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A Study to Assess the Immediate Effect of Breathing Exercises on Selected Respiratory Parameters Among Patients with Restrictive Respiratory Disorders at Selected Hospital of the City

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ABSTRACT

Background: Restrictive lung diseases are characterized by reduced lung volumes, either because of an alteration in lung parenchyma or because of a disease of the pleura, chest wall, or neuromuscular apparatus. Unlike obstructive lung diseases, such as asthma and chronic obstructive pulmonary disease (COPD), which show a normal or increased total lung capacity (TLC), restrictive disease are associated with a decreased TLC. Measures of expiratory airflow are preserved and airway resistance is normal and the forced expiratory volume in 1 second (FEV1)/forced vital capacity (FVC) ratio is increased. If caused by parenchymal lung disease, restrictive lung disorders are accompanied by reduced gas transfer, which may be marked clinically by desaturation after exercise. The many disorders that cause reduction or restriction of lung volumes may be divided into two groups based on anatomical structures.

The first is intrinsic lung diseases or diseases of the lung parenchyma. The diseases cause inflammation or scarring of the lung tissue (interstitial lung disease) or result in filling of the air spaces with exudate and debris (pneumonitis). he second is extrinsic disorders or extrapulmonary diseases. The chest wall, pleura, and respiratory muscles are the components of the respiratory pump, and they need to function normally for effective ventilation.

Objectives: objectives of the study were 1. To assess selected respiratory parameters among patients with restrictive respiratory disorders.2. To evaluate the immediate effect of breathing exercises on selected respiratory parameters among patients with restrictive respiratory disorders.3. To compare the selected respiratory parameters before and after the breathing exercise.4. To find out the association between selected respiratory parameters with selected demographic variables.

Method: A quasi experimental one-group pre-test and post-test design were used to assess the immediate effect of breathing exercises on selected respiratory parameters among patients with restrictive respiratory disorders at selected hospital of the city. The data was collected from 30 restrictive respiratory disorders patients by using non-probability purposive sampling technique. The results were computed using both the descriptive and inferential statistics based on the objectives of the study.

Results: The result PFT parameter shows that, PEFR before breathing exercises mean found to be 6.78 and standard deviation 0.92, after breathing exercises mean found to be 7.99 and standard deviation 0.41 and unpaired t test value found to be 6.559*. FEV1 before breathing exercises mean found to be 3.11 and standard deviation 0.90, after breathing exercises mean found to be 4.01 and standard deviation 1.36 and unpaired t test value found to be 3.009*. FVC before breathing exercises mean found to be 3.74 and standard deviation 1.15, after breathing exercises mean found to be 4.39 and standard deviation 1.32 and unpaired t test value found to be 2.038*. FEV1/FVC percentage before breathing exercises mean found to be 84.2% and standard deviation 9.37, after breathing exercises mean found to be 91.09 and standard deviation 8.80 and unpaired t test value found to be 2.936*.

Conclusion: findings of the study indicates that breathing exercises among patients with restrictive respiratory disorder is found to be effective and helpful in improving pulmonary function.

Keywords: *Effectiveness, Restrictive Respiratory Disorders, Breathing Exercises.*

1. INTRODUCTION

"Whatever is going to happen in life will happen. Just be thankful to be alive — to be breathing." – John Landry

The respiratory system in humans is subdivided into two major parts: the upper respiratory tract (URT) and the lower respiratory tract (LRT). The URT is composed of nose/nostrils, mouth, and the initial portion of trachea. The LRT includes the trachea that progressively bifurcates into the bronchi, bronchioles, and finally to the functional units known as alveoli. The airways are supported by the lung parenchyma, and the gas exchange takes place with pulmonary vasculature. The most important function of the respiratory system is the exchange of gases, that is, absorption of oxygen (O_2) and release of carbon dioxide (CO_2). This gas exchange into the pulmonary capillaries takes place through the single membranes of the pulmonary alveolus. The process of inhalation/exhalation is facilitated by predominantly two types of muscles, that is, diaphragm and intercostal muscles. The average weight of a normal human lungs is approximately 1 kg. Measuring the volume and action of inhalation/exhalation of air is key to establish the presence of restrictive and/or obstructive lung diseases, such as asthma and COPD.[1]

Normal ventilation is an automatic, seemingly effortless inspiratory expansion and expiratory contraction of the chest cage. This act of normal breathing has a relatively constant rate and inspiratory volume that together constitute normal respiratory rhythm. The accessory muscles of inspiration (sternocleidomastoid and scalene) and expiration (abdominal) are not normally used in the resting state. Abnormalities may occur in rate, rhythm, and in the effort of breathing. There are multiple types of normal and abnormal respiration. They include apnea, eupnea, orthopnea, dyspnea, hyperpnea, hyperventilation, hypoventilation, tachypnea, Kussmaul respiration, Cheyne-Stokes respiration, sighing respiration, Biot respiration, apneustic breathing, central neurogenic hyperventilation, and central neurogenic hypoventilation. Each pattern is clinically important and useful in evaluating patients.[2]

Respiratory diseases are any of the diseases and disorders of the airways and the lungs that affect human respiration. Any part of the respiratory system may become infected or diseased and the effects may have a wide variety of complications. The response to infection, as elsewhere in the body, is an inflammatory reaction. Fibrosis occurs if the condition becomes chronic, resulting in a loss of elasticity, with possible permanent decrease in ventilation. The oxygen uptake is impaired and carbon dioxide accumulates. The tissues no longer perform as well and general health is impaired, with the patient easily fatiguing. Alongside the inflammatory reaction, there is increased mucus secretion, resulting in obstruction of the airways with collapse of the lung tissue distal to the block. It is of paramount importance to regain expansion of the area as soon as possible because the collapsed tissue becomes fibrosed, with permanent reduction of the ventilation capacity of the lungs.[3]

Based on disease pathology and mode of transmission, the respiratory diseases could be broadly categorized into communicable, that is, infectious diseases (e.g., tuberculosis and pneumonia), and noncommunicable (NCD), that is, diseases that do not have an infectious etiology (e.g., asthma, chronic obstructive pulmonary disease (COPD), cystic fibrosis, interstitial pulmonary fibrosis, and lung cancer). These respiratory diseases have a set of varied causes and are diagnosed very differently. However, especially the noncommunicable CRDs are treated similarly; that is, the treatment of these diseases generally includes a bronchodilator, corticosteroids, and antibiotics. Moreover, the focus on understanding the pathology of COPD has only been initiated in the last two decades, and the regions with substantial disease burden lack a credible disease diagnosis and prevention/management strategy. This is particularly a cause of concern in low- and middle-income countries such as India, China, and countries in multiple regions, including those in Asia Pacific, Latin America, and Africa.[4]

Restrictive lung diseases are a category of extrapulmonary, pleural, or parenchymal respiratory diseases that restrict lung expansion, resulting in a decreased lung volume, an increased work of breathing, and inadequate ventilation and/or oxygenation. Pulmonary function test demonstrates a decrease in the forced vital capacity. Restrictive lung diseases may be due to specific causes which can be intrinsic to the parenchyma of the lung, or extrinsic to it.

Intrinsic causes: - Pneumoconiosis caused by long-term exposure to dusts, especially in mining. For example, Asbestosis, Radiation fibrosis, usually from the radiation given for cancer treatment, Certain drugs such as amiodarone, bleomycin and methotrexate, As a consequence of another disease such as rheumatoid arthritis, Hypersensitivity pneumonitis due to an allergic reaction to inhaled particles, Acute respiratory distress syndrome (ARDS), a severe lung condition occurring in response to a critical illness or injury, Infant respiratory distress syndrome due to a deficiency of surfactant in the lungs of a baby born prematurely, Tuberculosis.

Many cases of restrictive lung disease are idiopathic (have no known cause). Still, there is generally pulmonary fibrosis. Examples are: Idiopathic pulmonary fibrosis, Idiopathic interstitial pneumonia, of which there are several types, Sarcoidosis, Eosinophilic pneumonia, Lymphangioleiomyomatosis, Pulmonary Langerhans' cell histiocytosis, Pulmonary alveolar proteinosis, interstitial lung diseases.

Extrinsic causes: -

Non-muscular diseases of the upper thorax such as kyphosis, pectus carinatum and pectus excavatum, Diseases restricting lower thoracic/abdominal volume (e.g. obesity, diaphragmatic hernia, or the presence of ascites), Pleural thickening.[5]

BACKGROUND OF THE STUDY:

Restrictive lung diseases are characterized by reduced lung volumes, either because of an alteration in lung parenchyma or because of a disease of the pleura, chest wall, or neuromuscular apparatus. Unlike obstructive lung diseases, such as asthma and chronic obstructive pulmonary disease (COPD), which show a normal or increased total lung capacity (TLC), restrictive diseases are associated with a decreased TLC. Measures of expiratory airflow are preserved and airway resistance is normal and the forced expiratory volume in 1 second (FEV)/forced vital capacity (FVC) ratio Is Increased. If caused by parenchymal lung disease, restrictive lung disorders are accompanied by reduced gas transfer, which may be marked clinically by desaturation after exercise.[5]

The many disorders that cause reduction or restriction of lung volumes may be divided into two groups based on anatomical structures.

The first is intrinsic lung diseases or diseases of the lung parenchyma. The diseases cause inflammation or scarring of the lung tissue (interstitial lung disease) or result in filling of the air spaces with exudate and debris (pneumonitis). These diseases can be characterized according to etiological factors. They include idiopathic fibrotic diseases, connective-tissue diseases, drug-induced lung disease, environmental exposures (inorganic and organic dusts), and primary diseases of the lungs (including sarcoidosis).

The second is extrinsic disorders or extrapulmonary diseases. The chest wall, pleura, and respiratory muscles are the components of the respiratory pump, and they need to function normally for effective ventilation. Diseases of these structures result in lung restriction, impaired ventilatory function, and respiratory failure (e.g., non-muscular diseases of the chest wall, neuromuscular disorders).[5]

Frequency of respiratory disease: -

Asthma (42.4%) was the most frequent primary diagnosis among enrolled patients, followed by AR (29.9%) COPD (23.2%) and rhinosinusitis (4.5%).[5]

2. NEED FOR STUDY

The range of clinical conditions included under the umbrella of "respiratory medicine" is wide. From cancers to obstructive sleep apnea, interstitial lung disease to airways disease, occupational lung disease to respiratory infections, there is a variety present in respiratory medicine not seen in other hospital-based specialties. This diversity makes respiratory medicine a deeply rewarding specialty in which to work, but also means that it is not easy to quantify the full impact of lung disease on the health of the British public.[6]

For this reason, the British Thoracic Society has produced the second edition of "The Burden of Lung Disease" which includes a number of statistics that may be startling to the casual reader and of interest to those involved in resource allocation in the NIIS For example, of the 580 000 deaths each year in the UK, one in five is due to respiratory disease with 35 000 deaths from lung cancer, 34 000 from pneumonia, and 27 000 from COPD. Respiratory disease now accounts for more than 845 000 hospital admissions each year and is second only to injury and poisoning as a cause of emergency admission to hospital. Asthma remains the most common chronic illness in children.[6]

In the past, respiratory research has proved itself effective in vanquishing major killers such as tuberculosis, transforming the lives of patients with asthma and developing life-saving non-invasive ventilation for those with chronic respiratory failure. Now, new problems affect our patients with respiratory diseases and present an enormous burden of ill health that we are currently ill equipped to deal with. The second edition of the Burden of lung disease was published by the British Thoracic Society in June 2006; it documents that respiratory diseases now kill one in five people in the UK, with the standardized mortality ratio for respiratory diseases showing a threefold difference across social classes. More people die from respiratory disease than from ischemic heart disease. Respiratory diseases are the most common cause of long-term illness in children, result in the highest levels of consultations with general practitioners and are the second most common reason for emergency hospital admission.[6]Over time, stale air builds up, leaving less room for the diaphragm to contract and bring in fresh oxygen. With the diaphragm not working to full capacity, the body starts to use other muscles in the neck, back and chest for breathing. This translates into lower oxygen levels, and less reserve for exercise and activity. Breathing exercises can help rid the lungs of accumulated stale air, increase oxygen levels and get the diaphragm to return to its job of helping you breathe.[7]Considering the above statistics, the researcher felt the need to assess the effect of deep breathing exercise on selected respiratory parameters among patients with restrictive respiratory disorders.

STATEMENT OF PROBLEM: -

"A study to assess the immediate effect of breathing exercises on selected respiratory parameters among patients with restrictive respiratory disorders at selected hospitals of the city."

OBJECTIVES OF THE STUDY: -

Primary objectives: -

- To assess selected respiratory parameters among patients with restrictive respiratory disorders.
- To evaluate the immediate effect of breathing exercises on selected respiratory parameters among patients with restrictive respiratory disorders.
- To compare the selected respiratory parameters before and after the breathing exercise.
- To find out the association between selected respiratory parameters with selected demographic variables.

HYPOTHESIS: -

(All Hypotheses will be tested at 0.05 level of significance)

Primary Hypothesis: -

H_{01} – There will be no significant immediate effect of breathing exercises on selected respiratory parameters in patients with restrictive respiratory disorders.

H_1 – There will be significant immediate effect of breathing exercises on selected respiratory parameters in patients with restrictive respiratory disorders.

Secondary hypothesis: -

H_{02} - There will be no significant association between selected respiratory parameters with selected demographic variables.

H_2 - There will be significant association between selected respiratory parameters with selected demographic variables.

OPERATIONAL DEFINITIONS: -

ASSESS: - According to oxford dictionary, assess refers to make a judgement about the nature or quality of somebody/something.

In the present study, it is operationalized that measurement of effect of breathing exercises on selected respiratory parameters.

IMMEDIATE EFFECT: - According to Oxford Dictionary "effect is designed as a change which is a result of an action or other cause."

Immediate effect refers to the direct consequence or outcome resulting from a particular event or action without any significant delay.

BREATHING EXERCISE: - Breathing exercises are designed to retrain the muscles of respiration and improve ventilation, lessen the work of breathing and improve gas exchange and oxygenation.

RESTRICTIVE RESPIRATORY DISORDERS: - Restrictive lung diseases are a heterogeneous set of pulmonary disorders defined by restrictive patterns on spirometry. These disorders are characterized by a reduced distensibility of the lungs, compromising lung expansion, and, in turn, reduced lung volumes, particularly with reduced total lung capacity.

SELECTED RESPIRATORY PARAMETERS: - In the present study selected respiratory parameters are respiration rate, SPO_2, breathing pattern, PFT (PEFR), FVC, FEV_1, FVC/FEV_1).

Breathing Pattern: - Normal ventilation is an automatic, seemingly effortless inspiratory expansion and expiratory contraction of the chest cage. This act of normal breathing has a relatively constant rate and inspiratory volume that together constitute normal respiratory rhythm. The accessory muscles of inspiration (sternocleidomastoid and scalenes) and expiration (abdominal) are not normally used in the resting state. Abnormalities may occur in rate, rhythm, and in the effort of breathing.

CONCEPTUAL FRAMEWORK: -

A conceptual framework is a theoretical approach to the study of problems that are scientifically based on emphasizes the selection, arrangement, and classification of its concepts. Conceptual framework refers to the interrelated concepts or abstractions that are assembled together in some rational scheme by virtue of their relevance to a common theme.

Conceptualization is a process of forming ideas, which utilized and form a conceptual framework for the development of research design. It helps the researcher to know what data need to be collected and gives direction to the entire research process. The aim of the present study is to assess the immediate effect of breathing exercises on selected respiratory parameters among patients with restrictive respiratory disorders at selected hospitals of the city. The theoretical framework for this study is based upon Nola penders health promotion model theory (1997) that is mostly applicable while dealing with improve the breathing pattern and promoting deep breathing exercise. Health promotion is defined as behavior motivated by the desire to increase well-being and actualize human health potential. It is an approach to wellness.

Major concept: -

Person

Man has the ability to express human health potential and has the capacity for reflective self-awareness, including the assessment of his own competencies The important of an individual's unique personal factors or characteristics and experiences will depend on the target behavior for health promotion.

Health

Health promotion is defined as client behavior towards developing well-being and actualization human health potential. Health protection is client behavior geared towards preventing illness detecting it early or maintaining function.

Nursing

The trend towards health promotion has created the opportunity for nurse to strengthen the professions influences on health information disseminate information that promotes an educated public and assist individuals and communities to change long–standing health behavior.

Environment

Individuals are more apt to perform behavior if they are comfortable with the environment versus feeling alienated environment that are consider safe as well as facilitate health promotion behavior.

Key concept: -

Individual characteristics and experiences

- Prior related behavior
- Most of the person have breathing problem and less know about the deep breathing exercise
- Personal factors: -

People have inadequate experience about deep breathing exercise

Behavior specific cognitions and affect

- Perceived benefits of action
- In this study the immediate effect of breathing exercises among patients with restrictive respiratory disorder.

Perceived barriers to action

- Perceived self –efficacy
- Activity –related affect
- Interpersonal influences
- Situational influences

Behavior outcomes

- Commitment to a plan of action
- Immediate competing demands and preferences
- Health –promoting behavior

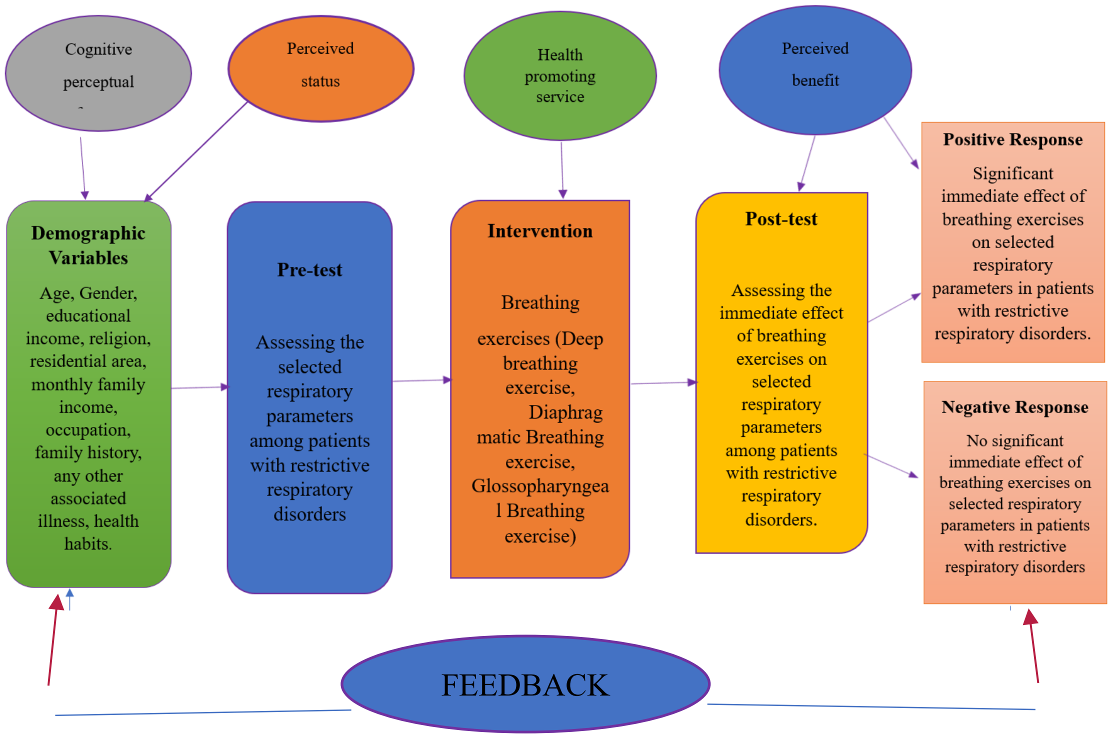


Figure: 1 Nola Penders health promotion model (1997)

3. REVIEW OF LITERATURE

Review of literature is the key step in the research process. Review of literature refers to an extensive, exhaustive, and systemic examination of publications relevant to the research project. The most satisfying aspect of the literature review is the contribution it makes to the new knowledge, insight, and general scholarship of the research.

A literature review is defined as a broad, comprehensive, in-depth, systematic, and critical review of scholarly publication, unpublished printed or audio-visual materials, and personal communications.

The overall purpose of the review of literature is to develop a strong knowledge base to carry out research scholarly education and clinical practice activities. It helps to determine the gaps and inconsistencies in the literature about a particular study subject under the study. Review of literature guides the investigator to design the proposed study in a scientific manner so as to achieve the desired results.

The literature reviewed under following heading: -

- Literature Related to Prevalence/ Incidence of restrictive respiratory disorders.
- Literature Related to effect of breathing exercise on respiratory disorders.

Literature Related to Prevalence / Incidence of restrictive respiratory disorders: -

Roy Arokiam Daniel (2021) conducted study on Prevalence of chronic obstructive pulmonary disease in India: A systematic review and meta-analysis. Author searched PubMed, Embase, Cochrane Library, Google Scholar, and Scopus and included community-based cross-sectional studies reporting data on the prevalence of COPD among adults based on spirometry. A random-effects model was used to estimate the pooled prevalence of COPD. The author concluded that in the eight identified studies, (pooled sample of 8,569 individuals), the estimated prevalence was 7.4% (95% confidence interval: 5.0% -9.8%), 1^2 = 95.4% (P<0.001). The prevalence was higher among males, in the urban area, and the northern region. Adequate training and resources should be provided to diagnose COPD at primary health care level for early management. A nationwide population-based survey is indicated to provide reliable estimates of the burden to inform evidence-based community-based interventions.[8]

Dr Earl S. Ford (2015), conducted a study on Trends in the Prevalence of Obstructive and Restrictive Lung Function Among

Adults in the United States. The objective of this study was to provide current estimates for obstructive and restrictive impairment of lung function and to examine changes since 1988-1994. Author used data from 14,360 participants aged 20 to 79 years from the National Health and Nutrition Examination Survey (NHANES) III (1988-1994) and 9,024 participants from NHANES 2007-2010. Spirometry was conducted using the same spirometers and generally similar protocols. During 2007-2010, 13.5% (SE, 0.6) of participants had evidence of airway obstruction (FEV_1/FVC, <0.70): 79.9% of adults had normal lung function, 6.5% had a restrictive impairment, 7.5% had mild obstruction, 5.4% had moderate obstruction, and 0.7% had severe obstruction. Although the overall age-adjusted prevalence of any obstruction did not change significantly from 1988-1994 (14.6%) to 2007-2010 (13.5%) ($P = .178$), significant decreases were noted for participants aged 60 to 79 years and for Mexican Americans. The prevalence of current smoking remained high among participants with moderate (48.4%) and severe (37.9%) obstructive impairments. A significant decline in current smoking occurred only among those with normal lung function ($P < .05$). author concluded the study that Spirometry revealed little change in the prevalence of any obstructive and restrictive impairment in lung function during 2007-2010, compared with 1988-1994.[9]

Min Xie, Xiansheng Liu et al (2020), conducted a study on Trends in prevalence and incidence of chronic respiratory diseases from 1990 to 2017. Based on data from the Global Burden of Diseases, Injuries, and Risk Factors Study 2017, author analyzed the prevalence and incidence trends of CRDs from 1990 to 2017 according to age, sex, region and disease pattern. Furthermore, the correlations between the incidence and the World Bank income levels, sociodemographic index (SDI), and human development index (HDI) levels were analyzed to assess the factors affecting incidence. The total number of CRD cases increased by 39.5% from 1990 to 2017, nevertheless, the age-standardized prevalence rate (ASPR) and age-standardized incidence rate (ASIR) showed decreasing trends. The ASIRs of CRD, chronic obstructive pulmonary disease (COPD), pneumoconiosis, and asthma decreased, whereas the ASIR of interstitial lung disease and pulmonary sarcoidosis increased during the past 27 years. Significant differences between males and females in the incidence rates of pneumoconiosis, interstitial lung disease and pulmonary sarcoidosis were observed. Elderly people especially suffered from CRDs, except for asthma. Author concluded that in 2017, CRDs were still the leading causes of morbidity worldwide. A large proportion of the disease burden was attributed to asthma and COPD. The incidence rates of all four types of CRDs varied greatly across the world. Statistically significant correlation was found between the ASIR and SDI/HDI.[10]

Davies Adeloye, (2019), conducted a study on Global, regional, and national prevalence of, and risk factors for, chronic obstructive pulmonary disease (COPD) in 2019: a systematic review and modelling analysis, for this systematic review and modelling study, author searched MEDLINE, Embase, Global Health, and CINAHL, for population-based studies on COPD prevalence published between Jan 1, 1990, and Dec 31, 2019. Researcher included data reported using the two main case definitions: the Global Initiative for Chronic Obstructive Lung Disease fixed ratio (GOLD; FEV_1/FVC<0·7) and the lower limit of normal (LLN; FEV_1/FVC<LLN). Researcher employed a multilevel multivariable mixed-effects meta-regression approach to generate the age-specific and sex-specific prevalence of COPD in 2019 for high-income countries (HICs) and low-income and middle-income countries (LMICs) according to the World Bank definition. Common risk factors for GOLD-COPD were evaluated using a random-effects meta-analysis. Author identified the overall prevalence of GOLD-COPD among people aged 30–79 years was the highest in the Western Pacific region (11·7% [95% CI 9·3–14·6]) and lowest in the region of the Americas (6·8% [95% CI 5·6–8·2]). Globally, male sex (OR 2·1 [95% CI 1·8–2·3]), smoking (current smoker 3·2 [2·5–4·0]; ever smoker 2·3 [2·0–2·5]), body-mass index of less than 18·5 kg/m^2 (2·2 [1·7–2·7]), biomass exposure (1·4 [1·2–1·7]), and occupational exposure to dust or smoke (1·4 [1·3–1·6]) were all substantial risk factors for COPD.[11]

Literature related to effect of breathing exercise on respiratory disorders: -

Elizabeth Tharion (2020), conducted a study on influence of deep breathing exercise on spontaneous respiratory rate and heart rate variability: a randomized controlled trial in healthy subjects, studies show that yogic type of breathing exercises reduces the spontaneous respiratory rate. Author investigated the effects of non-yogic breathing exercise on respiratory rate and heart rate variability. Healthy subjects (21-33 years, both genders) were randomized into the intervention group (n-18), which performed daily deep breathing exercise at 6 breaths/min (0.1 Hz) for one month, and a control group (n-18) which did not perform any breathing exercise. Reassessment was done after one month and the change in the parameters from baseline was computed for each group. Comparison of the absolute changes [median (inter-quartile ranges)] of the parameters between the intervention and control group showed a significant difference in the spontaneous respiratory rate (intervention group -2.50 (-4.00, -1.00), control group 0.00 (-1.00, 1.00), cycles/min, P<0.001), mean arterial pressure [Intervention group -0.67 (-6.67, 1.33), control group 0.67 (0.00, 6.67), mmHg. (P<0.05)], high frequency power [intervention group. 278.50 (17.00, 496.00), control group -1.00 (-341.00, 196.00) ms. In conclusion, the changes produced by simple deep slow breathing exercise in the respiratory rate and cardiac autonomic modulation of the Intervention group were significant, when compared to the changes in the control group. Thus, practice of deep slow breathing exercise improves heart rate variability in healthy subjects, without altering their cardiac autonomic balance. These findings have implications in the use of deep breathing exercises to improve cardiac autonomic control in subjects known to have reduced heart rate variability.[12]

Arazi, Tajmohammad (2021), conducted a study on Effect of a Breathing Exercise on Respiratory Function and 6-Minute Walking Distance in Patients Under Hemodialysis: A Randomized Controlled Trial: [RETRACTED], study was designed to determine the effectiveness of a breathing exercise on respiratory function and 6-minute walk (6MW) distance in patients under hemodialysis. A randomized controlled trial approach was used. The sample consisted of 52 patients under hemodialysis from a university teaching hospital in Iran. The experimental group (n = 26) received the breathing exercise program and was encouraged to perform incentive spirometry for 2 months. The control group (n = 26) received only routine hospital care. The respiratory function test and 6MW test were performed at baseline and at 2 months after the intervention (posttest). Author concluded the study the 2-month breathing exercise effectively improved pulmonary function parameters (forced vital capacity, forced expiratory volume in 1 second) in patients under hemodialysis but did not affect 6MW distance. Hemodialysis nurses should strengthen their clinical health education and apply breathing exercise programs to reduce the pulmonary complications experienced by patients under hemodialysis.[13]

Manzur Kader (2022), conducted a study on Effects of short-term breathing exercises on respiratory recovery in patients with COVID-19: a quasi-experimental study, the author used a quasi-experimental, pre-and post-test study. The study recruited 173 patients hospitalized with moderate to severe COVID-19. All the patients received standardized care for COVID-19, and 94 patients in the intervention group also received the intervention of breathing exercises, which included breathing control, followed by diaphragmatic breathing, deep breathing, or thoracic expansion exercise, and huffing (forced expiratory technique) and coughing. Data on the mean values of peripheral oxygen saturation (SpO_2), need for oxygen therapy (litre/min), respiratory rate (breaths/minute), and heart rate (beats/minute) and were collected at baseline, 4 days, and 7 days after the baseline assessment. The results were mean (± SD) age of the intervention (69.6% men) and control group (62.1% men) were 50.1 (10.5) and 51.5 (10.4) years, respectively. At 4-day of follow-up, SpO2 (96.6% ± 1.9 vs. 90.7% ± 1.8, P < 0.001), need for oxygen therapy (0.8 ± 2.6 vs. 2.3 ± 2.9, P < 0.001), respiratory rate (20.5 ± 2.3 vs. 22.3 ± 2.5, P < 0.001), and heart rate (81.2 ± 9.5 vs. 89.2 ± 8.9, P < 0.001) improved in the intervention group compared to the control group. At 7-day follow-up, differences remained significant concerning the oxygen saturation and the need for oxygen therapy (P < 0.001) between the groups. The results indicated that breathing exercise, even for a short period, effectively improves specific respiratory parameters in moderate to severe COVID-19 patients.[14]

Danielle S. R. Vieira (2014), conducted a study on breathing exercises: influence on breathing patterns and thoracoabdominal motion in healthy subjects, the objective was to evaluate the impact of four on breathing exercises (diaphragmatic breathing, inspiratory sighs, sustained maximal inspiration and intercostal exercise) the on-breathing pattern and thoracoabdominal motion in healthy subjects. Fifteen subjects of both sexes, aged 23±1.5 years old and with normal pulmonary function tests, participated in the study. The subjects were evaluated using the optoelectronic plethysmography system in a supine position with a trunk inclination of 45° during quiet breathing and the breathing exercises. The order of the breathing exercises was randomized. Statistical analysis was performed by the friedman test and an anova for repeated measures with one factor (breathing exercises), followed by preplanned contrasts and bonferroni correction. A p<0.005 value was considered significant. The results showed that the breathing exercises investigated in this study produced modifications in the breathing pattern (*e.g.,* increase in tidal volume and decrease in *RR*) as well as in thoracoabdominal motion (*e.g.,* increase in abdominal contribution during diaphragmatic breathing), among others.[15]

Sunitha G (2013), conducted a study on effect of deep breathing on respiratory parameters in healthy young individuals, The present study was done to evaluate the effect of deep breathing on respirator y parameters. In the study, author examined the relationship between exposure to deep breathing and performance on Respiratory parameters before and after the deep breathing. The study was a comparative prospective study consisting of 30 male healthy subjects of 18-20 years age. This study was conducted in the Department of physiology, Adichunchanagiri institute of medical sciences, Mandya after the institutional ethical clearance and written consent from each participant. The participants were asked to perform deep breathing. The duration of the study was twelve weeks. Pre and pos t deep breathing respiratory functions were assessed by measuring respiratory rate, chest expansion and breath holding time. The parameters were analyzed by Student 't' test and p<0.05 was considered the level of significance. Results: There was significant decrease in respiratory rate, and significant increase in chest expansion and breath holding time compared to pre deep breathing practice. Conclusions: This study showed beneficial effects of deep breathing on respiratory functions in normal healthy individuals.[16]

Nutsupa Ubolnuar (2019), conducted a study on Effects of Breathing Exercises in Patients with Chronic Obstructive Pulmonary Disease: Systematic Review and Meta-Analysis. Randomized controlled trials investigating the effects of BEs in COPD patients published through May 2018, were retrieved from five electronic databases (MEDLINE, CINAHL, Cochrane, Scopus, and ScienceDirect). Risk of bias and quality of evidence were assessed, using Cochrane Collaboration's tool, and the Grading of Recommendation Assessment, Development, and Evaluation (GRADE) approach, respectively. Nineteen studies (n=745), were included. Quality of evidence, was low to moderate. When compared to the control groups, respiratory rate significantly (p≤0.001) improved in the pursed-lip breathing (PLB), ventilatory feedback (VF) plus exercise, diaphragmatic breathing exercise (DBE), and combined BEs. Additionally, PLB significantly improved tidal volume (p<0.001), inspiratory time (p=0.007), and total respiratory time (p<0.001). PLB, VF plus exercise, DBE, combined BEs, and singing could be used to improve ventilation and QoL.[17]

Hyun-Ju Jun Ki-Jong Kim Ki-Won Nam and Chang-Heon Kim, (2016), conducted a study on Effects of breathing exercises on lung capacity and muscle activities of elderly smokers. The purpose of the study was to investigate the effects of an intervention program to enhance the pulmonary function and muscle activity of elderly smokers. Participants were randomly assigned to one of two experimental groups or a control (CG) group. The experimental groups performed exercises three times per week for six weeks, whereas the CG performed no exercises. One of the experimental groups performed a Feedback Breathing Exercise (FBE) for 15 minutes, and the other repeated three sets of Balloon-Blowing Exercises (BBE) with sufficient rest of more than one minute between sets. In the experimental groups, FVC, FEV1/FVC, PEF and muscle activity of the rectus abdominis significantly improved after four weeks, but no significant differences were observed in FEV1 or VC after six weeks. The results show that FBE and BBE improved the pulmonary functions of elderly smokers, demonstrating the potential benefits of the development of various training methods using balloons, and group programs, including recreational factors, for increasing respiratory muscles strength.[18]

Hatem Essam, Nashwa Hassan Abdel Wahab, Gihan Younis, Enas El-sayed, Hanaa Shafiek (2022), conducted a study on Effects of different exercise training programs on the functional performance in fibrosing interstitial lung diseases: A randomized trial. The objective was to compare the effects of different aerobic exercise training (ET) programs on respiratory performance, exercise capacity, and quality of life in fibrosing interstitial lung diseases (f-ILD). A case-control study where 31 patients with f-ILD diagnosis based on chest high-resolution computed tomography were recruited from Main Alexandria University hospital-Egypt. Ten patients were randomly assigned for only lower limbs (LL) endurance training program, and 10 patients for upper limbs, lower limbs, and breathing exercises (ULB) program for consecutive 18 sessions (3 sessions/week for 6 consecutive weeks). Eleven patients who refused to participate in the ET program were considered as control. All patients were subjected for St George's respiratory questionnaire (SGRQ), 6-minute walk test (6-MWT), forced spirometry and cardiopulmonary exercise testing (CPET) before and after ET programs. Author concluded that ET was associated with improvements in exercise capacity and quality of life in f-ILD patients irrespective of the type of ET program provided.[19]

Ruisheng Yun, Yiwen Bai, Yan Lu, Xubo Wu, and Shin-Da Lee (2020), conducted a study on How Breathing Exercises Influence on Respiratory Muscles and Quality of Life among Patients with COPD? A Systematic Review and Meta-Analysis. The aim of the study was to investigate the effect of different breathing exercises on respiratory muscle function, 6-minute walk test (6MWT), and quality of life (QoL) in patients with chronic obstructive pulmonary disease (COPD). Researcher searched online databases including PubMed, Embase, Web of Science, Cochrane Library, and Ovid for randomized controlled trials that assessed the efficacy of breathing exercises on patients with COPD. The Cochrane Collaboration tool was used to assess the risk of bias for each included study. This systematic review summarized the use of breathing exercises for treating patients with COPD. Breathing exercises were found to be an effective tool for treating patients with COPD by improving inspiratory muscle strength and 6MWT. However, breathing exercises showed no significant improvements on the QoL of patients with COPD.[20]

J Thorac Dis, Masatoshi Hanada (2020), conducted a study on Aerobic and breathing exercises improve dyspnea, exercise capacity and quality of life in idiopathic pulmonary fibrosis patients: systematic review and meta-analysis. This systematic review aimed to synthesize evidence of exercise interventions during pulmonary rehabilitation that aim to improve exercise capacity, dyspnea, and health-related quality of life (HRQL) in IPF patients. Searches were performed in MEDLINE, Embase, CENTRAL, SPORTDiscus, PubMed and PEDro from inception to January 2019 using search terms for: (I) participants: 'IPF or interstitial lung disease'; (II) interventions: 'aerobic training or resistance training or respiratory muscle training'; and (III) outcomes: 'exercise capacity or dyspnea or health-related quality of life'. Two reviewers independently screened titles, abstracts and full texts to identify eligible studies. Methodological quality of studies was assessed using the Downs and Black checklist and meta-analyses were performed. Author concluded that Breathing exercises appears to complement exercise training towards improved dyspnea and HRQL in patients with Idiopathic Pulmonary Fibrosis.[21]

Parisa Sedaghati, Korosh Fakhimi Derakhshan, Somayeh Ahmadabadi & Seyed Reza Rahimi Moghaddam(2023), conducted a study on Effects of corrective and breathing exercises on respiratory function older adults with a history of COVID-19 infection: a randomized controlled trial, In this clinical trial study, thirty elderlies with a history of COVID-19 disease were divided into two groups based on the study inclusion criteria. Exercise interventions included two sections-breathing exercises and corrective exercises in the cervical and thoracic spine. The spirometry test, craniovertebral angle, and thoracic kyphosis test were used. To evaluate differences between variables, paired-samples t-test and ANCOVA were used (p-value < 0.01). Results showed a significant difference between the two groups in craniovertebral angle ($P = 0.001$), thoracic kyphosis ($P = 0.007$), and respiratory capacity including Forced expiratory volume in one second (FEV1) ($P = 0.002$), FEV1/FVC ($P = 0.003$), Peripheral oxygen saturation (SPO2) ($P = 0.001$), while no significant differences were observed between two groups in terms of chest anthropometric indices ($P > 0.01$). The results showed the combination of corrective and breathing exercises could improve pulmonary function and correct cervical and thoracic posture in patients with a history of COVID-19 infection. Therefore, corrective and breathing exercises can be helpful as a complementary treatment along with pharmaceutical therapy to reduce chronic pulmonary complications in patients infected with COVID-19.[22]

Stephan Budweiser et al (2006), conducted a study on Respiratory muscle training in restrictive thoracic disease: a randomized controlled trial. The objective of the study was to investigate the effects of respiratory muscle training (RMT) in patients with restrictive thoracic disorders and intermittent noninvasive positive-pressure ventilation (NPPV). Prospective randomized controlled trial design was used. Thirty patients with restrictive thoracic disorders; 28 patients completed the trial. After RMT, maximal inspiratory mouth pressure was increased. In patients who could perform cycle ergometer testing (n=17), peak oxygen consumption and maximal work rate increased relative to a control group. Similar differences occurred regarding changes of HRQOL and time of ventilator use. Lung volumes, 12-second maximum voluntary ventilation, 6-minute walking distance, and blood gases were unchanged. The study concluded that, in patients with restrictive thoracic disorders and NPPV, RMT improved inspiratory muscle strength. Exercise performance and HRQOL were improved when the 2 groups were compared. RMT was practicable and safe despite severe respiratory impairment. Further evaluation, including different training intensities and modalities, seems warranted.[23]

Shu-Chuan Ho, Horng-Chyuan Lin(2013), conducted a prospective controlled study on Exercise training with negative pressure ventilation improves exercise capacity in patients with severe restrictive lung disease, 36 patients with restrictive lung disease were prospectively enrolled for a 12-week multidisciplinary rehabilitation program. During this program, half of them (n:18; 60.3 ± 11.6 years; 6 men; FVC: 32.5 ± 11.7% predicted) received regular sessions of exercise training under NPV, whilst the 18 others (59.6 ± 12.3 years; 8 men; FVC: 37.7 ± 10.2% predicted) did not. Exercise capacity, pulmonary function, dyspnea and quality of life were measured. The primary endpoint was the between-group difference in change of 6 minute-walk distance (6MWD) after 12 weeks of rehabilitation. prospective, non-randomized, controlled study was carried out. All patients in the NPV-exercise group were able to tolerate and completed the program. The between-group differences were significantly better in the NPV-exercise group in changes of 6MWD (34.1 ± 12.7 m vs. -32.5 ± 17.5 m; $P = 0.011$) and St George Score (−14.5 ± 3.6 vs. 11.8 ± 6.0; $P < 0.01$). There was an improvement in dyspnea sensation (Borg's scale, from 1.4 ± 1.5 point to 0.8 ± 1.3-point, $P = 0.049$) and a small increase in FVC (from 0.85 ± 0.09 L to 0.91 ± 0.08 L, $P = 0.029$) in the NPV-exercise group compared to the control group. The study showed exercise training with NPV support is feasible for patients with severe restrictive lung diseases, and improves exercise capacity and health-related quality of life.[24]

Li Shen et al (2021), conducted a study on New pulmonary rehabilitation exercise for pulmonary fibrosis to improve the pulmonary function and quality of life of patients with idiopathic pulmonary fibrosis: a randomized control trial, The aim of the study was to investigate the impact of the simple breathing exercises (LHP's respiratory rehabilitation for pulmonary fibrosis, LHP's RRPF) on patients with idiopathic pulmonary fibrosis (IPF). The safety and effectiveness of LHP's RRPF were first verified in 20 healthy individuals. (II) A total of 101 patients with IPF administrated in Shanghai Pulmonary Hospital between January 2015 and May 2017 were screened, and 82 cases were randomly assigned to receive a 12-month LHP's RRPF program (exercise group) or usual medical care (control group). Lung function, chest X-ray, 6-minute walk distance (6MWD), quality of life (St. George's Respiratory Questionnaire, SGRQ), and EKG were measured at the 6th and 12th month during the trial. At the 6th month visit, the exercise group showed improved SGRQ score and lung function parameters (FVC, FEV1, and DLCO). At the 12th months visit, the exercise group had significantly improved SGRQ score, 6MWD, and lung function (FVC, FEV1, and DLCO) compared to the control group ($P<0.05$). No obvious adverse events occurred in the exercise group. The incidence of acute exacerbation and one-year mortality were 7.69% and 2.56%, respectively in the exercise group, which were lower than those (20.9% and 9.3%, respectively) in the control group. The study concluded that LHP's RRPF can delay the pulmonary function decline of patients with IPF and improve their quality of life. This breathing exercise may be an adjunct to pulmonary rehabilitation for IPF.[25]

Leona M Dowman et al (2016), conducted a study on evidence of benefits of exercise training in interstitial lung disease: a randomized controlled trial, the objective of the study was to establish the impact of exercise training in patients with ILDs of differing aetiology and severity. 142 participants with ILD (61 idiopathic pulmonary fibrosis (IPF), 22 asbestosis, 23 connective tissue disease-related ILD (CTD-ILD) and 36 with other aetiologies) were randomised to either 8 weeks of supervised exercise training or usual care. Six-minute walk distance (6MWD), Chronic Respiratory Disease Questionnaire (CRDQ), St George Respiratory Questionnaire IPF-specific version (SGRQ-I) and modified Medical Research Council dyspnoea score were measured at baseline, 9 weeks and 6 months. Exercise training significantly increased 6MWD (25 m, 95% CI 2 to 47 m) and health-related quality of life (CRDQ and SGRQ-I) in people with ILD. Larger improvements in 6MWD, CRDQ, SGRQ-I and dyspnoea occurred in asbestosis and IPF compared with CTD-ILD, but with few significant differences between subgroups. Benefits declined at 6 months except in CTD-ILD. Lower baseline 6MWD and worse baseline symptoms were associated with greater benefit in 6MWD and symptoms following training. Greater gains were seen in those whose exercise prescription was successfully progressed according to the protocol. At 6 months, sustained improvements in 6MWD and symptoms were associated with better baseline lung function and less pulmonary hypertension. The study concluded that Exercise training is effective in patients across the range of ILDs, with clinically meaningful benefits in asbestosis and IPF. Successful exercise progression maximizes improvements and sustained treatment effects favor those with milder disease.[26]

Lin yang et al (2023), conducted a study on the Influence of Breathing Exercises on Regional Ventilation in Healthy and

Patients with Chronic Obstructive Pulmonary Disease, in this study, a total of 30 healthy volunteers and 9 patients with COPD were included. Data were recorded continuously during (1) diaphragmatic breathing; (2) pursed lip breathing with full inhalation; (3) pursed lip combining diaphragmatic breathing. The sequence of the three breathing exercises was randomized using machine generated random permutation. Spatial and temporal ventilation distributions were evaluated with electrical impedance tomography. Results showed that, tidal volume was significantly larger during various breathing exercises compared to quiet tidal breathing, in both healthy and COPD ($p < 0.01$). However, for other EIT-based parameters, statistical significances were only observed in healthy volunteers, not in patients. Diaphragmatic breathing alone might not be able to decrease functional residual capacity in COPD and the effect varied largely from patient to patient. Ventilation distribution moved toward ventral regions in healthy during breathing exercises ($p < 0.0001$). Although this trend was observed in the COPD, the differences were not significant. Ventilation became more homogeneous when diaphragmatic breathing technique was implemented ($p < 0.0001$). Again, the improvements were not significant in COPD. Regional ventilation delay was relatively high in COPD and comparable in various breathing periods. In conclusions, the impact of pursed lip and diaphragmatic breathing varied in different patients with COPD. Breathing exercise may need to be individualized to maximize the training efficacy with help of EIT.[27]

Mojtaba Amini et al (2019), conducted a study on Effect of Diaphragmatic Respiratory Training on Some Pulmonary Indexes in Older People with Chronic Obstructive Pulmonary Disease**.** The objective of the study was to investigate the diaphragmatic respiratory training on some pulmonary indexes in these patients. This quasi-experimental study type with pre-test-post-test design, 16 male patients (Mean±SD=55+5.4 y) with moderate COPD were selected through convenient sampling method and were randomly divided into two groups of 8 (diaphragmatic training and control group). A demographic questionnaire was used to control the inclusion criteria. Maximal inspiratory pressure, forced expiratory volume in 1 second, and respiratory rate per minute were measured by laboratory equipment. The training group performed the respiratory exercises 3 sessions per week for 8 weeks. The control group did not do any exercise. After the end of training, the pulmonary indexes were re-evaluated. Statistical data were analyzed by ANOVA and Tukey's post hoc test in SPSS V. The results indicated that diaphragmatic respiratory exercises had a significant effect on pulmonary Indexes (P=0.001). There was no improvement in any of the variables in the control group (P>0.05). The study concludes that Diaphragmatic respiratory training seems to play an essential role in improving the respiratory Indexes of patients with pulmonary disease. The results of our study showed that respiratory training improves the respiratory function of patients and should be included in the pulmonary rehabilitation program for these patients**.**[28]

Baruch Vainshelboim et al (2014), conducted a study on Exercise Training-Based Pulmonary Rehabilitation Program Is Clinically Beneficial for Idiopathic Pulmonary Fibrosis, the study aimed to examine the effect of exercise training (ET) on clinical outcomes in IPF patients. A randomized controlled study included thirty-two IPF patients (aged 68 ± 8 years) who were allocated either to the ET group (n = 15), participating in a 12-week, twice-weekly 60-min supervised ET-based pulmonary rehabilitation program, or to a control group (n = 17) continuing with regular medical treatment alone. Cardiopulmonary exercise test, 6-min walking distance (6MWD) test, 30-second chair-stand test, pulmonary function tests, dyspnea and QOL were assessed at baseline and at the end of the 12-week intervention. Significant differences were observed between the ET and the control groups in raw mean deltas (Δ = post- - pre-intervention): Δ6MWD, 81 m, p < 0.001; ΔV<smlcap>O</smlcap>$_2$ peak, 2.6 ml/kg/min, p = 0.002; Δ work rate, 22 W, p < 0.001; Δ anaerobic threshold, 3.1 ml/kg/min, p < 0.001, and ΔFVC % predicted, 6%, p = 0.038. Dyspnea, QOL and 30-second chair-stand were also improved significantly following the program. In the conclusion, ET improves exercise tolerance, functional capacity, pulmonary function, dyspnea and QOL in patients with IPF, suggesting a short-term treatment efficacy for clinical improvement, and should be considered the standard care for IPF.[29]

Nizar A Naji et al (2006), conducted study on Effectiveness of Pulmonary Rehabilitation in Restrictive Lung Disease, forty-six patients with restrictive lung disease (35 interstitial lung diseases, 11 skeletal abnormalities) were admitted to a pulmonary rehabilitation program; 26 completed the 8-week program and 15 were followed to a 1-year reassessment. Fifteen noncompliant patients were excluded and 1 patient with interstitial lung disease died at 8 weeks. Pulmonary function tests, exercise endurance, quality of life (Chronic Respiratory Disease Questionnaire, St. George's Respiratory Questionnaire, Hospital Anxiety and Depression scale and dyspnea) were measured at baseline, 8 weeks, and 1 year. Exercise endurance (treadmill) improved at 8 weeks (mean improvement, 10.2 +/- 7.4 minutes) and at 1 year (mean improvement, 8.7 +/- 12.2 minutes). Shuttle test improved at 8 weeks (mean improvement, 27.2 +/- 75.9 m) but not at 1 year. Patients using long-term oxygen therapy (LTOT) had a better improvement in the treadmill test (P < .01) at 8 weeks compared with those not using LTOT. Thirty-three percent of patients failed to complete the program. There was significant improvement in dyspnea and quality of life in Chronic Respiratory Disease Questionnaire, St. George's Respiratory Questionnaire, and Hospital Anxiety and Depression scale for depression at 8 weeks compared with baseline; there was a sustained significant reduction in hospital admission days noted at 1-year post rehabilitation (P < .05). Pulmonary rehabilitation is effective in improving exercise endurance and the quality of life and in reducing hospital admissions in this small group of patients with significant restrictive lung disease. The relatively large dropout number suggests that a standard chronic obstructive pulmonary disease program may not be ideal for patients with restrictive lung disease.[30]

Mariana Hoffman (2021), conducted a study on Inspiratory muscle training in interstitial lung disease: a systematic scoping review, this scoping review aimed to explore the role and the rationale of IMT in patients with ILD and to gather recent evidence on the effects of IMT in this population. The studies included in this review showed improvements in respiratory muscle function, quality of life, exercise capacity and dyspnea after ILD patients participated in programs that included stand-alone IMT or combined with pulmonary rehabilitation. There is still a gap in the literature to allow a clear conclusion on the indications of IMT as part of ILD treatment because of poor research design and small numbers of participants. Therefore, although IMT seems to have a positive effect in patients with ILD, current evidence prevents us from drawing a definite conclusion. Further studies need to be conducted using better research methodology to demonstrate and confirm the positive effects of IMT.[31]

Salvatore Fuschillo et al (2015), conducted a study on Pulmonary Rehabilitation Improves Exercise Capacity in Subjects with Kyphoscoliosis and Severe Respiratory Impairment. The aim of this study was to analyze the effects of combining pulmonary rehabilitation with LTOT (long-term oxygen therapy) and NIV (Noninvasive ventilation) treatments on arterial blood gases and the 6-min walk test (6MWT) in a homogeneous group of subjects with kyphoscoliosis. Twenty-three subjects with kyphoscoliosis and respiratory failure who were being treated with both LTOT and NIV and who had been referred to a pulmonary rehabilitation program were retrospectively analyzed. Eighteen subjects were included, and there was no control group. Pulmonary rehabilitation involved educational and physical training sessions and was carried out daily for 4–6 weeks. Exercise intensity was personalized based on individual tolerance, physiologic parameters, or physiotherapist judgment. Upon completion of pulmonary rehabilitation, a significant improvement in 6-min walk distance was observed ($P = .04$). The dyspnea score at the end of the 6MWT improved as well, although the improvement did not reach statistical significance ($P = .06$). These changes were not confirmed at a 12-month follow-up visit. No significant effects of pulmonary rehabilitation on arterial blood gases were observed. A combined intervention including a tailored pulmonary rehabilitation program together with LTOT and NIV seems to be of short-term benefit in subjects with kyphoscoliosis and severe respiratory impairment.[32]

Holger Cramer et al (2019), conducted a study on the risks and benefits of yoga for patients with chronic obstructive pulmonary disease: a systematic review and meta-analysis. Objective of the study was to determine the effectiveness and safety of yoga interventions on disease symptoms, quality of life and function in patients diagnosed with chronic obstructive pulmonary disease (COPD). Eleven randomized controlled trials with a total of 586 patients were included. Meta-analysis revealed evidence for effects of yoga compared to no treatment on quality of life on the COPD Assessment Test (MD = 3.81; 95% CI = 0.97 to 6.65; $P = 0.009$, $I^2 = 70\%$), exercise capacity assessed by the 6-minute walk test (MD = 25.53 m; 95% CI = 12.16 m to 38.90 m; $P = 0.001$, $I^2 = 0\%$), and pulmonary function assessed by FEV1 predicted (MD = 3.95%; 95% CI = 2.74% to 5.17%; $P < 0.001$, $I^2 = 0\%$). Only the effects on exercise capacity and pulmonary function were robust against methodological bias. Effects were only present in breathing-focused yoga interventions but not in interventions including yoga postures. Adverse events were reported infrequently. This meta-analysis found robust effects of yoga on exercise capacity and pulmonary function in patients with COPD. Yoga, specifically yoga breathing techniques, can be an effective adjunct intervention for patients with COPD.[33]

Jean-Christian Borel et al (2009), conducted a study on home exercise training with non-invasive ventilation in thoracic restrictive respiratory disorders: A randomized study. Aim of the study was to assess the effects of exercise training and non-invasive ventilation (NIV) during exercise in patients with restrictive disorders. Sixteen patients underwent an 8-week home-based cycle exercise program. Nine patients exercised with and seven without NIV. Before and after training, evaluations included incremental and constant-load cycling tests, a 6-min walking test and the Chronic Respiratory Questionnaire (CRQ). For the whole group, training increased walking distance, maximal cycling power output, cycling endurance and CRQ score (+10 ± 13 pts). These changes did not differ between patients training with or without NIV. During exercise non-invasive ventilation in chronic restrictive respiratory failure. training with NIV induced greater improvement in walking distance and CRQ score. We concluded that in patients with restrictive disorders (i) exercise training including NIV is feasible at home, (ii) whatever the modalities, exercise training induces significant benefits in exercise tolerance and quality of life, and (iii) in acute NIV responders, chronic use of NIV during exercise may lead to synergetic effects compared to traditional training.[34]

Cesare Gregoretti et al (2014), conducted a Prospective physiological study on Physiological effects of trans laryngeal open ventilation in patients with restrictive respiratory disorders. Objective of the study was to compare the efficacy of pressure-controlled ventilation (PCV) delivered through a conventional endotracheal tube with the same ventilatory mode using a small-size tube with the cuff left deflated (trans laryngeal open ventilation: TLOV), Thirteen consecutive patients with restrictive neuromuscular and thoracic respiratory disorders ventilated in pressure-controlled mode. The standard tube was removed and a microlaryngeal tube (i.e. 4 mm, o.d. 6 mm, length 380 mm) was inserted with the cuff left deflated. PCV was increased to match the tracheal pressure measured during conventional ventilation. Arterial blood gases were measured before, 1 h and 20 h after initiating TLOV. A patient comfort score was measured by a visual analogue scale during conventional ventilation and 20 h after initiating TLOV (0= very bad, 1= bad, 2= quite bad, 3= sufficient, 4= good, and 5=

very good). Inspiratory pressure was significantly increased after 1 h and after 20 h to match the tracheal pressure measured during conventional ventilation (CV) (p<0.005). No statistically significant differences were found in arterial blood gases and patient's respiratory rate before and after 1 and 20 h of TLOV. The comfort score was 1.3±0.4 and 3.6±0.4 during CV and TLOV, respectively, on a scale from 0 to 5 (p<0.002). This study indicates that, in selected patients, TLOV was as efficient as conventional PCV.[35]

Thayla A Santino et al (2020), conducted a study on Breathing exercises for adults with asthma, objective was to evaluate the evidence for the efficacy of breathing exercises in the management of people with asthma. The researcher included randomized controlled trials of breathing exercises in adults with asthma compared with a control group receiving asthma education or, alternatively, with no active control group. Two review authors independently assessed study quality and extracted data. Researcher used Review Manager 5 software for data analysis based on the random-effects model. The researcher applied the Chi^2 test, with a P value of 0.10 indicating statistical significance, and the I^2 statistic, with a value greater than 50% representing a substantial level of heterogeneity. The primary outcome was quality of life. Researcher concluded that Breathing exercises may have some positive effects on quality of life, hyperventilation symptoms, and lung function. Due to some methodological differences among included studies and studies with poor methodology, the quality of evidence for the measured outcomes ranged from moderate to very low certainty according to GRADE criteria. In addition, further studies including full descriptions of treatment methods and outcome measurements are required.[36]

Chi-Hsien Chen et al (2022), conducted a study on Air pollution enhance the progression of restrictive lung function impairment and diffusion capacity reduction: an elderly cohort study, study aimed to evaluate the effects of long-term exposure to ambient air pollution on the change rates of total lung capacity, residual volume, and diffusion capacity among the elderly. From 2016 to 2018, single-breath helium dilution with the diffusion capacity of carbon monoxide was performed once per year on 543 elderly individuals. Monthly concentrations of ambient fine particulate matters (PM2.5) and nitric dioxide (NO2) at the individual residential address were estimated using a hybrid Kriging/Land-use regression model. Linear mixed models were used to evaluate the association between long-term (12 months) exposure to air pollution and lung function with adjustment for potential covariates, including basic characteristics, indoor air pollution (second-hand smoke, cooking fume, and incense burning), physician diagnosed diseases (asthma and chronic airway diseases), dusty job history, and short-term (lag one month) air pollution exposure. An interquartile range (5.37 ppb) increase in long-term exposure to NO2 was associated with an additional rate of decline in total lung volume. There is no effect on the transfer factor. Researcher concludes that Long-term exposure to ambient NO2 is associated with an accelerated decline in static lung volume and diffusion capacity in the elderly. NO2 related air pollution may be a risk factor for restrictive lung disorders.[37]

M. Hanada et al (2019), conducted a study on Aerobic and Breathing Exercises Improve Dyspnea, Exercise Capacity and Quality of Life in Idiopathic Pulmonary Fibrosis Patients: Systematic Review and Meta-Analysis. The purpose of this systematic review was to synthesize evidence of various exercise interventions that aim to improve exercise capacity and dyspnea in IPF patients. Methods: Comprehensive searches were performed. Two reviewers independently screened titles, abstracts and full texts to determine eligible studies. Methodological quality of studies was assessed using the Downs and Black checklist and meta-analyses were performed. Results: of 1499 articles identified, 14 were included (four randomized controlled trials and 10 prospective observational studies with pre-post design). The mean quality assessment score was 58±8%. Aerobic capacity measured by 6-minute walk distance, maximal oxygen consumption and peak work rate significantly improved in the exercise groups (aerobic; aerobic and breathing exercise; aerobic and inspiratory muscle training) versus control groups. Dyspnea scores significantly improved after aerobic and breathing exercises. HRQL increased after aerobic exercise training versus control when measured with St. George's Respiratory Questionnaire and Short-Form 36 Health Survey. Conclusion: Pulmonary rehabilitation programs with aerobic and breathing exercises are beneficial in IPF patients for improving exercise capacity, dyspnea and quality of life.[38]

Hee Eun Choi et al (2023), conducted a study on The Efficacy of Pulmonary Rehabilitation in Patients with Idiopathic Pulmonary Fibrosis. This study evaluated the efficacy and safety of pulmonary rehabilitation (PR) on functional performance, exercise-related oxygen saturation, and health-related quality of life among patients with idiopathic pulmonary fibrosis (IPF). A total of 25 patients with IPF (13 in the PR group and 12 in the non-PR group) were enrolled between August 2019 and October 2021 at Haeundae-Paik Hospital in the Republic of Korea. A cardiopulmonary exercise test (CPET), six-minute walk test (6MWT), pulmonary function test (PFT), Saint George’s Respiratory Questionnaire (SGRQ), muscle strength test, and bioelectrical impedance analysis were performed in each group at baseline and after eight weeks of PR. The mean age was 68 years of age and most subjects were male. Baseline characteristics were similar between the two groups. The distance during 6MWT after PR was significantly improved in the PR group (inter-group p-value = 0.002). VO2max and VE/VCO2 slopes showed a significant difference after eight weeks only in the PR group, but the rate of change did not differ significantly from the non-PR group. Total skeletal muscle mass, PFT variables, and SGRQ scores did not differ significantly between the groups. PR improved exercise capacity, as measured using CPET and 6 MWT. Further studies in larger samples are needed to evaluate the long-term efficacy of PR in IPF patients.[39]

Rongping Ni et al (2023), conducted a study on The Effects of Respiratory Training Combined with Limb Exercise on Pulmonary Function and Quality of Life in Patients with Bronchiectasis. The aim of the study was to investigate the effects of respiratory rehabilitation training combined with limb rehabilitation on sputum clearance and quality of life in patients with bronchiectasis. A retrospective analysis of 86 patients with bronchiectasis was divided into an intervention group and an observation group, with 43 cases in each group. Patients in the observation group were treated with conventional drugs, and those in the intervention group were given respiratory rehabilitation training and limb rehabilitation on this basis. After three months of treatment, the indexes of sputum discharge, sputum traits, lung function, and the 6-minute walk distance (6MWD) were compared and quality of life and survival skills were assessed using the Barthel index and a quality-of-life comprehensive assessment questionnaire. Results were the percentage of patients with mild Barthel index in the intervention group was higher than that in the observation group, and the difference between the groups was statistically significant ($P < 0.05$). After treatment, the scores of life quality and the lung function in the intervention group were higher than those in the observation group (both $P < 0.05$). After three months of treatment, the sputum volume and sputum viscosity scores of the two groups were higher than those before treatment ($P < 0.05$). Respiratory rehabilitation training with limb exercise rehabilitation can effectively improve the sputum clearance rate, lung function, and quality of life of patients with bronchiectasis and is thus worthy of clinical promotion and application.[40]

R. Torres-Castro et al (2021), conducted a study on Respiratory function in patients post-infection by COVID-19: a systematic review and meta-analysis. Objective was to determine the prevalence of restrictive pattern, obstructive pattern and altered diffusion in patients post-COVID-19 infection and to describe the different evaluations of respiratory function used with these patients. A systematic review was conducted in five databases. Studies that used lung function testing to assess post-infection COVID-19 patients were included for review. Two independent reviewers analyzed the studies, extracted the data and assessed the quality of evidence. In the sensitivity analysis, we found a prevalence of 0.39 (CI 0.24–0.56, $p < 0.01$, $I2 = 86\%$), 0.15 (CI 0.09–0.22, $p = 0.03$, $I2 = 59\%$), and 0.07 (CI 0.04–0.11, $p = 0.31$, $I2 = 16\%$) for altered diffusion capacity of the lungs for carbon monoxide (DLCO), restrictive pattern and obstructive pattern, respectively. Post-infection COVID-19 patients showed impaired lung function; the most important of the pulmonary function tests affected was the diffusion capacity.[41]

ARAZI, Tajmohammad et al (2021), conducted a study on Effect of a Breathing Exercise on Respiratory Function and 6-Minute Walking Distance in Patients Under Hemodialysis: A Randomized Controlled Trial. Study was designed to determine the effectiveness of a breathing exercise on respiratory function and 6-minute walk (6MW) distance in patients under hemodialysis. A randomized controlled trial approach was used. The sample consisted of 52 patients under hemodialysis from a university teaching hospital in Iran. The experimental group ($n = 26$) received the breathing exercise program and was encouraged to perform incentive spirometry for 2 months. The control group ($n = 26$) received only routine hospital care. The respiratory function test and 6MW test were performed at baseline and at 2 months after the intervention (posttest). The two groups were homogeneous in terms of respiratory function parameters, 6MW distance, and demographic characteristics at baseline. Forced expiratory volume in 1 second and forced vital capacity were significantly better in the experimental group compared with the control group at 2 months after intervention. No significant difference was found in 6MW distance between the groups at the 2-month posttest. The 2-month breathing exercise effectively improved pulmonary function parameters (forced vital capacity, forced expiratory volume in 1 second) in patients under hemodialysis but did not affect 6MW distance.[42]

Ambiga K (2020), conducted a study on A study to assess the effectiveness of breathing exercises on selected pulmonary parameters on patients with chronic obstructive pulmonary disease at selected hospitals Chennai. To assess the pulmonary function before administering breathing exercises, to assess the pulmonary function after administering breathing exercises. The research design used in this study was quasi-experimental, two groups before and after design. Non-probability convenient sampling technique was followed to allow the samples to an experimental and control group. The tool contains 3-parts, part A- demographic variables, part B-measurement of pulmonary parameters and part C-self-instructional module on breathing exercises. The practicing of breathing exercise was found to be effective in improving the pulmonary parameters. Younger age patients gained more breathing hold time after practicing breathing exercise. Non-smokers gained more chest expansion and PEFR after practicing breathing exercise. The results of the study were concluded that selected breathing exercises (Pursed lip and Diaphragmatic Breathing Exercise) given to the COPD patients was effective to improve in their pulmonary parameters.[43]

Ms. Aileen George, et al (2017), conducted a study on A Study to Assess the Effectiveness of Deep breathing Exercise with Incentive Spirometer on The Respiratory Status of Patients Who Have Undergone Cardio Thoracic and Vascular Surgery in Selected Hospital Puducherry. The main aim of the study was to assess the effectiveness of deep breathing exercise with incentive Spirometer on the respiratory status of patients who have undergone cardio thoracic and vascular surgery in selected hospitals of Puducherry. Research design used for the study was quasi experimental one group pre-test post-test design. The study was conducted on 30 patients. Data collection tool consisted of demographic variables and assessment of respiratory status using Respiratory Rate, Modified Borg Dyspnea Scale, Peak Flow Meter and Pulse oximeter. Data were collected by pre assessment questionnaire and observation method. The collected data was tabulated, analyzed and interpreted by using descriptive and inferential statistics. The result showed that deep breathing exercise with incentive spirometer was highly effective among patients who have undergone cardio thoracic and vascular surgery. The obtained P-value 0.000 was highly significant at $p < 0.001\%$ level. The respiratory complications are the major post-operative complications which reduce the projected outcome of most of the cardio thoracic and vascular surgeries. This study reveals that deep breathing exercise with incentive spirometer can improve the respiratory status of the patients who have undergone cardio thoracic vascular surgery to a great extent.[44]

4. RESEARCH METHODOLOGY

Methodology of research indicates the general pattern to gather valid and reliable data for the problem under investigation. It refers to a set of orderly disciplined procedures involved in the purposeful collection, analysis and, interpretation of the data. The planned method is very essential for systemic and organized conduction of research study cannot be completed. Research methodology is a way to systematically solve the research problem. It may be understood as a science of studying how research is done scientifically.

RESEARCH APPROACH: -

The research approach is a systematic, controlled, empirical, and critical investigation of natural phenomena guided by theory and hypotheses about the presumed relations among such phenomena.

In view of the nature of the problem selected and to accomplish the objectives of the study Quantitative evaluative approach could be suitable for proposed research study.

RESEARCH DESIGN: -

Research design is the researcher's overall plan for obtaining answers to the researcher's questions or for testing the hypothesis. It is the overall plan for addressing a research question including specialization for enhancing the integrity of the study.

A research design selected for the present study was Quasi experimental one group pretest posttest design.

The design did not include any control group.

Pretest- following respiratory parameters will be assessed

- Respiratory rate
- Breathing pattern
- Spo2
- PFT (Pulmonary Function Test)

1. PEFR (Peak Expiratory Flow Rate)

FEV_1 (Forced Expiratory Volume in one second)

FVC (Forced Vital Capacity)

FEV_1/FVC

Intervention-

Breathing exercises such as: -

- Deep Breathing exercise for 1 min
- Diaphragmatic Breathing exercise for 1 min
- Glossopharyngeal Breathing exercise for 1 min

Post test-

Following respiratory parameters will be assessed immediately after the interventions.

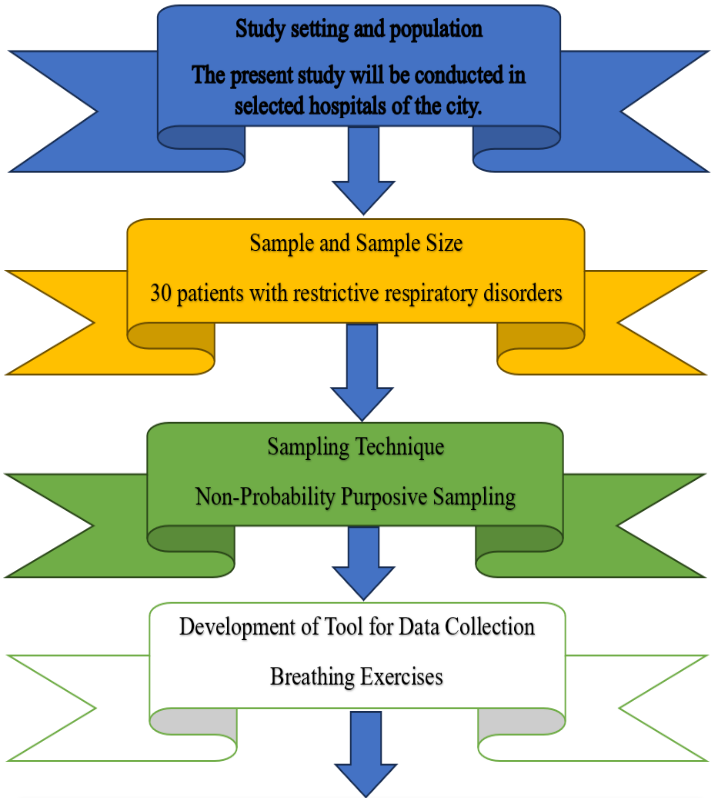
- Respiratory rate
- Breathing pattern: - Normal & Abnormal
- SPO_2
- PFT (Pulmonary Function Test)

1. PEFR (Peak Expiratory Flow Rate)
2. FEV_1 (Forced Expiratory Volume in one second)
3. FVC (Forced Vital Capacity)
4. FEV_1/FVC

Table No. 1 Presentation of research design

Group	Pre-test	Intervention	Post-test
Patient with Restrictive respiratory disorder	O_1	X	O_2

O_1 – Pre-test
X – Intervention
O_2 – Post-test



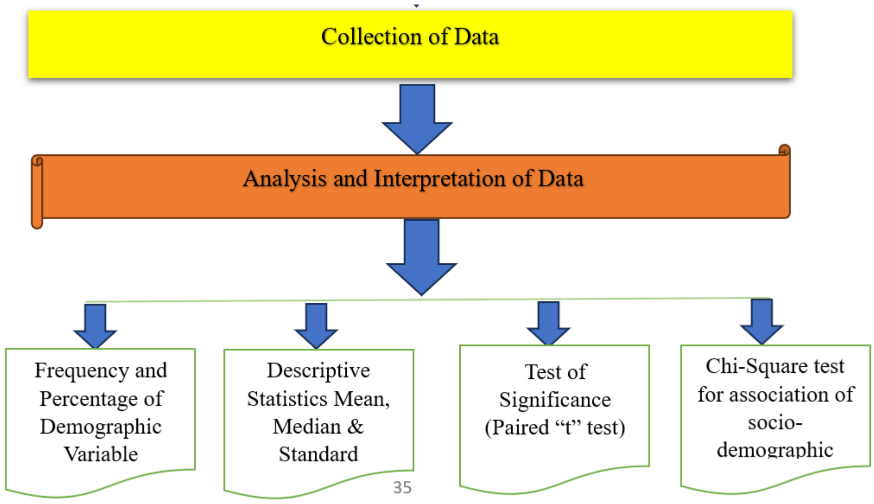


Figure 2 - Schematic representation of research process

VARIABLES: -

Variables are the characteristics, quality, or attributes of a person or objects that change or vary.

A Dependent variable: - It is response, behavior, or outcome that the researcher wants to predict or explain**.**

In this study, the selected respiratory parameters are the dependent variables.

Respiratory rate was recorded for 1 minute with the wrist watch

Breathing Pattern were assessed by observation method for 1 minute.

SPO2 was measured with the help of Pulse oximeter.

PEFR, FEV1, FVC, FEV1/FVC were measured with the help of Pulmonary Function Test (PFT) Machine.

SETTING OF THE STUDY: -

The research setting is the specific place where the data collection occurs**.**

Participants were enrolled from Respiratory Ward of the selected hospital setting.

Patients who are diagnosed with ILD (Interstitial Lung Disease), Idiopathic Pulmonary Fibrosis, Sarcoidosis, Connective tissue disease Such as scleroderma, Drug induced lung disease, Neuromuscular disorders extrinsic restrictive lung diseases such as multiple sclerosis, muscular dystrophy.

Participants were assessed with the help of Pulse Oximeter and PFT (Pulmonary Function Test) Machine.

Patients were accessed by the hospital admission record book for selected diagnosis.

The present study was conducted in a selected hospital of the city.

SAMPLE: -

A sample is a subset of population elements.

In the present study, the sample comprises patients with restrictive respiratory disorders admitted in the selected hospitals.

SAMPLING TECHNIQUE: -

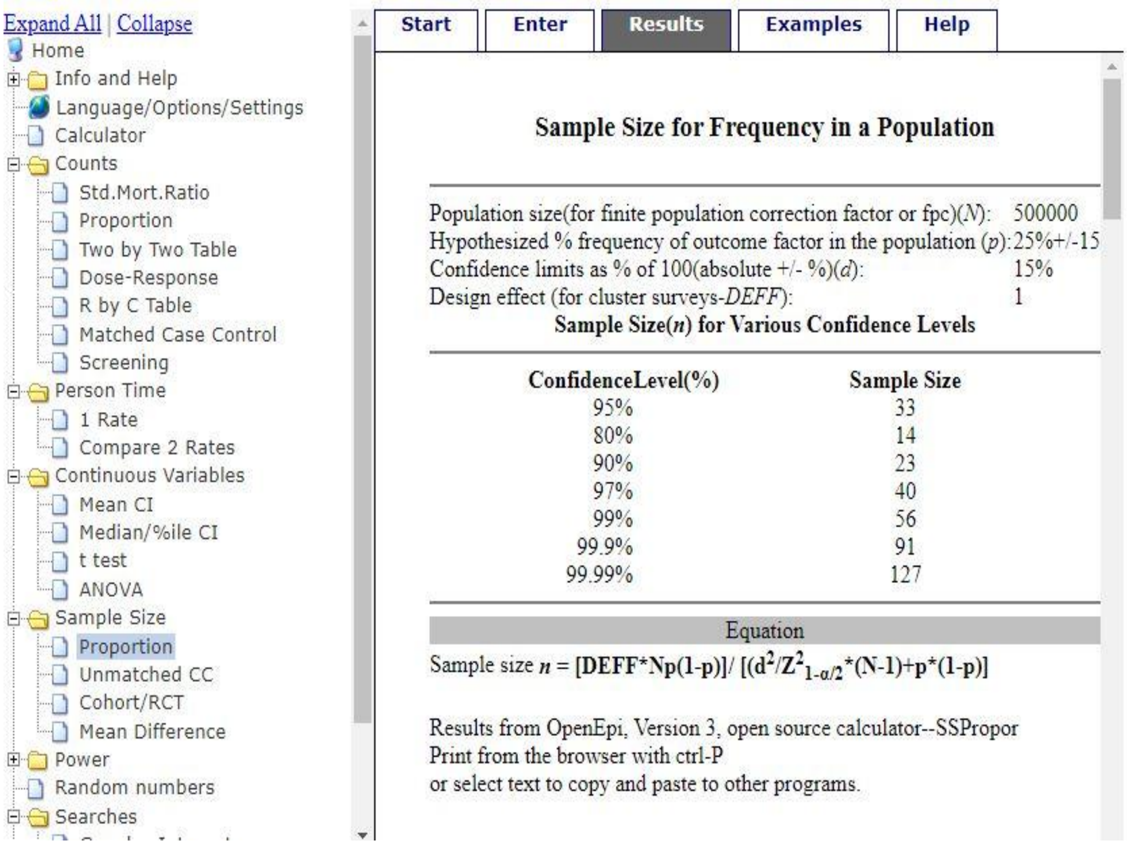
Sampling refers to the process of selecting a portion of the population to represent the entire population.

The sampling technique for this study will be non-probability purposive sampling technique.

SAMPLE SIZE: -

The sample size is the numerical value assigned to a subset population selected to participate in a study.

The sample size is determined with the help of the open EPI software system (sample size for frequency in a population). The determined sample size is 33 at 95% confidence interval. A further 5% attrition rate was considered hence the final sample size is 30, so it will be 30, by proportion sample size for the present study.



Criteria for selection of the sample: -

The following criteria were set for the selection of sample: -

INCLUSION CRITERIA: -

- Patients who are available during the period and data collection.
- Patients with restrictive respiratory disorders who are willing to participate in this study.
- Those who are able to understand and speak Marathi.
- Patients who are diagnosed with ILD (Interstitial Lung Disease), Idiopathic Pulmonary Fibrosis, Sarcoidosis, Connective tissue disease Such as scleroderma, Drug induced lung disease, Neuromuscular disorders extrinsic restrictive lung diseases such as multiple sclerosis, muscular dystrophy.
- Patients admitted in respiratory ward in selected hospital.

EXCLUSION CRITERIA: -

- Patients who are in critical condition.
- Patients with other respiratory disorders than the restrictive respiratory disorder.
- Patients who are not willing to participate.
- Patients who are not available during data collection.

DATA COLLECTION TECHNIQUE: -

Tool Preparation: Data collection tools are the procedures or instruments used by the researcher to observe or measure the key variables in the research problem. Assessment checklist for selected respiratory parameters were prepared to assess the immediate effect of breathing exercises in restrictive respiratory disorders at selected hospital of the city.

Development of the Tool: -

1. Extensive review of the literature.

2. Consultation with guide and subject expert.
3. Development of the blueprint.
4. Construction of the demographic variable, structured knowledge questionnaire, and attitude scale.
5. Content validity from experts.
6. Pilot study
7. Reliability

Review of Literature: -

An intense search for related reviews of the literature was carried out from books, journals, articles, reports, published and unpublished research studies also the guide and subject experts were consulted for developing an appropriate tool, items were collected scrutinized, selected, and checked for ambiguity and error.

Consultation with Guide and Subject Expert: -

Assessment checklist for selected respiratory parameters were given to the experts in the field of Medical-Surgical Nursing, Physician, Statistician and Language Experts. Their opinions and suggestions were considered to modify the tool, consulted with the guide while finalizing the tool.

DESCRIPTION OF TOOL: -

Modified checklist for selected respiratory parameters was designed to assess the immediate effect of breathing exercises in restrictive respiratory disorders at selected hospital of the city.

The tool is divided into two parts: **-**

Part A: Demographic Variable.

Part B: Breathing exercises

PART A: - DEMOGRAPHIC VARIABLE: -

This section consists of 10 items seeking information on demographic variables of patients with restrictive respiratory disorder such as Age, Gender, Educational qualification, Religion, Residential area, Monthly Family income, Occupation, Family history of respiratory disorders, any other associated illness, Health habits.

PART B: -

In this study, the researcher has used a Modified check list for selected respiratory parameters. These were seven respiratory parameters that helped in assessing the immediate effect of breathing exercises among patients with restrictive respiratory disorder.

This section deals with breathing exercises:

1 Deep Breathing Exercise: -

Most people take short, shallow breaths into their chest. It can make you feel anxious and zap your energy. With this technique, you'll learn how to take bigger breaths, all the way into your belly.

- Get comfortable. You can lie on your back in bed or on the floor with a pillow under your head and knees, or you can sit in a chair with your shoulders, head, and neck supported against the back of the chair.
- Breathe in through your nose. Let your belly fill with air.
- Breathe out through your nose.
- Place one hand on your belly. Place the other hand on your chest.
- As you breathe in, feel your belly rise. As you breathe out, feel your belly lower. The hand on your belly should move more than the one that's on your chest.
- Take three more full, deep breaths. Breathe fully into your belly as it rises and falls with your breath.

2. Diaphragmatic Breathing exercise: -

Focusing one's breath is an effective way to encourage the body to relax. When practicing diaphragmatic breathing, the stomach, rather than the chest, moves with each breath, expanding while inhaling and contracting while exhaling Deliberately paying attention to each breath serves to distract and quiet the mind.

How Does It Help?

There are many advantages to learning diaphragmatic breathing. The technique:

- Lowers heart rate and blood pressure
- Decreases muscle tension
- Increases blood oxygenation
- Brings warmth to the hands and feet
- Increases energy and motivation
- Improves concentration
- Strengthens the immune system
- Reduces stress hormones

Learning to Practice Diaphragmatic Breathing: -

- Sit or lie in a comfortable place. Close your eyes.
- Place one hand on your chest and one hand on your abdomen. The bottom hand should do the moving. The top hand should remain still or only move as the bottom hand moves.
- Inhale through your nose for about 4 seconds, feeling your abdomen expand. (You may feel slight tension the first few times you inhale.)
- Hold your breath for 2 seconds.
- Exhale very slowly and steadily through your mouth for about 6 seconds. The mouth should be relaxed.
- Repeat for 5-15 minutes.

Diaphragmatic breathing is an excellent tool for relaxation, but it is a skill that requires practice. With practice it becomes easier over time, and eventually can be done with eyes open, while sitting, standing or even walking or driving.

3. Glossopharyngeal Breathing Exercise: -

Glossopharyngeal breathing, also known as "frog breathing, is a positive pressure breathing method using muscles of mouth and pharynx to push volume of air (gulps) into the lungs. It is a trick movement that was first described by Dail (1951) when patients with poliomyelitis were observed to be gulping air into their lungs. It was this gulping action that gave the technique the name 'frog breathing'.

Techniques: -

- Mouth opens oral pharynx filled with air
- Mouth closes air trapped in the oral pharynx
- Mouth remains closed and forces the air back to the open glottis and then into the lungs
- Glottis closed and air is trapped in the lungs

It should be practised slowly at first and then gradually speeded up until the movement flows. A leak of air may occur through the nose and, until it is prevented by the soft palate, a nose dip may be required. It is learnt easily by some patients, but others need time and patience to acquire this skill and must be motivated to practise frequently during the learning period.

VALIDITY OF TOOL: -

Validity refers to the degree to which an instrument measures what is supposed to measure. Content validity of the tool was determined along with objectives, hypothesis, scoring key, and criteria checklist for validation was submitted to 10 experts who included 5 nursing experts, 2 cardiovascular thoracic physiotherapist, 2 TB chest Physicians and 1 Physicians. The expert was requested to judge the items for accuracy on the appropriateness relevance and degree of agreement. The tool was modified as per the suggestion given by the expert.

PRE – TESTING OF THE TOOL: -

The pre-test helps the researcher to determine whether the respondents understand the item and whether the directions are clear. The pre-testing of the validated tool was done to determine the clarity of item, feasibility, ambiguity, and time required to complete the items. The tool was found to be clear, feasible, and was clearly understood.

RELIABILITY: -

The reliability of the research instrument is defined as the extent to which the instrument yields the same results on repeated measures.

Reliability

Sr. No	Physiotherapy OPD PFT Machine	Respiratory OPD PFT Machine
1	2.8	2.81
2	2.4	2.39
3	3.2	3.25
4	2.4	2.3
5	3.21	3.34
6	2.62	2.78

R=0.921

Reliability =0.959.

Reliability Method and statistical method.

In this study reliability was obtained by taking the respiratory parameters measurements by the two different PFT machine one from physiotherapy OPD and another from Respiratory OPD. Correlation coefficient was taken from scores of the two measurements and Reliability was calculated and r value found to be 0.959. which indicate a measure of the two tests were more accuracy.

1 Karl Pearson's Coefficient of Correlation

r= (n (∑xy)- (∑x)(∑y))/(√ [n ∑x2-(∑x)2][n ∑y2– (∑y)2)

2 Reliability of whole,

r whole = (2r)/(1+r)

PILOT STUDY: -

The pilot study was conducted among restrictive respiratory disorders patients who met the inclusion criteria in selected hospitals of the city. 5 samples were taken for the pilot study. Pre-test was conducted then breathing exercises was given as intervention post-test was conducted immediately after the intervention. The pilot study helped the researcher to visualize practical problems that could be encountered while conducting the main study. It also gave him insight into the actual process of data collection and analysis.

DATA COLLECTION PROCEDURE: -

Data collection is a precise, systematic method of gathering information relevant to the research problem.

1 Permission from the concerned authority: - prior to the collection of data, permission was obtained from the authorities of the selected hospital. The purpose and the nature of the study were explained to the authority to gain co-operation.

2 Period of data collection: -

The data collection was done from 15/01/2024 to 08/02/2024. During this study, the investigator collected both pre-test and post-test and also implemented a breathing exercise.

Consent: inform consent was obtained from patient with restrictive respiratory disorder.

Pre-test: - selected respiratory parameters were assessed before implementing the breathing exercise.

Providing breathing exercise to the patients (Intervention): - Immediately after the pre-test, breathing exercises was given such as deep breathing exercise, pursed lip breathing exercise, diaphragmatic breathing exercise for 5 min.

Post-test: - immediately after the intervention, selected respiratory parameters were assessed.

PLAN FOR DATA ANALYSIS: -

Data analysis is the organization and synthesis of the research data and the testing of the research hypothesis using the data. The research planned to analyze the data by using inferential and descriptive statistics. The data will be presented in the form of graphs, tables, diagrams and figures, data will be analyzed by computing mean, standard deviation, 'p' value and paired, 't' test.

1 Descriptive statistics

2 Inferential statistics

Descriptive statistics: -

Frequency and percentage were used to analyzed the demographic data of restrictive respiratory disorder.

Mean, mean percentage, standard deviation was used to analyzed the pre-test and post-test effect of breathing exercises among patients with restrictive respiratory disorders at selected hospitals.

Inferential statistics: -

1 The statistical significance of the immediate effectiveness of breathing exercises on selected respiratory parameters was analyzed by using paired t-test.

2 Chi-square test was used to find out the association between selected respiratory parameters with selected demographic variables.

DATA ANALYSIS AND INTER PRETATION

Polit and Hungler (1999), "statistical analysis is a method of rendering qualitative information which is meaningful and intelligible statistical procedures enable the researcher to reduce, summarize, organize, evaluate, interpret and communicate numeric information."

OBJECTIVES OF THE STUDY: -

1. To assess selected respiratory parameters among patients with restrictive respiratory disorders.

To evaluate the immediate effect of breathing exercises on selected respiratory parameters among patients with restrictive respiratory disorders.
To compare the selected respiratory parameters before and after the breathing exercise.
To find out the association between selected respiratory parameters with selected demographic variables of patients with restrictive respiratory disorders.

ORGANIZATION AND PRESENTATION OF DATA: -

The analysis of data was organized and finalized according to the plan for data analysis and presented in the form of tables and figures. The analyzed data are presented under the following sections:

SECTION A: Describing the frequency and percentage distribution of socio demographic variables of patients with restrictive respiratory disorders.

SECTION B: To assess pre-test level of selected respiratory parameters among patients with restrictive respiratory disorders.

SECTION C: To assess post-test level of selected respiratory parameters among patients with restrictive respiratory disorders.

SECTION D: To evaluate the immediate effect of breathing exercises on selected respiratory parameters among patients with restrictive respiratory disorders.

SECTION E: To find out the association between selected respiratory parameters with selected demographic variables patients with restrictive respiratory disorders.

SECTION A: Describing the frequency and percentage distribution of socio demographic variables of patients with restrictive respiratory disorders.

Table No. 02 - Frequency and percentage distribution of socio demographic variables of patients with restrictive respiratory disorders.

N=30

Sr. No.	Demographic Variables	Category	Frequency	Percentage
1	Age	40-45	10	33.33
		46-50	11	36.67
		55-60	7	23.33
		61 and above	2	6.67
2	Gender	Male	15	50.00
		Female	15	50.00
3	Educational Qualification	Illiterate	5	16.67
		Primary	11	36.67
		Secondary	10	33.33
		Graduate	4	13.33
		Post graduate	18	60.00
4	Religion	Hindu	18	60.00
		Christian	9	30.00
		Muslim	3	10.00
		Others	0	0.00
5	Residential Area	Urban area	8	26.67
		Rural area	22	73.33
6	Monthly Family Income	Below 10000/-	0	0.00
		10000/- to 20000/-	15	50.00
		20000/- to 30000/-	13	43.33
		Above 30000/-	2	6.67
7	Occupation	Government employer	0	0.00
		Private employer	17	56.67
		Business man	0	0.00
		Daily wages	8	26.67
		Farmer	5	16.67
8	Family History of	Obstructive respiratory disorders.	0	0.00
		Restrictive respiratory disorder.	0	0.00
		None of the above	30	100.00
9	Any Other associated illness	Cardiovascular disorder	6	20.00
		Renal disorder	6	20.00
		Neurological disorder	2	6.67
		Others	16	53.33
10	Health Habits	Smoking	11	36.67

		Drinking	9	30.00
		Tobacco	10	33.33
		Nothing significant	0	0.00

AGE

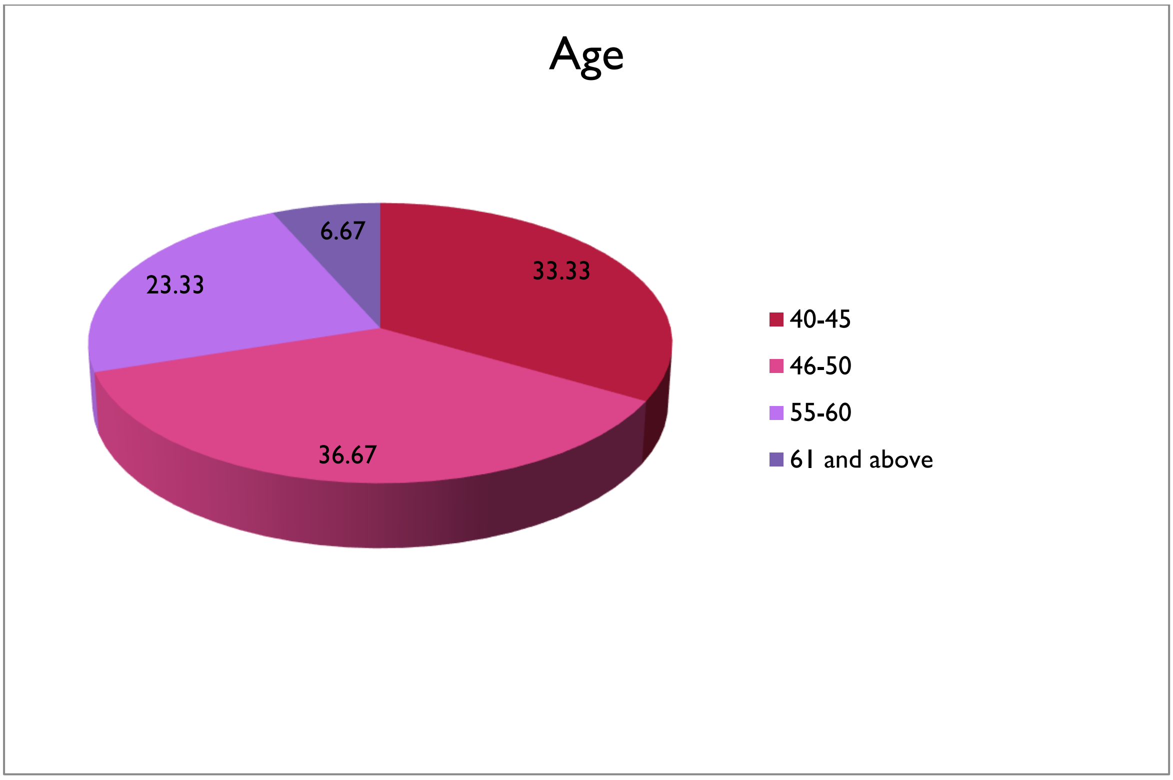


Figure No. 03

Age indicated that out of 30 patients, 36.67% were found in the age group of 46 to 50 years followed by 33.33% patients were in the age group of 40-45 years, 23.33% were found in the age group of 55-60 years of age and remaining 6.67 % of patients were in the age group of 61 and above years.

GENDER

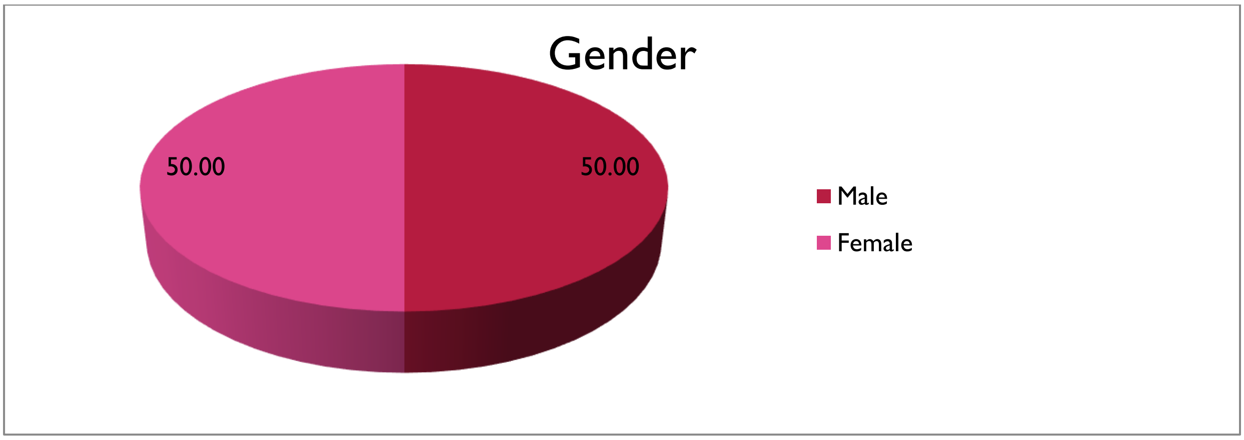


Figure No. 04

Age indicated that out of 30 patients, both the gender of patients were equally distributed i.e. 50% were male and female.

EDUCATIONAL QUALIFICATION

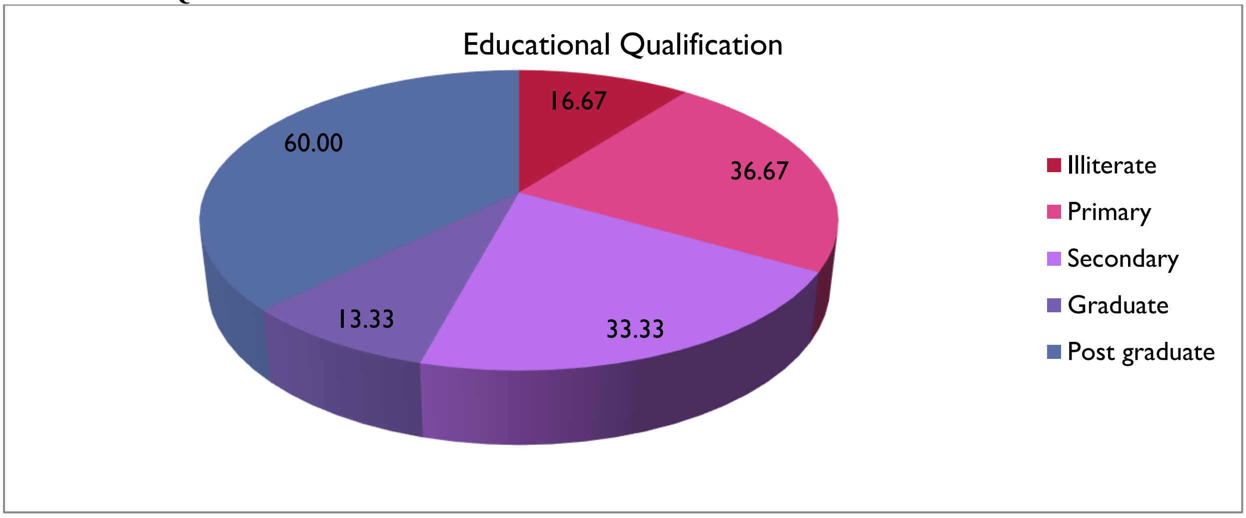


Figure No. 05

Educational status of patient indicates that majority 60% were had post graduate followed by 36.67% were completed primary, 33.33% of patient were secondary education 16.67% of patient were illiterate and remaining 13.33% of patient were had graduate level of education.

RELIGION

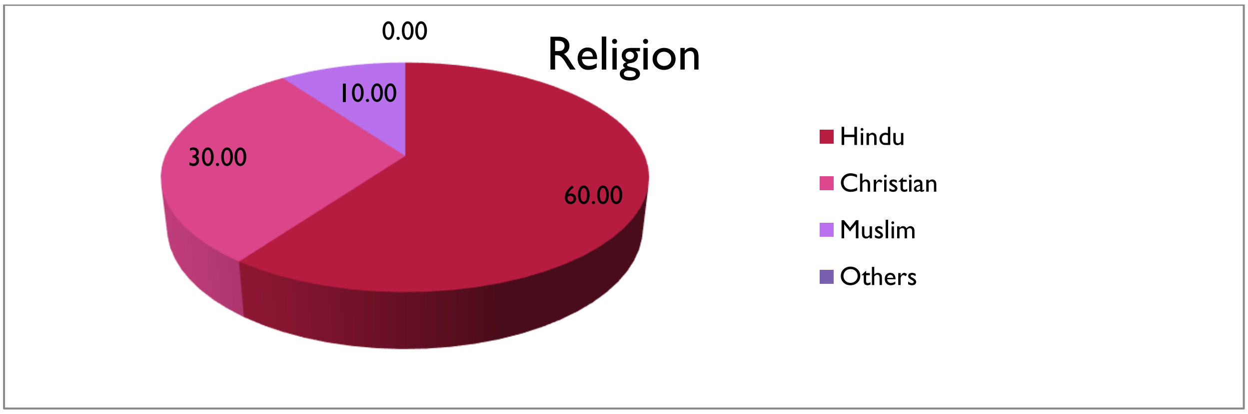


Figure No. 06

Religion indicated that out of 30 Patient, majority 60% were found Hindu followed by 30% of patient were Christian, 10% of women were found Muslim and none were others.

RESIDENTIAL AREA

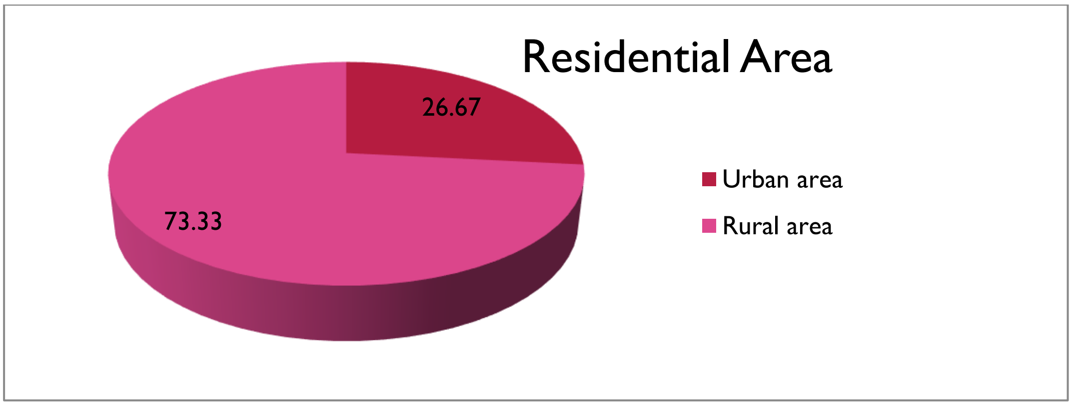


Figure No. 07

Residential area of patients indicates that majority 73.33% were residing in rural area followed by 26.67% were residing in urban area.

MONTHLY FAMILY INCOME

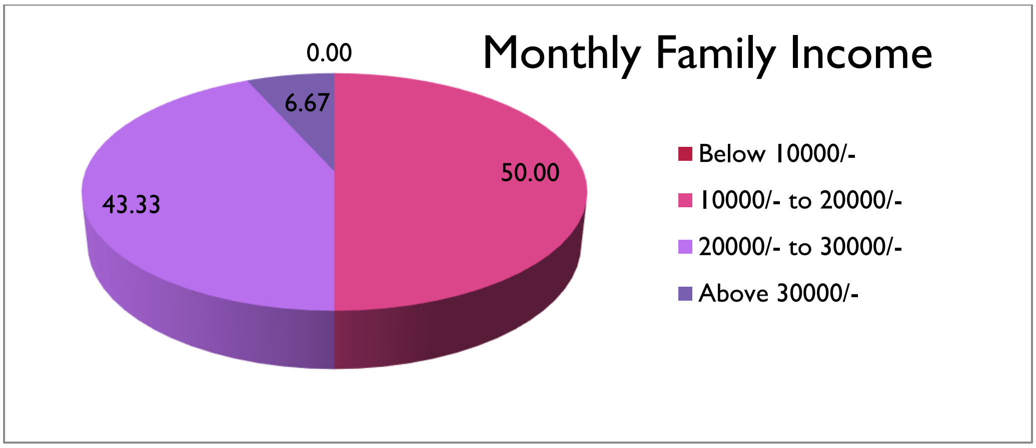


Figure No. 08

Figure No. 08 indicated that according to income status out of 30 patient, majority 50% were 10000-20000 followed by 43.33% patient were 20000-30000, 6.67% were above 30000, and none of patient were found below 10000.

OCCUPATION

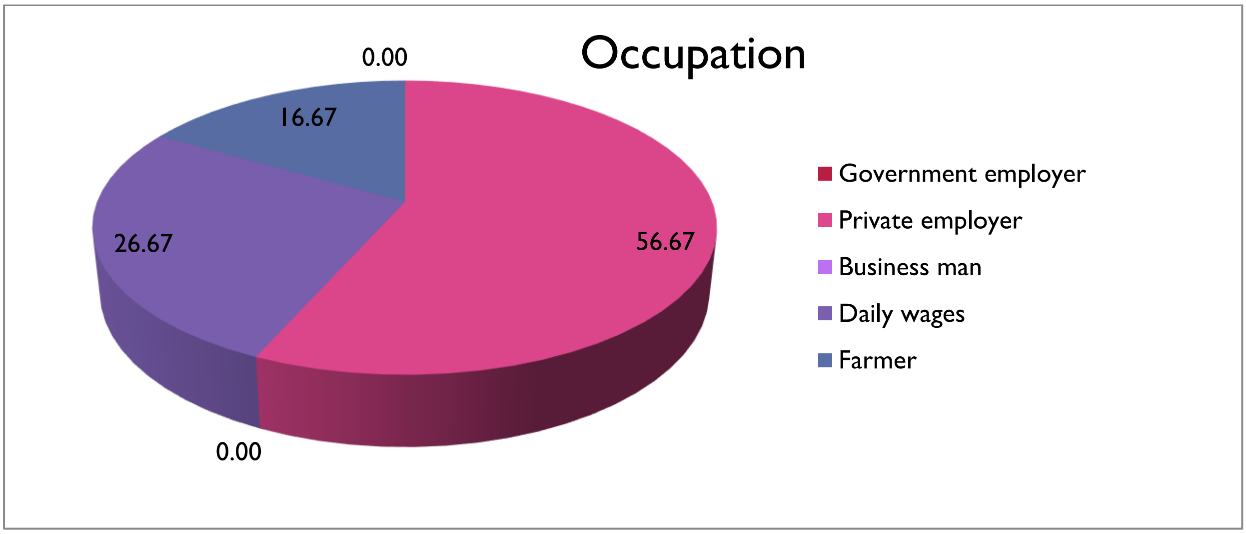


Figure No. 09

Figure No. 09 indicated that in occupation out of 30 patient, majority 56.67% were private employee followed by 26.67% patient daily wages, 16.67 % were found Forming and none were Business and government employee.

FAMILY HISTORY

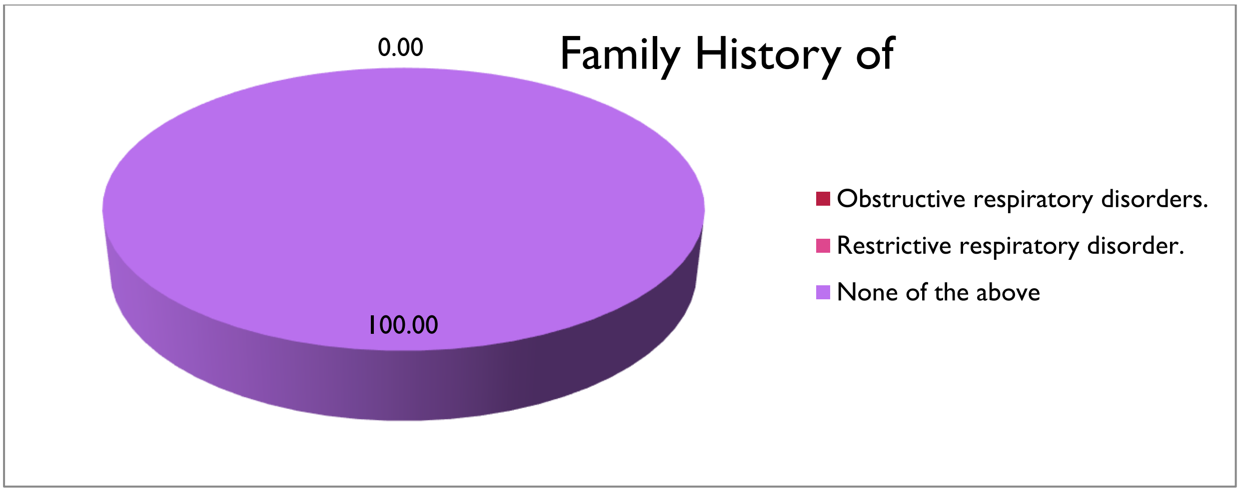


Figure No. 10

According to family history of patient indicates that all the patient were not having history of obstructive respiratory disorder and restrictive respiratory disorder.

ANY OTHER ASSOCIATED ILLNESS

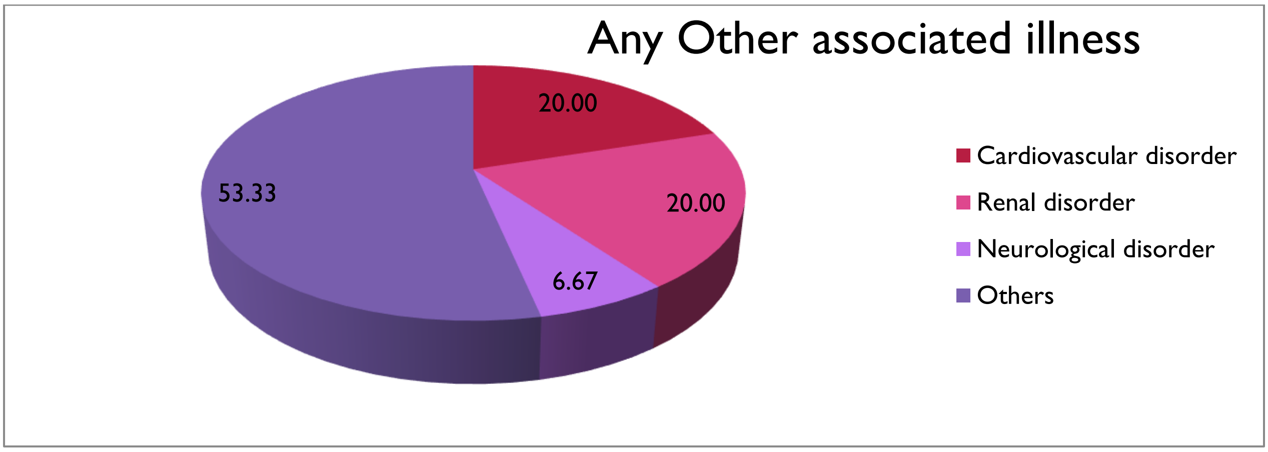


Figure No. 11

According to other associated illness of patient indicates that majority 53.33% of patient were other than listed, followed by 20% of patient had history of cardiac disorder and renal disorder and 6.67% of patient were neurological disorder.

HEALTH HABITS

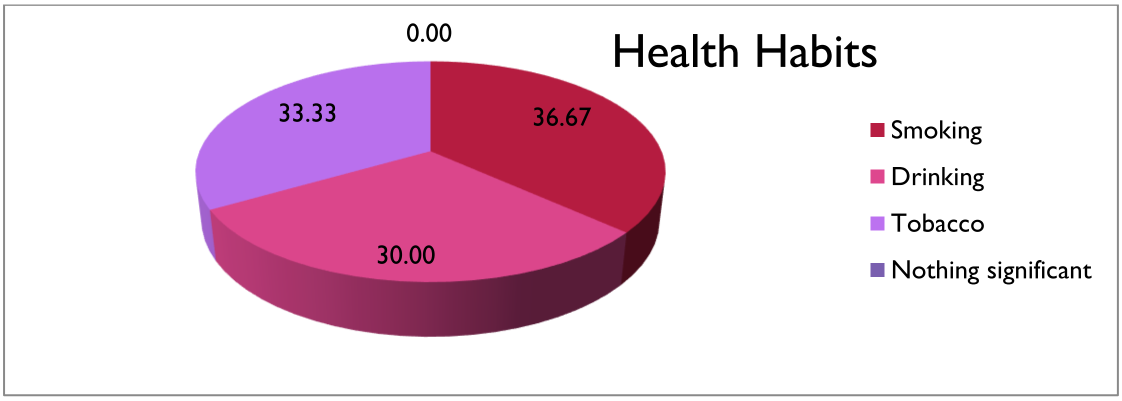


Figure No. 12

According to habits of patient indicate highest 36.67% were smoking followed by 33.33 were tobacco, 30% were drinking alcohol.

SECTION B: To assess pre-test level of selected respiratory parameters among patients with restrictive respiratory disorders.

Table No. 03 - Assess pre-test level of selected respiratory parameters among patients with restrictive respiratory disorders.

N=30

Sr. No	PFT Parameters	Range	Less than Normal		Normal	
			Frequency	Percentage	Frequency	Percentage
1	PEFR	>7.5	18	60.00	12	40.00
2	FEV1	>3.5 in Male, >2.5 in Female	15	50.00	15	50.00
3	FVC	>3.5	13	43.33	17	56.67
4	FEV1/FVC	>70%	4	13.33	26	86.67

PRE-TEST PFT PARAMETERS

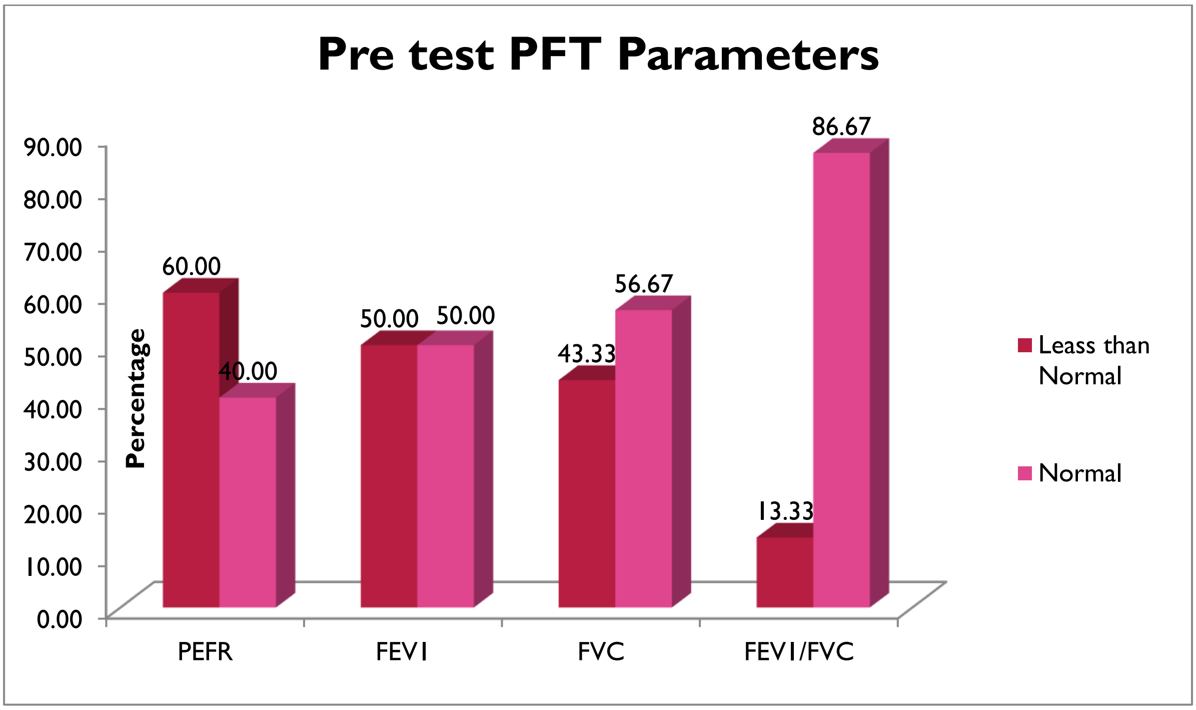


Figure No. 13

Figure No. 13 depicts that pre-test level of selected PFT parameters on breathing among patients with restrictive respiratory disorders. The result shows that, PEFR indicate 60% were below normal and 40% were normal, FEV1 indicate 50% of patient were in both below normal and normal, FVC indicate 43.33% were below normal and 56.67% were normal in range, FEV1/FCV indicate 13.33% were below normal and 86.67% were normal,

SECTION C: To assess post test level of selected respiratory parameters among patients with restrictive respiratory disorders.

Table No. 04 - Assess post-test level of selected respiratory parameters among patients with restrictive respiratory

disorders.

N=30

Sr. No	PFT Parameters	Range	Less than Normal		Normal	
			Frequency	Percentage	Frequency	Percentage
1	PEFR	>7.5	3	10.00	27	90.00
2	FEV1	>3.5 in Male, >2.5 in Female	9	30.00	21	70.00
3	FVC	>3.5	6	20.00	24	80.00
4	FEV1/FVC	>70%	1	3.33	29	96.67

POST-TEST PFT PARAMETERS

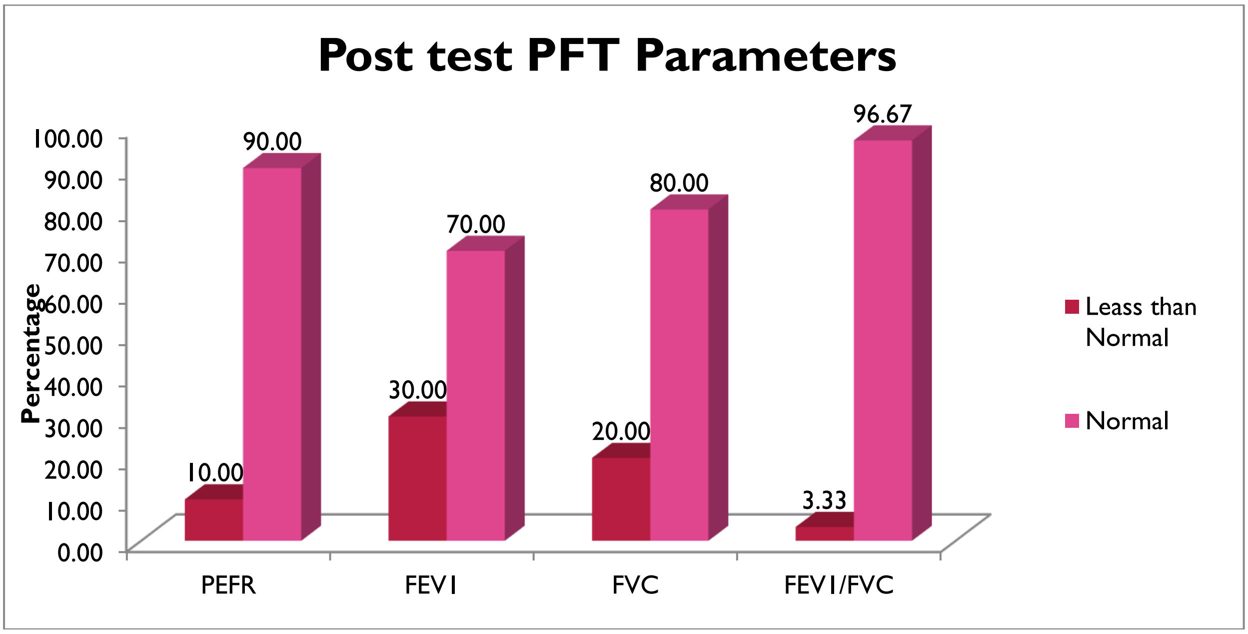


Figure No. 14

Figure No. 14 depicts that post test level of selected PFT parameters on breathing among patients with restrictive respiratory disorders. The result shows that, PEFR indicate 10% were below normal and 90% were normal, FEV1 indicate 30% of patient were below normal and 70% of patient were normal, FVC indicate 20% were below normal and 80% of patient were normal in range, FEV1/FCV indicate 3.33% were below normal and 96.67% of patient were normal in range.

SECTION D: To evaluate the immediate effect of breathing exercises on selected respiratory parameters among patients with restrictive respiratory disorders.

Table No. 05 - Evaluate the immediate effect of breathing exercises on selected respiratory parameters among patients with restrictive respiratory disorders.

N=30

Sr. No	PFT Parameters	Pre-test PFT		Post-test PFT		Unpaired t test	p value
		Mean	SD	Mean	SD		
1	PEFR	6.78	0.92	7.99	0.41	6.559*	0.0001
2	FEV1	3.11	0.90	4.01	1.36	3.009*	0.003
3	FVC	3.74	1.15	4.39	1.32	2.038*	0.046
4	FEV1/FVC	84.20	9.37	91.09	8.80	2.936*	0.004

Table No. 05 depicts that effectiveness of breathing exercises on selected respiratory parameters among patients with restrictive respiratory disorders. The result PFT parameter shows that, PEFR before breathing exercises mean found to be 6.78 and standard deviation 0.92, after breathing exercises mean found to be 7.99 and standard deviation 0.41 and unpaired t test value found to be 6.559*.

FEV1 before breathing exercises mean found to be 3.11 and standard deviation 0.90, after breathing exercises mean found to be 4.01 and standard deviation 1.36 and unpaired t test value found to be 3.009*. FVC before breathing exercises mean found to be 3.74 and standard deviation 1.15, after breathing exercises mean found to be 4.39 and standard deviation 1.32 and unpaired t test value found to be 2.038*. FEV1/FVC percentage before breathing exercises mean found to be 84.2% and standard deviation 9.37, after breathing exercises mean found to be 91.09 and standard deviation 8.80 and unpaired t test value found to be 2.936*.

Sr. No	PFT Parameters	Male				Female			
		Pre test		Post test		Pre test		Post test	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD
1	FEV_1	2.98	0.81	3.91	1.29	3.24	0.96	4.11	1.42

FEV_1 in male before breathing exercises mean found to be 2.98 and standard deviation 0.81, after breathing exercises mean found to be 3.91 and standard deviation 1.29 and in female before breathing exercises mean found to be 3.24 and standard deviation 0.96, after breathing exercises mean found to be 4.11 and standard deviation 1.42

SECTION E: To find out the association between selected respiratory parameters with selected demographic variables patients with restrictive respiratory disorders.

Table No. 06 - Find out the association between selected respiratory parameters with selected demographic variables patients with restrictive respiratory disorders.

N=30

Sr. No	Socio demographic variables	Category	Levels of PEFR				Total	Chi square value	p value
			Below Normal		Normal				
			f	%	f	%			
1	Age	40-45	5	50.00	5	50.00	10	1.834	0.607
		46-50	7	63.64	4	36.36	11		
		55-60	4	57.14	3	42.86	7		
		61 and above	2	100.	0	0.00	2		
2	Gender	Male	11	73.33	4	26.67	15	2.222	0.136
		Female	7	46.67	8	53.33	15		
3	Educational Qualification	Illiterate	2	40.00	3	60.00	5	5.392	0.249
		Primary	9	81.82	2	18.18	11		
		Secondary	4	40.00	6	60.00	10		
		Graduate	3	75.00	1	25.00	4		
		Post graduate	12	66.67	6	33.33	18		
4	Religion	Hindu	4	44.44	5	55.56	9	0.444	0.505
		Christian	2	66.67	1	33.33	3		
		Muslim	0	0.00	0	0.00	0		

		Others	0	0.00	0	0.00	0		
5	Residential Area	Urban area	4	50.00	4	50.00	8	0.455	0.500
		Rural area	14	63.64	8	36.36	22		
6	Monthly Family Income	Below 10000/-	0	0.00	0	0.00	0	0.566	0.753
		10000/- to 20000/-	10	66.67	5	33.33	15		
		20000/- to 30000/-	7	53.85	6	46.15	13		
		Above 30000/-	1	50.00	1	50.00	2		
7	Occupation	Government employer	0	0.00	0	0.00	0	3.707	0.157
		Private employer	8	47.06	9	52.94	17		
		Business man	0	0.00	0	0.00	0		
		Daily wages	7	87.50	1	12.50	8		
		Farmer	3	60.00	2	40.00	5		
8	Family History of	Obstructive respiratory disorders.	0	0.00	0	0.00	0		
		Restrictive respiratory disorder.	0	0.00	0	0.00	0		
		None of the above	18	60.00	12	40.00	30		
9	Any Other associated illness	Cardiovascular disorder	5	83.33	1	16.67	6	6.389	0.094
		Renal disorder	5	83.33	1	16.67	6		
		Neurological disorder	0	0.00	2	100.00	2		
		Others	8	50.00	8	50.00	16		
10	Health Habits	Smoking	8	72.73	3	27.27	11	2.576	0.276
		Drinking	6	66.67	3	33.33	9		
		Tobacco	4	40.00	6	60.00	10		
		Nothing significant	0	0.00	0	0.00	0		

Table No. 06 shows that no association between levels of PFT (PEFR) before breathing exercise with Age, Gender, Educational Qualification, Religion, Residential Area, Monthly Family Income, Occupation, Family History of, Any Other associated illness and Health Habits the p value found to be 0.607, 0.136, 0.249, 0.505, 0.500, 0.753, 0.157, constant, 0.094 and 0.276 respectively and no significant at the level of 0.05.

5. DISCUSSION, SUMMARY, AND CONCLUSION

I. DISCUSSION: -

This chapter deals with a detailed discussion on the study findings interpreted from the analysis. A comparison with various other studies is done with the current findings of the study and the related suggestions are being stated in order to improve it further.

FINDINGS OF THE STUDY: -

Major findings of the study are discussed under the following heading:

Description of demographic data

- Analysis of data related to assess pre-test level of selected respiratory parameters among patients with restrictive respiratory disorders.
- Analysis of data related to assess post-test level of selected respiratory parameters among patients with restrictive respiratory disorders.
- Analysis of data related to evaluate the immediate effect of breathing exercises on selected respiratory parameters among patients with restrictive respiratory disorders.
- Analysis of data related to find out the association between selected respiratory parameters with selected demographic variables patients with restrictive respiratory disorders.

Section I: Description of demographic data: -

Age: - In the present study, 34% were from 40-45 years of age group, 37% belongs to 46-50 years of age group, 23% were 55-60 years of age group, 7% above 61 years of age and above.

Gender: - In this present study, 50% of patients were male and 50% were female.

Educational Qualification: - In this study, post graduates were 60%, graduates were 13.33%, Secondary were 33.33%, primary were 36.67%, and illiterate were 16.67%.

Religion: - In this study, Hindu were 60%, Christians were of 30%, Muslim were 10%, and other 0%.

Residential area: - In this study, 26.67% were from urban area, and 73.33% were rural area.

Monthly Family Income: - In this study, 10000/- to 20000/- were 50%, 20000/- to 30000/- were 43.33%, above 30000/- were 6.67%, and below 10000/- were 0%.

Occupation: - 56.67% were private employee, 26.67% were of daily wages, 16.67% were of farmers, and government employee were 0%.

Family history: - there was no any evidence of family history of restrictive respiratory disorders.

Any other associate illness: - In the present study, 20% of samples had cardiovascular disorders, 20% renal disorders, 6.67% neurological disorders and others was 53.33%.

Health Habits: - In this study, 36.67% of samples had habit of smoking, 30% of alcohol drinking, 33.33% had habit of tobacco consumption.

Section II: Analysis of data related to assess pre-test level of selected respiratory parameters among patients with restrictive respiratory disorders.

PEFR parameter range - >7.5 with 12(40%) is normal and 18(60%) is of less than normal.

FEV1 parameter range->3.5 in male and >2.5 in female with 15(50%) is normal and 15(50%) is less than normal.

FVC parameter range >3.5 with 17(56.67%) is normal and 13(43.33%) is less than normal.

FEV1/FVC parameter range >70% with 26(86.67%) is normal and 4(13.33%) is less than normal.

Section III: Analysis of data related to assess post-test level of selected respiratory parameters among patients with restrictive respiratory disorders.

PEFR parameter range >7.5 with 27(90%) is normal and 3(10%) is less than normal.

FEV1 parameter range->3.5 in male and >2.5 in female with 21(70%) is normal 9(30%).

FVC parameter range >3.5 with 24(80%) is normal and 6(20%) is less than normal.

FEV1/FVC parameter range > 70% with 29(96.67%) is normal and 1(3.33%).

Section IV: Analysis of data related to evaluate the immediate effect of breathing exercises on selected respiratory parameters among patients with restrictive respiratory disorders.

PEFR of pre-test PFT mean 6.78 & SD 0.92, **post test PFT** mean 7.99 & SD 0.41

PEFR unpaired 't' test 6.559 & p value 0.001.

FEV1 of pre-test PFT mean 3.11 & SD 0.90, post test PFT mean 4.01 & SD 1.36 **FEV1** unpaired 't' test 3.009 & p value 0.003.

FVC of pre-test PFT mean 3.74 & SD 1.15, post test PFT mean 4.39 & SD 1.32, FVC unpaired 't' test 2.038 & p value 0.046

FEV1/FVC of pre-test PFT mean 84.20 & SD 9.3, post test PFT mean 91.09 & SD 8.80, FEV1/FVC unpaired 't' test 2.936 & p value 0.004.

The result PFT parameter shows that, PEFR before breathing exercises mean found to be 6.78 and standard deviation 0.92, after breathing exercises mean found to be 7.99 and standard deviation 0.41 and unpaired t test value found to be 6.559*. FEV1 before breathing exercises mean found to be 3.11 and standard deviation 0.90, after breathing exercises mean found to be 4.01 and standard deviation 1.36 and unpaired t test value found to be 3.009*. FVC before breathing exercises mean found to be 3.74 and standard deviation 1.15, after breathing exercises mean found to be 4.39 and standard deviation 1.32 and unpaired t test value found to be 2.038*. FEV1/FVC percentage before breathing exercises mean found to be 84.2% and standard deviation 9.37, after breathing exercises mean found to be 91.09 and standard deviation 8.80 and unpaired t test value found to be 2.936*.

SectionV: Analysis of data related to find out the association between selected respiratory parameters with selected demographic variables patients with restrictive respiratory disorders.

In the association of socio demographic variable

There was no association between levels of PFT (PEFR) before breathing exercise with Age, Gender, Educational Qualification, Religion, Residential Area, Monthly Family Income, Occupation, Family History of, Any Other associated illness and Health Habits the p value found to be 0.607, 0.136, 0.249, 0.505, 0.500, 0.753, 0.157, constant, 0.094 and 0.276 respectively and no significant at the level of 0.05.

II. SUMMARY:

The present investigation of the study was "To assess the immediate effect of breathing exercises on selected respiratory parameters among patients with restrictive respiratory disorders at selected hospitals of the city."

OBJECTIVE OF THE STUDY: -

1. To assess selected respiratory parameters among patients with restrictive respiratory disorders.

To evaluate the immediate effect of breathing exercises on selected respiratory parameters among patients with restrictive respiratory disorders.

To compare the selected respiratory parameters before and after the breathing exercise.

To find out the association between selected respiratory parameters with selected demographic variables.

HYPOTHESES: -

(All hypotheses were tested at 0.05 level of significant)

H01 – There will be no significant immediate effect of breathing exercises on selected respiratory parameters in patients with restrictive respiratory disorders.

H1 – There will be significant immediate effect of breathing exercises on selected respiratory parameters in patients with restrictive respiratory disorders.

Other hypothesis: -

H02 - There will be no significant association between selected respiratory parameters with selected demographic variables.

H2 - There will be significant association between selected respiratory parameters with selected demographic variables.

FINDINGS ARE SUMMARIZED AS FOLLOW: -

Findings related to Demographic Variables

Findings related to the assessment of selected respiratory parameters among patients with restrictive respiratory disorders

Findings related to the assessment of effect of breathing exercises on selected respiratory parameters among patients with restrictive respiratory disorders

Findings related to the association between selected respiratory parameters with selected demographic variables

III. CONCLUSION: -

At the end of the study, the Breathing exercises among patients with restrictive respiratory disorder is found to be effective and helpful in improving pulmonary function.

IMPLICATIONS: -

The following implications in various fields of nursing have been stated based on the

findings of the study: -

Nursing Implication: -

The main aim of the present study was to assess the effect of breathing exercises on selected respiratory parameters among patients with restrictive respiratory disorders at selected hospitals of the city. The findings of the study have implications not only in the field of nursing but also in the other allied areas.

The present study findings have implications for –

- Nursing education.
- Nursing practice.
- Nursing administration.
- Nursing practice
- **Nursing Education: -**
  - Nursing education is developing rapidly in India and nurse is providing care through the base of scientific nursing education.
  - As a nurse educator there are abundant opportunities for nursing professionals to educate nurses and community regarding breathing exercises by taking a significant role in conducting training programs.
  - Inservice education can be conducted for improving the nursing skills in care of the patient with respiratory diseases.
  - More encouragement should be given in awareness campaign, seminars for students to update their knowledge regarding respiratory diseases and breathing exercises.
  - As a nurse educator shall give training on how to do breathing exercises.
  - Health information can be imparted from various sources such as pamphlets, mass media, and awareness campaign to update the knowledge of patients.
- **Nursing Practice: -**
  - Education can be given regarding breathing exercises such as deep breathing exercise, diaphragmatic breathing exercise, Glossopharyngeal Breathing Exercise.
  - Education can be given regarding breathing exercises in the hospital as well as in community.
  - Improve the skills of the nurses in preparation of the patient for breathing exercises.
  - Nursing profession has been developing faster in recent years in a unique way.
  - The major changes that have occurred in the profession are due to the expansion of the nurses. Final year undergraduate students will soon graduate and join their profession so the present study recommends the integration of breathing exercises that will help them to improve their knowledge.
  - Nurses shall take interest in various teaching strategies suitable for themselves and society regarding breathing exercises.
- **Nursing Administration: -**
  - Nurses play a major role as an administrator in educating the professionals and in policy-making counselling services, referral services, mass health education programs.
  - Nursing personnel should be prepared to take a leadership role in training the staff, educating students, guiding, advising, and supporting them regarding breathing exercises.
  - The administrator shall arrange the training program regarding breathing exercises.
  - The nurse administrator can provide different platforms.
  - Different technique can be used for making awareness in the patients.
  - Nursing administration can plan continue nursing education regarding breathing exercises.

- **Nursing Research: -**
  - Findings of the study will motivate the researcher to conduct the same study with different variables on a large scale.
  - The study will serve as a valuable reference to further investigations.
  - It will emphasize evidence-based practice related to breathing exercises.
  - Study finding can be used in other research studies.

LIMITATIONS OF THE STUDY: -

- The study was limited only to the only restrictive respiratory disorders.
- The study did not use any control group.
- Only immediate effect of breathing exercises on selected respiratory parameters was assessed.
- The sample for the study was limited to 30 patients.

RECOMMENDATIONS: -

Based on the findings of the study following recommendations are made

- A similar study can be conducted on large scale by increasing the sample size to draw more definite conclusions and make generalizations.
- New interventions can be given to different target population.
- The study can be conducted by including various demographic variables.
- The study can be conducted by used different research design.
- A comparative study may be conducted to find the effectiveness of breathing exercises on respiratory parameters.

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