

**“A COMPARATIVE STUDY TO ASSESS THE EFFICACY OF BALLOON THERAPY AND INCENTIVE SPIROMETRY IN PROMOTION OF PULMONARY FUNCTION AMONG RESPIRATORY COMPROMISED PATIENTS AT SELECTED HOSPITALS OF GREATER NOIDA, U.P”**

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**Abstract**

A research study titles A comparative study to assess the efficacy of balloon therapy and incentive Spirometry in promotion of pulmonary function among respiratory compromised patients at selected hospitals of greater Noida, Uttar Pradesh.

This purpose of the study was to find out the level of improvement in pulmonary function among respiratory compromised patients by giving Balloon therapy vs. Incentive spirometry. The findings of the study can help the participants and health care professionals to plan and implement this on patient's care (who are suffering from respiratory compromised diseases).

The objectives of the study were to assess the pulmonary function in respiratory compromised patients. to assess the efficacy of balloon therapy in promotion of pulmonary function and also to assess the efficacy of incentive Spirometry in promotion of pulmonary function in respiratory compromised patients.to compare the efficacy of balloon therapy & incentive Spirometry in promotion of pulmonary function in respiratory compromised patients. to find out the association between level of pulmonary function in respiratory compromised patients after administration of balloon therapy and selected demographic and clinical variables. to find out the association between level of pulmonary function in respiratory compromised patients after administration of incentive spirometry and selected demographic and clinical variables.

A quantitative research approach was used and the research design adopted for the present study was quasi-experimental pre-test / post-test designs. The target population for the study was respiratory compromised patients at selected hospital of greater Noida, Uttar Pradesh. Sample size was 60. data analysis was done on the basis of objective and hypothesis of study.

The obtained data was analyzed based on objective and hypothesis by using descriptive and inferential statistics and hypothesis was tested at 0.05 level of significance. The results of the study say that pulmonary function improvement among 60 respiratory compromised patients, that there is significant difference between mean post-test score of balloon therapy (2.00) and mean post-test score of incentive spirometry (1.20) of pulmonary function after administration of balloon therapy and incentive spirometry in experimental groups. Study also revealed that there was no statistically significant association between level of pulmonary function in respiratory compromised patients after administration of balloon therapy and incentive spirometry with selected demographic and clinical variable.

This study concluded that mean post-test score of incentive spirometry showing more significant difference therefore, spirometry is showing more efficacy in promotion of pulmonary function among respiratory compromised patients.

**Keywords:** Respiratory compromised, Incentive spirometry, Balloon therapy, Efficacy, Pulmonary function.

## INTRODUCTION

“As you breathe in, cherish yourself. As you breathe out, cherish all beings”

**(Dalai Lama)**

Breathing is the bridge between mind and body, the connection between consciousness and unconsciousness. Breathing is one of the important functions of our body. Breath is the key to health and wellness, a function can learn to regulate and develop in order to improve our physical, mental and spiritual wellbeing. A person can only live from 5 to 10 seconds without taking another breath. We take our breathing and our respiratory health for granted, but our lungs are the vital organ, that is vulnerable to airborne infection and injury. Respiratory diseases are leading causes of death and disability in the world. Respiratory disease is a significant chronic health problem in our society. Chronic respiratory disease is found to be one of the most distressful conditions, badly affecting human life.

The respiratory system is a series of organs that are responsible for breathing; the lungs are the primary organ of this system, which also includes the nasal passage, oral cavity, pharynx, larynx, trachea, bronchi and bronchioles. Diseases of the respiratory system are one of the main causes of death in the EU and include conditions such as chronic obstructive pulmonary disease, pneumonia or asthma.

**(Respiratory diseases statistics, 2018)**

The lower respiratory tract infection pneumonia remains that most common infection seen in the community and among hospitalized patient. National disease statistics (2011) worldwide shows a

high prevalence of respiratory morbidity among patients with respiratory disorders. It says that COPD is the third leading cause of death in America. 12.7 million U.S adults (aged 18 and above) were estimated to have COPD, 10.1 million American reported chronic bronchitis and 4.7 million with emphysema.

Most of the disease burden in India is due to the respiratory disorders namely asthma, bronchitis, tuberculosis (TB) and pneumonia. **(National disease statistics , 2011)**

Respiratory compromise is a state in which there is a high likelihood of decompensation into respiratory insufficiency, respiratory failure, respiratory arrest or death, therefore in which specific interventions (continuous monitoring and therapies) might prevent or mitigate decompensation. Lung diseases and conditions, such as COPD (Chronic Obstructive Pulmonary Diseases), pneumonia, ARDS (Acute Respiratory Distress Syndrome) Pulmonary Embolism and Cystic fibrosis. These diseases and conditions can affect the flow of air and blood into and out of your lungs.

The peak expiratory flow (PEF), also called peak expiratory flow rate (PEFR), is a person's maximum speed of expiration, as measured with a peak flow meter, a small, hand-held device used to monitor a person's ability to breathe out air. It measures the airflow through the bronchi and the degree of obstruction in the airways. Peak expiratory flow is typically measured in units of liters per minute (L/min). Peak flow readings are higher when patients are well, and lower when the airways are constricted. From changes in recorded values, patients and doctors may determine lung functionality, the severity of symptoms. Measurement of PEFR requires training to correctly use a meter and the normal expected value depends on the patient's age. It is classically reduced in obstructive lung disorders such as asthma and also measure the pulmonary function. Peak flow readings are often classified into 3 zones of measurement according to the (American Lung Association) green, yellow, and red. Doctors and health practitioners can develop management plan based on the green-yellow-red zones.

Balloon therapy is a simple exercise that creates lung capacity is blowing up a certain amount of balloons each day. Blowing balloons work out the intercostal muscles responsible for spreading and elevating your diaphragm and ribcage. This allows lungs to absorb oxygen, alter its chemical composition while still in the lungs, and expel out carbon dioxide as exhaling is commenced. Balloon blowing, while effectively exercising the lungs' ability to expand and take in air, it does not affect the size or number of alveoli contained in the lungs. Alveoli are air sacs that disperse carbon dioxide during exhalation and oxygen into the blood during inhalation.

The more oxygen supplied to the body during exercise, the longer a trainer is able to exercise without becoming breathless and fatigued. Oxygen restores energy to cells and muscles by removing carbon dioxide. When plenty of oxygen is able to be processed by lungs, muscles equip themselves with energy reserves that permit trainers to continue a workout session. Committing to

a daily routine of blowing up 10 or 15 balloons steadily increases lung capacity and also amplifies the lungs ability to maintain a sufficient supply of oxygen. The deep inhalation and exhalation will enhance the way you breathe as diaphragm become stronger. This will push up more air into the lungs and therefore, increase lung capacity.

A Spirometry is a device used for the evaluation of lung function with a spirometer. It is one of the simplest most common pulmonary function tests and may be necessary for all following reason.

- To determine how well the lung, receive, hold and utilize air.
- To monitor a lung disease.
- To monitor the effectiveness of treatment
- To determine the severity of lung disease.
- To determine whether the lung disease is restrictive or obstructive.

After taking a deep breath a person forcefully breaths out in the spirometer as completely and forcefully as possible. The spirometer measures both the amount of air expelled and how quickly the air expelled from lungs. A spirometer is a vital tool in the measurement of lung functions. It provides important information to help diagnose, manage and treat a patient with any lung disease including asthma, and COPD (chronic obstructive pulmonary disease: emphysema, and chronic bronchitis). The cost of owning a spirometer has been decreasing and insurance companies, including Medicare and Medicaid, will reimburse the physician for performing the spirometry and the interpretation, so in a short time, the spirometer will pay for itself. In the future, we will see that a pulmonary function testing will be required to be done for all patients with a diagnosis of cough, bronchitis, wheezing, emphysema, pneumonia or any respiratory disorders.

### **PROCEDURE OF DATA COLLECTION**

The data was collected from January 17th to February 15th, 2019, from 60 Respiratory compromised patients who admitted inpatient department unit of Sharda Hospital, Greater Noida, U P. The sample who met the sampling criteria were included in the study. The data was collected during morning hours from 8 am to 6 pm. They were explained about the purpose of the study and a copy of subject information sheet was provided. The participants were asked to fill the demographic and clinical variable Performa after obtaining the informed consent from them. After this pulmonary function was assessed by using peak flow meter. Intervention is given in two interventional groups, one group get balloon therapy and other groups get incentive spirometry. Each participant has get intervention 3 times in a day for 3 consecutive days approximately (10-15 min) of time to be taken for completion of the procedure and there should be a 5 hours gap in between each intervention. The participants were also assured regarding the confidentiality of the information. The researcher found the participants to be co-operative during the data collection period.

### **ANALYSIS AND INTERPRETATION OF DATA**

**Section 1: Description of sample characteristics.**

Using demographic Performa, data was collected with regard to age in years, gender, educational status, area of residency, history of marriage, food habit, occupational status, area of work, habit of smoking, habit of tobacco chewing, area of admission, duration of illness, have you previously done balloon therapy, previously done spirometry, medication intake, history of any allergy, lifestyle practices. The data is presented in table.

Table: Frequency (f) and percentage (%) distribution of demographic variables and clinical variables in balloon therapy, experimental group-1

n=30

<b>Sample Characteristics</b>	<b>Frequency (f)</b>	<b>Percentage (%)</b>
<b>Age in years</b>		
20-29 years	7	23.3
30-39 years	6	20.0
40-49 years	5	16.7
50-60 years	12	40.0
<b>Gender</b>		
Male	12	40.0
Female	18	60.0

Data presented in table revealed that out of 30 samples, majority of sample having age group under 50-60year (40%). Majority of them are female (60%). Majority of them having primary education (66.7%). Majority of them belongs from rural area (56.7%).

Majority of them are married (86.7%). Majority of them are vegetarian (53.3%). Majority of them are working in private sector (33.3%) Majority of them are not working in any area (73.3%). Majority of them are non-smoker (63.3%). Majority of them are not having any history of tobacco chewing (76.7%) Majority of them admitted in chest ward (36.7%). Majority of them having duration of illness <2 years or 2-3 year (40%).Majority of sample not done balloon therapy previously (100%). Majority of sample not done spirometry previously (96.7%) Majority of sample having history of bronchodilator intake (46.7%). Majority of them are having history of allergy (66.7%). Majority of samples are not following any lifestyle modifications (73.3%).

Out of 30 samples, majority of having age group under 50-60year (46.7%). Majority of them are female (53.3%). Majority of them having primary education (50%). Majority of them belongs from rural area (53.3%). Majority of them are married (93.3%). Majority of them are vegetarian (56.7%) majority of them are self-employed occupation (36.7%) Majority of them are not working in any area (53.3%). Majority of them are non-smoker (50%). Majority of them are not tobacco chewer (70%) Majority of them admitted in chest ward (50%). Majority of them having duration of illness 2-3 year (40%). Majority of sample not done balloon therapy previously (100%). Majority of sample not done spirometry previously (96.3%). Majority of sample having history of

bronchodilator intake (63.3%). Majority of them are having history of allergy (66.7%). Majority of samples are not following any lifestyle modifications (63.3%).

### **Section 2: Description of the pulmonary function in respiratory compromised patient.**

Data presented revealed that pre-test score of pulmonary function in experimental group1 (balloon therapy) (0%) of samples having peak expiratory flow rate Good: 80-100% (>280 lit/min), (20%) are having peak expiratory flow rate Caution: 50-80% (280-235 lit/min), (80%) are having peak expiratory flow rate Need Help < 50% (<235lit/min)

### **Section 3: Description of the efficacy of balloon therapy and incentive spirometry in promotion of pulmonary function in respiratory compromised patients.**

H01: There will be no significant difference between mean pre-test score and mean post-test score of pulmonary function after administration of balloon therapy among respiratory compromised patients.

Data presented revealed that there is a significant difference between mean pre-test and post-test scores of pulmonary function after administration of balloon therapy in experimental group-1 at 0.05 level of significance. P value= 0.001\*. Hence, Null hypothesis is rejected and research hypothesis is accepted.

There is significant difference between mean pre-test and mean post-test scores of pulmonary function after administration of incentive spirometry in experimental group-2 at 0.05 level of significance. P value= 0.001\* Hence, Null hypothesis is rejected and research hypothesis is accepted.

### **Section 4: Compare the efficacy of balloon therapy and incentive spirometry in promotion of pulmonary function in respiratory compromised patients.**

Data presented revealed that there is significant difference between mean post-test score of balloon therapy (2.00) and mean post-test score of incentive spirometry (1.20) of pulmonary function after administration of balloon therapy and incentive spirometry in experimental groups.

### **Section 5: Find out the association between level of pulmonary function in respiratory compromised patients after administration of balloon therapy and selected demographic and clinical variables.** H03: There will be no significant association between the level of pulmonary function in respiratory compromised patients after administration of balloon therapy and selected demographic and clinical variables.

Data presented revealed that there was no statistically significant association between level of pulmonary function in respiratory compromised patients after administration of balloon therapy and selected demographic and clinical variables (experimental group -1) Demographic variables such as age (p=.392), gender (p=.585), education (p=.152), residential area (p=.392), marital status (p=.585), type of diet (p=.387), occupation (p=.694), work area (p=.594). Clinical variables such as smoking habit (p=.262), habit of tobacco chewing (p=.387), area of admission (p=.809),

duration of illness ( $p=.320$ ), previously done spirometry ( $p=.355$ ), medication intake ( $p=.472$ ), history of allergy ( $p=.549$ ), life style followed ( $p=.656$ ). Hence, null hypothesis is accepted and research hypothesis is rejected.

**Section 6: Find out the association between level of pulmonary function in respiratory compromised patients after administration of incentive spirometry and selected demographic and clinical variables.**

H04: There will be no significant association between the level of pulmonary function in respiratory compromised patients after administration of incentive spirometry and selected demographic and clinical variables.

Data presented revealed that there was no statistically significant association between level of pulmonary function in respiratory compromised patients after administration of incentive spirometry and selected demographic and clinical variables (experimental group -2) Demographic variables such as age ( $p=.226$ ), gender ( $p=.272$ ), education ( $p=.091$ ), residential area ( $p=.855$ ), marital status ( $p=.464$ ), type of diet ( $p=.580$ ), occupation ( $p=.681$ ), work area ( $p=.839$ ). Clinical variables such as smoking habit ( $p=.097$ ), habit of tobacco chewing ( $p=.392$ ), area of admission ( $p=.343$ ), duration of illness ( $p=.838$ ), previously done spirometry ( $p=.042$ ), medication intake ( $p=.309$ ), history of allergy ( $p=.1.000$ ), life style followed ( $p=.427$ ). Hence, null hypothesis is accepted and research hypothesis is rejected.

**MAJOR FINDINGS**

**Major findings Experimental Group -1(Balloon Therapy) of the study were:**

Shows that majority of sample having age group under 50-60year (40%). Majority of them are female (60%). Majority of them having primary education (66.7%). Majority of them belongs from rural area (56.7%). Majority of them are married (86.7%). Majority of them are vegetarian (53.3%). Majority of them are working in private sector (33.3%). Majority of them are not working in any area (73.3%). Majority of them are non-smoker (63.3%). Majority of them are not having any history of tobacco chewing (76.7%). Majority of them admitted in chest ward (36.7%). Majority of them having duration of illness Majority of sample not done spirometry previously (96.7%). Majority of sample having history of bronchodilator intake (46.7%). Majority of them are having history of allergy (66.7%). Majority of samples are not following any lifestyle modifications (73.3%). Major findings Experimental Group -2 (Incentive Spirometry) of the study were: Majority of sample having age group under 50-60year (46.7%). Majority of them are female (53.3%). Majority of them having primary education (50%). Majority of them belongs from rural area (53.3%). Majority of them are married (93.3%). Majority of them are vegetarian (56.7%). Majority of them are self-employed occupation (36.7%) Majority of them are not working in any area (53.3%). Majority of them are non-smoker (50%). Majority of them are not tobacco chewer (70%). Majority of them admitted in chest ward (50%). Majority of them having duration of illness 2-3 year (40%). Majority of them having duration of illness 2-3 year (40%). Majority of sample not done balloon therapy previously (100%). Majority of sample not done spirometry previously

(96.3%). Majority of sample having history of bronchodilator intake (63.3%). Majority of them are having history of allergy (66.7%). Majority of samples are not following any lifestyle modifications (63.3%).

Finding from study revealed that there is significant difference between mean pre-test (2.80) and post-test (2.00) scores of pulmonary function after administration of balloon therapy in experimental group-1. therefore, there is efficacy of balloon therapy in promotion of pulmonary function among respiratory compromised patient's P value= 0.001\* Finding from study revealed that there is significant difference between mean pre-test (2.53) and post-test (1.20) scores of pulmonary function in experimental group-2. therefore, there is efficacy of incentive spirometry in promotion of pulmonary function among respiratory compromised patient's P value= 0.001\*. Finding of study revealed that there is significant difference between mean posttest score of balloon therapy (2.00) and mean post-test score of incentive spirometry (1.20) of pulmonary function after administration of balloon therapy and incentive spirometry in experimental groups. Therefore, result revealed that incentive spirometry is more effective as compared to balloon therapy P-value =0.001\* in promotion of pulmonary function among respiratory compromised patients. Finding of study revealed that there was no statistically significant association between level of pulmonary function in respiratory compromised patients after administration of balloon therapy and selected demographic and clinical variables (experimental group -1) Finding of study revealed that there was no statistically significant association between level of pulmonary function in respiratory compromised patients after administration of incentive spirometry and selected demographic and clinical variables (experimental group -2).

## CONCLUSION

The study findings clearly reveal that regular practice of balloon therapy incentive spirometry improves the pulmonary function among respiratory compromised patients, as there was a significant improvement between mean post-test score (2.00) of balloon therapy and mean post-test score (1.20) of incentive spirometry of pulmonary function after administration of balloon therapy and incentive spirometry in experimental groups. The study findings also revealed that mean post-test score of incentive spirometry showing more significant difference than balloon therapy means post-test score of pulmonary function, therefore, spirometry is showing more efficacy in promotion of pulmonary function among respiratory compromised patients. This simple cost-effective intervention can also be considered as an alternative measure to improve the pulmonary function among respiratory compromised patients.

## RECOMMENDATIONS

The following recommendations are put forward as per the findings of the study.

- A similar study can be done on a larger population.
- Similar kind of study can be conducted for patients who were having other disorder which involving pulmonary function deterioration.



- The same study can be conducted by administering incentive spirometry in respiratory compromised patients for a longer period.
- The same study can be conducted among different age group.
- This study can be done as comparative study between incentive spirometry and deep breathing exercises.

### LIMITATION

Study was conducted in one setting.

- Setting of the study was selected purposively which limits the generalization of the findings.
- This study was limited to the respiratory compromised patients under (20-60) years of age.
- The study limited to those respiratory compromised patients who are admitted in Chest Ward, Medicine Ward, Respiratory ICU, and Casualty, therefore, generalization of the study findings is limited.

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