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A Study to Evaluate the Effectiveness of Breathing Exercise on Bio-Physiological Parameters among Patients with Bronchial Asthma at Government Doon Medical College Hospital, Dehradun, Uttarakhand

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ABSTRACT

BACKGROUND Asthma remains a major public health concern in India, with limited access to non-pharmacological interventions in resource-constrained settings. Breathing exercises have emerged as a promising adjunct therapy, yet evidence remains scattered across diverse populations. PROBLEM STATEMENT "A study to evaluate the effectiveness of breathing exercise on bio-physiological parameters among patients with bronchial asthma at Government Doon Medical College Hospital, Dehradun, Uttarakhand." OBJECTIVES• To assess the pre-test or post test level of bio-physiological parameters among patients with bronchial asthma. • To evaluate the effectiveness of breathing exercise on bio-physiological parameters among patients with bronchial asthma. • To find out the association between the pre-test level of bio-physiological parameters among patients with bronchial asthma with their selected demographic variables. RESEARCH DESIGN & SETTING This pre-experimental study adopted a one-group pre-test and post-test design. It was conducted in respiratory/ pulmonary ward of Government Doon Medical College Hospital, Dehradun, Uttarakhand. METHODOLOGYA total of 60 participants were recruited using convenience sampling technique. Inclusion criteria required participants to be above 20 years of age, of either gender, and diagnosed with bronchial asthma. Patients were excluded if they were unconscious, unwilling to participate, already practicing breathing exercises, or had significant co-morbidities. The intervention focused on guided breathing exercises, with the following bio-physiological parameters measured pre- and post-intervention: respiratory rate, pulse rate, blood pressure, oxygen saturation, peak expiratory flow rate, breath sounds, skin color, and general appearance. Data were collected using a self structured socio-demographic profile and an observational checklist. RESULTS Post-intervention data analysis revealed statistically significant improvements ($p < 0.05$) across multiple respiratory indicators, affirming the positive influence of breathing exercises. CONCLUSION Structured breathing exercises significantly enhance bio-physiological outcomes in asthma patients, suggesting their integration into standard clinical practice, especially in resource-limited settings.

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KEYWORDS: *Bronchial asthma Breathing exercises Respiratory rate Oxygen saturation Pulmonary function.*

INTRODUCTION

Bronchial asthma is a chronic respiratory condition of inflammation and narrowing of the airways, leading to symptoms such as wheezing, shortness of breath, chest tightness, and coughing. Managing asthma

effectively requires a combination of pharmacological treatments and lifestyle modifications, including breathing exercises[5].

In 2024, bronchial asthma continues to be a significant health issue in India, particularly among adults. Recent studies indicate that the prevalence of asthma in adults remains high, with a notable number of cases in the elderly population. The incidence of acute bronchial asthma is more common in the elderly, with 47% of cases in the 51-60 age group, 28% in those aged 61-70, and 13% in those over 70 years[6].

In 2019 asthma affected approximately 262 million people and caused approximately 461,000 deaths. Most of the deaths occurred in the developing world. This shows lower rates in Asia, Eastern Europe and Africa. Within developed countries it is more common in those who are economically disadvantaged while in contrast in developing countries it is more common in the affluent. The reason for these differences is not well known. Low- and middle-income countries make up more than 80% of the mortality. While asthma is twice as common in boys as girls, severe asthma occurs at equal rates. In contrast adult women have a higher rate of asthma than men and it is more common in the young than the old[7].

Breathing exercise for asthma can increase our overall breathing control. They cannot prevent your airways from restricting. The better controlled our asthma is, the better you can manage our asthma symptoms. When you are able to breathe better, our quality of life improves. Breathing exercises works to strengthen the respiratory muscles, promote relaxation, increase breathing control, clear airways, and improve overall lung health[8].

PROBLEM STATEMENT

A study to evaluate the effectiveness of breathing exercise on bio-physiological parameters among patients with bronchial asthma at Government Doon Medical College Hospital, Dehradun, Uttarakhand.

OBJECTIVES

- To assess the pre-test and post-test level of bio-physiological parameters among patients with bronchial asthma.
- To evaluate the effectiveness of breathing exercise on bio-physiological parameters among patients with bronchial asthma.
- To find out the association between the pre-test level of bio-physiological parameters among patients with bronchial asthma with their selected demographic variables.

HYPOTHESIS

H_0: There will be no significant difference in bio-physiological parameters among patients with bronchial asthma before and after performing breathing exercises.

H_1: There will be a significant difference in bio-physiological parameters among patients with bronchial asthma before and after performing breathing exercises.

H_2: There will be a significant association between the level of bio-physiological parameters among patients with bronchial asthma with their selected demographic variables.

OPERATIONAL DEFINATIONS

Effectiveness- In this study it refers to the capability of producing a desired result or the ability to produce desired output.

Breathing exercises- In this study it refers to the controlled techniques of inhaling and exhaling designed to improve physical, mental, and emotional well-being by regulating breath patterns consciously.

Bio-physiological parameters- In this study it refers to the measurable characteristics of bronchial asthma patient health parameters which provide valuable insights into their health state. These parameters included respiratory rate, pulse rate, blood pressure, oxygen saturation, peak expiratory flow rate, breath sounds, skin color and general appearance**.**

Bronchial asthma- In this study it refers to the patient with lung disorder characterized by narrowing of the airways, the tubes which carry air into the lungs that are inflamed and constricted, causing shortness of breath, wheezing and coughs.

ASSUMPTION

- Participants will adhere to the prescribed breathing exercise regime**.**
- There will be consistency of medical treatment for asthma patient during study period without any change.
- The participants will understand and comply with breathing exercise as per instructed in hospital setting.

DELIMITATIONS

- This study is limited to patients diagnosed with bronchial asthma who are receiving treatment at respiratory department in selected hospital. Participants outside this group were not included.
- This study focuses on specific bio-physiological parameters such as lung function, respiratory rate, and oxygen saturation, and does not include other potential indicators of asthma control.

- Participants adherence to the prescribed breathing exercises may vary, potentially impacting the results.

RESEARCH APPROACH

Research approach is a **systematic and structured way that researchers use to conduct research.** It decides the methods for data collection, analysis, and interpretation. It is based on the nature of a research question and consists of the steps of broad assumptions to detailed methods of data collection, analysis, and interpretation. Keeping in view the objective are quantitative research approach was found to be the most appropriate.

RESEARCH DESIGN

Since the present study was to evaluate the effectiveness of breathing exercise on bio-physiological parameters among patients with bronchial asthma at Government Doon Medical College Hospital, Dehradun, Uttarakhand. Pre-Experimental Research Design (one group pre- test and post test design) seemed to be the most appropriate for the study.

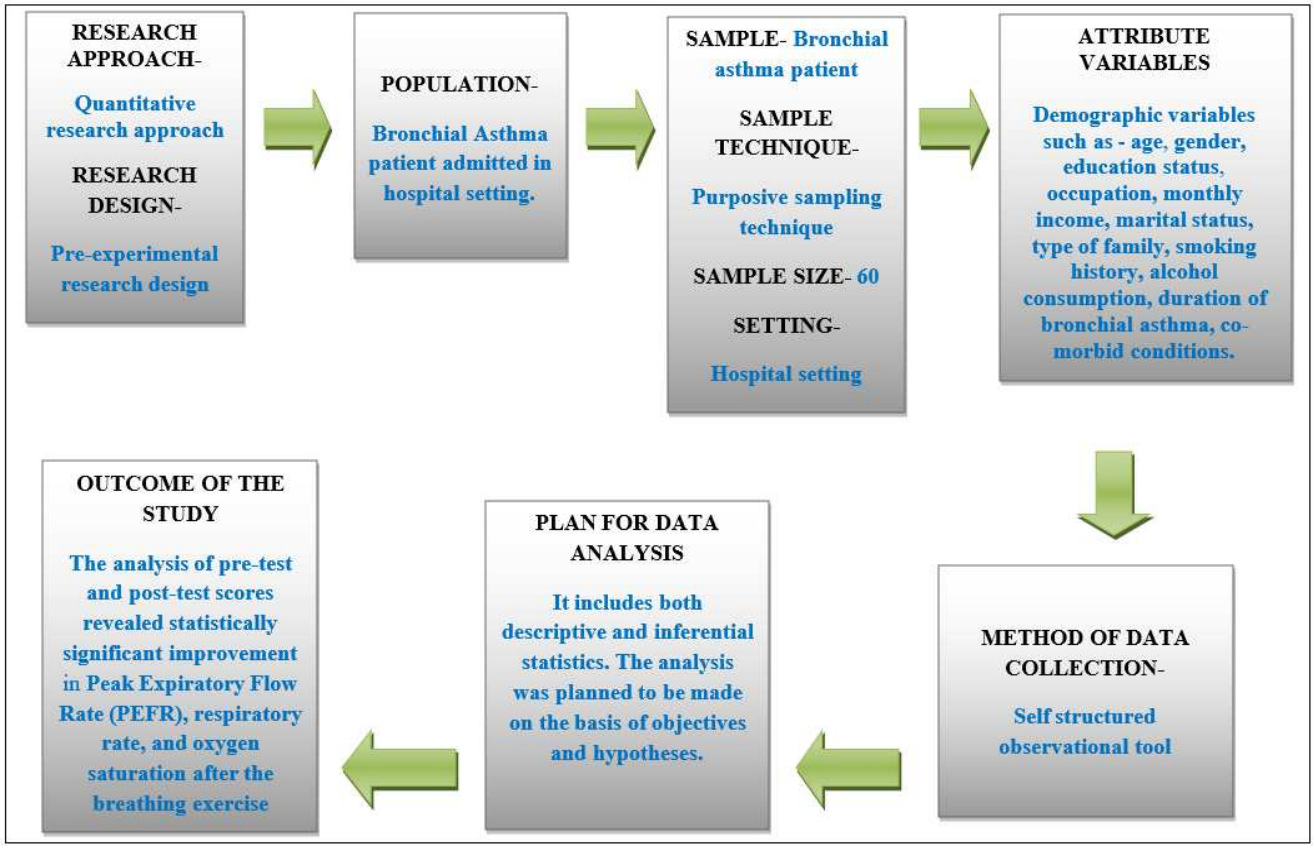

Fig. 2- Schematic representation of research data

VARIABLES

Independent variable: Breathing Exercise.

Dependent variable: Bio-physiological parameters including **-** Respiratory rate, pulse rate, blood pressure, oxygen saturation, peak expiratory flow rate, breath sounds, skin color, general appearance**.**

STUDY SETTING

Setting-

The present study was conducted in respiratory ward at Government Doon Medical College Hospital, Dehradun, Uttarakhand.

POPULATION

The population of the present study was the patient with bronchial in respiratory ward of Government Doon Medical College Hospital, Dehradun.

SAMPLE, SAMPLE SIZE AND SAMPLE TECHNIQUE:

Sample-

Sample include bronchial asthma patient admitted in Government Doon Medical College Hospital, Dehradun, Uttarahand.

Sample size- It refers to the number of subjects in a sample.

The sample of present study includes 60 bronchial asthma patients.

Sample Technique-

Purposive sampling technique was used for the current study. This is non-probability method which involves the conscious selection of certain subjects to include in the study.

Criteria for sample selection- The sample will be selected on the basis of inclusive and exclusive criteria.

- **Inclusive criteria**

- Age above 20 years.
- Both gender- Male and female.
- Patient with bronchial asthma.

- **Exclusive criteria**

- Patient who are not willing to participate in the study.
- Unconscious patients.
- Patients who are already exposed to exercise with co-morbid disease.

Tools

Section A: Demographic profile of patient with bronchial asthma.

Section B: Observational checklist to assess the bio physiological parameters.

CONTENT VALIDITY-

The content validity of the tool is observational checklist for bio-physiological parameters which was obtained by giving it to our 5 experts along with the tool validation criteria checklist. Our experts were requested to give their opinions and suggestions regarding the appropriateness and relevance of the items including, 2 Hindi and English content validation of the tool and also 1 from a statistician.

RELIABILITY-

The reliability of the observation tool, to ensure internal consistency, was assessed using Cronbach's alpha. It was administered to the same group of 10 asthmatic patients at Shri Mahant Indresh Hospital. The calculated reliability coefficient ($\alpha = 0.8$) indicated a high level of consistency across the items. This result confirmed that the tool was appropriate and dependable for evaluating the impact of breathing exercises on bio-physiological parameters among bronchial asthma patients.

FREQUENCY AND PERCENTAGE DISTRIBUTION OF DEMOGRAPHIC VARIABLES OF PATIENTS WITH BRONCHIAL ASTHMA (N=60)

S. No.	Variables	Frequency (n)	Percentage (%)
1	Age		
	a. 20-30 yr	14	23.3
	b. 30-40 yr	14	23.3
	c. 40-50 yr	10	26.7
	d. Above 50 yr	22	36.7
2	Gender		
	a. Male	26	43.3
	b. Female	34	56.7
	c. Other	0	0
3	Education status		
	a. No formal education	24	40
	b. Primary	17	28.3
	c. Secondary	12	20
	d. Graduate and above	7	11.7
4	Occupation		
	a. Employed	9	15
	b. Unemployed	38	63.3
	c. Student	8	13.4
	d. Retired	5	8.3

5	Monthly income		
	Below ₹20,000	15	25
	₹20,000 - ₹50,000	29	48.3
	₹50,000 - ₹1,00,000	11	18.3
	Above ₹1,00,000	5	8.3
6	Maried Status		
	Married	26	43.33
	Unmarried	14	23.33
	Widow/widower	16	26.7
	Divorced	4	6.7
7	Type of family		
	a. Nuclear	22	
	b. Joint	30	36.7 50 13.3
	c. Extended	8	
8	Smoking habit		
	a. Yes	31	51.7
	b. No	29	48.3
9	Alcohol Consumption		
	a. Yes	17	28.3
	b. No	43	71.7
10	Duration of Bronchial Asthma		
	a. Less than 1 year	16	26.7
	b. 1yr – 2yrs	15	25
	c. 2yrs – 5 yrs	13	21.6
	d. More than 5 yrs	16	26.7
10	Co-morbid Conditions		
	a. Hypertension	15	25
	b. Diabetes	7	11.7
	c. Others	6	10
	d. Not Any	32	53.3

SECTION II:

FREQUENCY AND PERCENTAGE DISTRIBUTION OF BIO-PHYSIOLOGICAL PARAMETERS AMONG PATIENTS WITH BRONCHIAL ASTHMA (N=60)

S. No.	Parameters	Score	Category	Pre-test		Post-test	
				Frequency n=60	Percentage %	Frequency n=60	Percentage %
1	Respiratory rate (breath/ min.)-	1	Less than 12	1	1.67	0	0
		2	12- 20 breath/ min.	44	73.33	20	33.33
		3	More than 20	15	25	40	66.7
2	Pulse rate (beats/min.)-	1	Below 60	1	1.7	0	0
		2	60-100	48	80	33	55.00
		3	Above 100	11	18.33	27	45.00
3	Blood Pressure (mm Hg)-	1	More than 140/90	15	25	02	3.33
		2	130/80	26	43.33	32	53.33
		3	Less than 120/80	19	31.7	26	41.7
4	Oxygen Saturation (SpO2 %)	1	Below 80%	1	1.7	0	0
		2	80%- 94%	50	83.33	21	35
		3	95%-100%	9	15	39	65
5	Peak Expiratory Flow Rate (L/min.)	1	Below 200	6	10	0	0
		2	200-320	43	71.7	16	26.67
		3	400-700	11	18.33	44	73.33

6	Breath Sounds (on auscultation)	1	Crackles	11	18.33	0	0
		2	Wheeze	38	63.33	32	53.33
		3	Normal	11	18.33	28	46.7
7	Skin Color	1	Cyanosis	0	0	0	0
		2	Pale	20	33.33	0	0
		3	Normal	40	66.7	60	100
8	General appearance	1	Anxious	7	11.7	0	0
		2	Mild discomfort or restlessness	46	76.7	25	41.7
		3	Comfortable and relaxed	7	11.7	35	5.00
	Total scoring point		**24**				

Objective 1: To compare the pre-test and post-test bio-physiological parameters

The analysis of pre-test and post-test scores revealed statistically significant improvement in Peak Expiratory Flow Rate (PEFR), respiratory rate, and oxygen saturation after the breathing exercise intervention. These improvements suggest that breathing exercises enhanced airway clearance, reduced bronchial constriction, and improved overall pulmonary efficiency.

Objective 2: To assess the effectiveness of breathing exercises

The intervention group exhibited greater improvement in bio-physiological parameters compared to the control group, validating the effectiveness of structured breathing exercises as an adjunct therapy. Patients reported enhanced ease of breathing and reduced frequency of asthma-related discomfort following the intervention.

Objective 3: To determine the association between bio-physiological parameters and selected demographic variables

Statistical analysis in the present study revealed significant associations between pre-test parameters and demographic variables such as age, duration of illness, and educational status. Older patients and those with a longer history of asthma generally showed poorer baseline respiratory function, while higher education levels influenced greater awareness of self-care practices.

SUMMARY

This pre-experimental study was conducted to assess the effectiveness of breathing exercises on bio-physiological parameters among 60 patients with bronchial asthma at Government Doon Medical College Hospital, Dehradun, Uttarakhand.

Using a structured observation checklist and statistical analysis, the study confirmed that breathing exercises significantly improved respiratory and cardiovascular function.

- The study successfully evaluated the impact of breathing exercises on bio-physiological outcomes in patients with bronchial asthma.
- Post-test scores showed statistically significant improvement in PEFR, respiratory rate, and oxygen saturation, establishing the intervention's effectiveness.
- Demographic factors such as age, illness duration, and educational level played a role in baseline respiratory function, suggesting that individualized strategies may improve results further.

CONCLUSION

- Breathing exercises proved to be a cost-effective, non-invasive, and safe intervention that significantly improved bio-physiological parameters among bronchial asthma patients.
- The findings highlight the potential for integrating breathing exercises into routine clinical nursing practice to enhance respiratory health and quality of life.
- Future research should focus on:
  - Long-term adherence to breathing practices,
  - Exploring psychological benefits such as reduced anxiety and stress,
  - Testing scalability across larger and diverse populations.

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