2.5%–19% of intensive care unit (ICU) patients. Its variation depends on the patent population study. The study determines on the ARDS patients in the ICU of



Jinnah Hospital Lahore. The study was conducted for 3 months and the patients were diagnosed already with the ARDS. After that the results were checked by giving a proper physiotherapy session to the ARDS patients. However, the pathophysiology of ARDS also carried fluid accumulation in the lungs. It is regularly incited by intense damage with flooding lungs' infinitesimal airspaces in charge of the trading of gases, for example, O₂ and CO₂ with vessels in lungs [5]. ARDS includes partial collapse of the lungs (atelectasis). This also has the low level of oxygen within the blood (hypoxemia). The pathological findings determined that it includes cryptogenic organizing pneumonia, eosinophilia pneumonia, cryptogenic organizing pneumonia and acute fibrous organizing pneumonia. However, the pathology of all this has a great association with ARDS is DAD. And this is characterized due to the diffuse inflammation of lung tissue. The activating affront to the tissue for the most part results in inflammatory and chemical signs between endothelial and epithelial cells. Some T-lymphocytes and Neutrophils rapidly move towards lung tissues and cause intensification of the wound [6,7]. The microscopic anatomy presentation includes hyaline formation in alveolar walls and alveolar damage. ARDS lungs indicate a high level of homogeneity. Major reason behind its occurrence is anatomical variations. Whereas, the airway pressure caused by the ventilators. This pressure significantly affects the lungs in two different ways: The ratio between elastic of respiratory system and lungs elastic (there is 0.2 to 0.8 variation occur in ARDS patients). Contaminated, the ARDS lung contains territories going about as nearby pressure multipliers and they could increase the worry by implying that in those areas the Trans pulmonary weight could be twofold that present in different pieces of a similar lung. These 'stress raisers' generally compare to the inhomogeneous zones of the ARDS lung and can be available in up to 40% of the lung [8]. Moreover, when the patients were on ventilator and their body positioning and recruitment optimized then the secretion oxygenation improved by the alveolar recruitment. In addition, the Manual hyperinflation (MHI) and positive end-expiratory pressure (PEEP) assist in secretion clearance [9].

Due to the prolonged stay in ICU of hospitals, some common complications occurred which include muscle weakness, depression, anxiety, dyspnea, deconditioning and patient also reduced the quality of life [10,11]. Furthermore, the chronic illness which are prolonged diseases are associated with immobility and with ICU stay [12]. For all this purpose the physiotherapists are involved in maintaining the patient acute, sub-acute and chronic respiratory problems [13,14]. Besides all this, the respiratory dysfunction is the most common cause of serious illness in the ICU [9]. If two primary components of the respiratory system get failed then there is a need of mechanical ventilation which is used to maintain adequate gas exchange and breathing [15,16]. The purpose of this research is basically to have an overview on the current understanding of ARDS and its pathophysiology management plan and finally to review the effect of physiotherapy on the patient. In addition, the aim and focus of respiratory dysfunction are to make improvement in global ventilation and lung compliance and also focus on the reduction of airway resistance. This paper focuses on the work of breathing, body positioning and mobilization for their improvement on the ventilation, gravity dependency, V/Q matching, alveolar recruitment and lung perfusion.

METHODS

A sample of 67 patients was selected by using non-probability convenient sampling from different settings such as Services hospital, Sheikh Zayed and Jinnah hospital, Lahore. Ventilated patients or those having endotracheal tube, age between 40-65 years, and either gender was included in the study. Patients having systemic diseases, acute stroke, cognitive impairment before acute ICU illness and obese patients were excluded. Data was analyzed using SPSS 23.0. Appropriate statistical tests were used after checking normality of data.

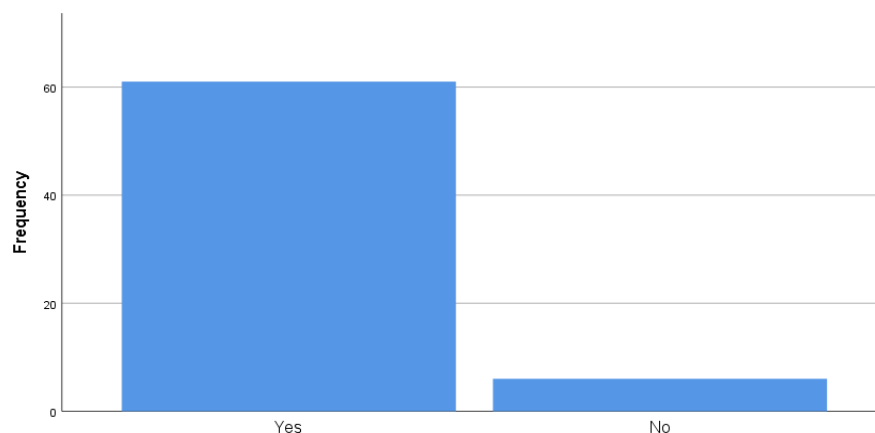


Figure 1: Patients who perform ankle pumping exercises

There were 61 participants (91%) who performed ankle pumping exercises of limbs while 6 (9%) did not perform exercises (Figure 1). In Figure 2, there were 55 participants (82%) in which edema had been reduced by ankle pumping.

Edema reduction	Frequency (%)
Yes	55 (82)
No	12 (18)
Total	67 (100)

Figure 2: Frequency of patients with reduced edema

DISCUSSION

Enrico Clini *et al.*, 2005 conducted a study to describes that acute pulmonary disease can be improved by specific body positioning. Position is directly linked with ventilation and breathing, it help to improve mucociliary clearance, lungs volume and perfusion. Ventilation of patients in ICU can be improved by changing position of patients. Upright positioning helps to increase lung volumes and reduce work of breathing. Same position increase lungs capacity [17].

Prone positioning increase oxygenation about 57–92% among patients with acute respiratory disease. Also increase lungs volume and improve its functioning. Chatte *et al.*, investigated 32 patients with mechanical ventilation. He found that mean PaO₂/FiO₂ rate significantly increased during prone position among patients [18]. Similarly, Ibanez *et al.*, designed a study in which 10 patients were studied, getting mechanical ventilation due to acute respiratory failure. They found that oxygenation rate significantly improved when patients were inside lying position. But the recovery rate was not significantly changed. Positioning prone helps to reduce gastroesophageal reflux. An additional consideration regarding the use of positioning is its effect on gastroesophageal reflux. [19].

A research on initial intensive care unit mobility therapy in the treatment of acute respiratory distress syndrome and giving to them results were of the 142 intubated admissions, 330 met study criteria and were allocated either to the Usual Care (n 165) established on block ICU allocation. Of the 1097 excepted, the exclusions were (some patients had more than one exclusion) hospital stay 72 hours before intubation, 543; nonambulatory, 168; cancer therapy, 153; stroke, 120; immunocompromised, 59; cardiopulmonary recovery at admission, 51; whereas in the current study, 14 (20.9%) had pneumonia, 33(49.3%) had sepsis and 20(29.9%) had injury [20].

CONCLUSIONS

Remarkable effects of physical therapy on critically ill patients with acute respiratory distress syndrome were observed. Ankle pumping exercises cause reduction in limb edema in these patients.

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