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Evaluating The Impact Of Respiratory Care Bundle On Dyspnea Among Bronchial Asthma Patients: A Quasi-Experimental Study In Panipat, Haryana

Shweta Agnihotri[1], Paul Dinagaran[2]

1. Senior Nursing Tutor, RPIIMS, Karnal
2. Professor, Ved nursing college, Panipat

Abstract: **Background of the Study:** Asthma is among the most prevalent chronic respiratory conditions worldwide, with its incidence steadily rising. Since a complete cure remains elusive, patients often depend on supportive measures such as deep breathing techniques, pursed-lip breathing exercises, and incentive spirometry to manage symptoms and enhance respiratory function. **Aim:** The purpose of this study was to assess how effective a respiratory care bundle is in reducing breathlessness (dyspnoea) among patients with bronchial asthma at LHDM & Dr. Prem Hospital and Ravindra Hospital in Panipat. **Methodology:** A **quasi-experimental research design** was employed to analyze the impact of specific interventions on asthma-related dyspnoea. The study was conducted across **two hospitals in Panipat**—LHDM & Dr. Prem Hospital and Ravindra Hospital—with a total **sample size of sixty patients**, evenly divided into two groups.

- **Group 1 (Experimental Group)** received a structured respiratory care bundle incorporating **oral hygiene, guided deep breathing exercises, and incentive spirometry**.
- **Group 2 (Control Group)** continued with standard nursing care for asthma management.

Participants were selected using a **non-probability purposive sampling technique**. To assess breathing difficulty, the **Modified Borg Dyspnoea Scale** was used. Prior to the main study, a **pilot trial involving six patients** was conducted to confirm feasibility. The final data was evaluated using **descriptive and inferential statistical methods**. **Results:** After the intervention, the average dyspnoea score in Group 1 was 3.54 ± 1.548, while in Group 2 it was 8.23 ± 1.006. An independent t-test showed a score of 14.041 with 58 degrees of freedom, which was highly significant ($p < 0.001$). This clearly indicates that patients in the experimental group experienced a notable improvement in their breathing compared to those who received routine care. **Conclusion:** The findings suggest that simple interventions like deep breathing exercises, proper oral care, and the use of incentive spirometry can make a meaningful difference in improving the breathing comfort of people living with bronchial asthma.

Keywords: Evaluate, Respiratory care bundle, Dyspnoea

I. INTRODUCTION

Respiratory illnesses, often referred to as lung disorders, involve abnormal conditions that impact the lungs and surrounding tissues, making breathing and gas exchange more difficult. These conditions can range from minor, short-term illnesses like the common cold, flu, and sore throat, to more severe, life-threatening diseases like pulmonary embolism, bacterial pneumonia, asthma, tuberculosis, and lung cancer[1].

Asthma, specifically, is a chronic inflammatory disorder of the airways. It is marked by episodes where the smooth muscles in the airway overreact, leading to a temporary narrowing of the bronchial passages. This results in classic symptoms like wheezing and breathlessness. Asthma is considered a reversible bronchial condition and currently affects over 25 million people, including a considerable number of children. Without proper treatment, it can become life-threatening. Thankfully, evidence-based stepwise guidelines are available to help manage the condition effectively[2].

Asthma is a chronic respiratory condition that affects individuals across various age groups, leading to breathing difficulties. As noted by the World Health Organization (WHO), the condition arises due to persistent inflammation and constriction of airway muscles, which restricts airflow and makes respiration more challenging. In 2019, asthma affected approximately 262 million people globally and was responsible for around 455,000 deaths. The worldwide prevalence is estimated at about 4.5%, and this number has been rising. By 2025, an additional 100 million people may be affected[3].

In India, recent studies using different estimation models—including INSEARCH, GINA, and WHO surveys—suggest that asthma prevalence ranges from 2.05% to 3.5%, affecting roughly 17 to 30 million individuals. The core issue appears to be a recurring abnormality in the body that causes excessive tightening of the airway muscles, increased mucus production, and swelling in the bronchial lining[4].

NEED OF STUDY

Asthma is a chronic respiratory condition characterized by inflammation, airway constriction, and excessive mucus production, all of which contribute to breathing difficulties. Symptoms can range from mild discomfort, such as occasional coughing and wheezing, to severe respiratory distress that may disrupt daily life or pose life-threatening risks. While asthma currently has no definitive cure, its symptoms can be effectively controlled through appropriate treatment strategies and ongoing care[5].

According to the Global Burden of Disease Study (2016), there were approximately 251 million cases of respiratory diseases worldwide in that year. In 2015, respiratory conditions accounted for an estimated 3.17 million deaths—equivalent to 5% of all global deaths. Notably, over 90% of these deaths occurred in low- and middle-income countries[6].

The World Health Organization (2017), in its report for World Asthma Day, highlighted the growing concern of respiratory-related deaths in India, which accounted for 11% of all deaths. It reported that 142.09 per 100,000 individuals died from some form of lung disease, making India the country with the highest number of such deaths. Frequent asthma symptoms can cause significant distress, including disrupted sleep, fatigue during the day, decreased physical activity, and missed work or school. Despite its global prevalence, asthma has a lower mortality rate compared to many other chronic diseases[7].

A study by J. Bindu et al. (2015) explored the impact of a respiratory care bundle on relieving Dyspnoea in patients admitted with respiratory problems at MMIMS & R Hospital. The quasi-experimental study included sixty patients selected using purposive sampling. The Modified Borg Dyspnoea Scale was used to assess breathlessness. Patients were instructed to follow a strict routine, which included performing oral hygiene

with a toothbrush and paste in the morning, using chlorhexidine mouthwash twice daily (at 10 a.m. and 4 p.m.), rinsing with plain water every two hours, and using an incentive spirometer seven times per day. Dyspnoea levels were measured before and after applying the respiratory care bundle. The results showed a statistically significant improvement in Dyspnoea scores after the intervention ($p < 0.01$), suggesting that the respiratory care bundle is an effective strategy for reducing breathlessness[8].

II. PROBLEM STATEMENT:

Evaluating The Impact Of Respiratory Care Bundle On Dyspnea Among Bronchial Asthma Patients: A Quasi-Experimental Study In Panipat, Haryana

Objectives:

1. To analyse and compare dyspnoea levels before and after intervention among bronchial asthma patients in both the experimental and control groups.
2. To evaluate the effectiveness of the respiratory care bundle in alleviating dyspnoea within the experimental group.
3. To investigate the correlation between post-intervention dyspnoea levels and selected demographic characteristics among asthma patients.

Hypotheses:

- H_1: The post-test dyspnoea score in the experimental group will demonstrate a statistically significant decrease compared to the pre-test score ($p < 0.05$).
- H_2: The mean dyspnoea level observed in the experimental group post-intervention will be notably lower than that of the control group ($p < 0.05$).
- H_3: There will be a statistically significant association between post-test dyspnoea levels and specific demographic factors among bronchial asthma patients ($p < 0.05$).

RESEARCH METHODOLOGY

Research Approach:
This study employed a quantitative research framework to systematically measure and evaluate outcomes related to dyspnoea in bronchial asthma patients.

Research Design:
A quasi-experimental design was utilized, incorporating pre-test and post-test assessments within a control group setup. This structure enabled a comparative analysis of intervention effectiveness, ensuring measurable results.

Study Setting:
The research was carried out among patients with bronchial asthma admitted to Dr. Prem Hospital and Ravindra Hospital, located in Panipat District, Haryana.

Sampling Technique and Sample Size:
This study employed a non-probability purposive sampling method to carefully select participants. A total of sixty patients, ranging in age from 20 to 80 years, were included in the research. These individuals were evenly distributed between two groups—30 patients in the experimental group and 30 in the control group—to facilitate comparative analysis of intervention effectiveness.

Target Population:
The population targeted in this study included patients diagnosed with bronchial asthma receiving care at Dr. Prem Hospital and Ravindra Hospital.

CRITERIA FOR SAMPLE SELECTION

Inclusion criteria: Patients eligible for the study were those who:

- Were admitted as inpatients with a confirmed diagnosis of bronchial asthma.
- Were receiving regular treatment and were between 20 and 80 years old.
- Were available during the data collection period and willing to take part in the study.

Exclusion Criteria: Participants were not considered for inclusion in the study if they met any of the following conditions:

- Had pre-existing **cardiac or renal diseases**, had undergone recent surgeries, or were managing other complex medical conditions.
- Were already engaged in **regular breathing exercises or yoga**, which could influence respiratory outcomes.
- Had participated in a **pulmonary rehabilitation program** within the past six months, potentially affecting intervention results.
- Were undergoing **alternative treatments**, including **Siddha, Unani, or Ayurveda**, which may alter respiratory function.

Selection and Development of Research Tool: Two primary tools were utilized in this study:

- **Assessment of Dyspnoea**: The Modified Borg Dyspnoea Scale was employed to measure the level of breathlessness experienced by patients. This scale ranges from 0 to 10, where 0 indicates no difficulty in breathing and 10 represents the greatest possible breathlessness.
- **Physiological Parameters**: An observational checklist was used to record key physiological indicators including:
- **Pulse Rate**: Normal range considered between 60 and 100 beats per minute (bpm).
- **Respiratory Rate**: Normal range set at 12 to 20 breaths per minute.
- **Peak Expiratory Flow Rate (PEFR)**: Normal values differ by gender, with 450–550 litres per minute for adult males and 320–470 litres per minute for adult females.

III. DATA COLLECTION PROCEDURE

This study was conducted at **Dr. Prem Hospital** and **Ravindra Hospital**, located in Panipat. The participants were systematically divided into **two equal groups**, each comprising **30 patients**.

- **Group 1 (Experimental Group)** received targeted **relaxation-based interventions**, including **oral care routines, guided deep breathing exercises, and incentive spirometry**.
- **Group 2 (Control Group)** continued receiving **standard nursing care** typically provided for bronchial asthma patients.

To evaluate the impact of the intervention, data was gathered using the **Modified Borg Dyspnoea Scale**, alongside an assessment of relevant **physiological parameters**. Prior to the main study, a **pilot trial involving six participants** was conducted to validate the **practicality and feasibility** of the research methodology.

Following the pilot, patients in Group 1 were taught breathing exercises to perform for **3 minutes, three times daily, over a period of 5 days**. On the 10th day, a post-test was administered using the same tools. The breathing techniques were practiced daily for **10 minutes, three times per day**. The post-test evaluation was conducted on the fifth day using the Modified Borg Dyspnoea Scale and the physiological parameter checklist.

IV. DATA ANALYSIS AND INTERPRETATION

Section A: Demographic Characteristics of Patients with Bronchial Asthma in the Experimental and Control Groups

The following analysis provides insights into the **frequency and percentage** distribution of patients across various demographic factors within **both experimental and control groups.** The data has been systematically organized to highlight patterns in **age, gender, marital status, educational background, occupational status, and health-related variables,** ensuring a comprehensive understanding of participant characteristics. **Table 1** presents the breakdown of these demographic variables, enabling a comparative evaluation between the two groups.

n=60 (30+30)

S.no.	Demographic variables		Experimental Group		Control Group	
			f	%age	f	%age
1.	Age (in years)	20-30	6	20.0	6	20.0
		31-40	6	20.0	9	30.0
		41-50	11	36.7	7	23.3
		51-60	6	20.0	6	20.0
		61-80	1	3.3	2	6.7
2.	Gender	Male	14	46.7	14	46.7
		Female	16	53.3	16	53.3
3.	Marital status	Unmarried	5	16.7	6	20.0
		Married	20	66.7	21	70.0
		Separated	3	10.0	3	10.0
		Widow	2	6.7	0	0
4.	Educational status	No formal education	5	21.0	4	17.2
		Primary education	4	13.4	13	43.4
		Secondary & higher secondary	7	23.3	8	26.7
		Diploma	9	30.0	4	13.3
		Graduate & post-graduate	4	13.3	0	0
5.	Occupational status	Unemployed	3	10.0	3	10.0
		Private employee	16	53.3	19	63.3
		Govt. employee	2	6.7	5	16.7
		Factory worker/ labourers/daily wages/farmers	9	30.0	3	10.0
6.	Family income	6000-18000	11	36.7	5	16.7
		18001-30000	9	30.0	10	33.3
		30001-50000	10	33.3	15	50.0
7.		Non-smoker	6	20.0	10	33.3

	Smoking habits	Passive smoker	14	46.7	12	40.0
		Chain smoker	6	20.0	4	13.3
		Ex- smoker	4	13.3	4	13.3
8.	Allergic factors	House dust mite	2	6.7	3	10.0
		Pollen	12	40.0	14	46.7
		Fungal spore	9	30.0	3	10.0
		Pet	7	23.3	10	33.3
9.	Seasonal attacks	Yes	15	50.0	17	56.7
		No	15	50.0	13	43.3
10.	Duration of illness	<less than 2 years	3	10.0	7	23.3
		2-5 years	16	53.3	21	70.0
		>than 5 years	11	36.7	2	6.7

Section B: Assessment of Pre-Test and Post-Test Dyspnoea Levels in the Experimental Group

This section evaluates **changes in dyspnoea levels** among bronchial asthma patients following the respiratory care bundle intervention. The analysis highlights **frequency and percentage distributions** to compare **pre-test and post-test dyspnoea measurements** in the experimental group, demonstrating the effectiveness of the intervention.

Table 2 presents a detailed breakdown of dyspnoea severity before and after the treatment, showcasing the observed improvements in respiratory comfort.

n=30

Levels of Dyspnoea	No evidence of dyspnoea		Mild Dyspnoea		Moderate Dyspnoea		Severe Dyspnoea	
	f	%age	F	%age	f	%age	f	%age
Pre-test	0	0	0	0	10	33.3	20	66.7
Post-test	4	13.33	17	56.7	9	30.0	0	0

The analysis of patients in the experimental group, during pre-test majority 20(66.7%) had severe Dyspnoea. Patients with moderate Dyspnoea was 10(33.3%). At the time of post-test Dyspnoea was present as majority among 17(56.7%). No evidence of severe Dyspnoea was there for 4(13.3%) of the patients.

Table 3 illustrates the frequency and Percentage Distribution of Patients Based on Dyspnoea Levels in the Control Group

n=30

Levels of Dyspnoea	No evidence of dyspnoea		Mild Dyspnoea		Moderate Dyspnoea		Severe Dyspnoea	
	f	%	F	%	f	%	f	%
Pre-test	0	0	0	0	3	10.0	27	90.0
Post-test	0	0	0	0	8	26.7	22	73.3

Among patients in the control group, the majority—**27 (90%)**—experienced severe dyspnoea during the pre-test, while **3 (10%)** had moderate dyspnoea. After the intervention, during the post-test, severe dyspnoea was still predominant in **22 (73.3%)** of the patients, with **8 (26.7%)** showing moderate levels of dyspnoea.

Section C: Comparison of Pre-Test and Post-Test Dyspnoea Levels Among Patients with Bronchial Asthma in the Experimental and Control Groups

Table 4 provides a comparison of dyspnoea levels prior to and after the intervention of patients in the experimental group.

n=30

Level of dyspnoea	Mean	Standard Deviation	Paired `t` value
Pre-test	7.87	1.042	t =15.078**
Post-test	3.5	1.546	

The difference was statistically significant with **p < 0.001**, which is below the critical table value. In the experimental group, the pre-test mean dyspnoea score was **7.87** with a standard deviation of **1.042**. After the intervention, the post-test mean decreased to **3.5** with a standard deviation of **1.546**, showing a significant reduction in dyspnoea levels (**p < 0.001**).

Table 5 provides a comparison of dyspnoea levels before and after the intervention among patients with bronchial asthma from the control group.

n=30

Level of dyspnoea	Mean	Standard Deviation	Paired `t` value
Pre-test	1.3	0.53	t =1.1**
Post-test	1.5	0.86	

The observed difference did not reach statistical significance, as the p-value remained above **0.05**, failing to exceed the critical threshold. Within the control group, the pre-test mean dyspnoea score was recorded at **1.3** with a standard deviation of **0.53**, whereas the post-test mean showed a slight increase to **1.5**, accompanied by a standard deviation of **0.86**. These findings suggest that routine care did not lead to a meaningful reduction in dyspnoea levels (**p > 0.05**).

Table 6 compares post-test dyspnoea levels between patients in the experimental group and those in the control group.

n=60(30+30)

Post-test	Mean	Standard Deviation	Paired `t` value
Experimental group	2.4	0.760	t =4.761**
Control group	1.4	0.861	

The difference was statistically significant with $p < 0.05$, which exceeded the critical table value. In the post-test comparison, the experimental group had a mean dyspnoea score of **2.4** with a standard deviation of **0.761**, while the control group had a lower mean score of **1.4** with a standard deviation of **0.861**. This suggests a significant reduction in dyspnoea levels among patients who received the respiratory care bundle compared to those who received routine care ($p < 0.05$).

Section D: Relationship Between Post-Test Dyspnoea Levels and Selected Demographic Variables in the Experimental Group

This section examines the **association between post-test dyspnoea scores** and various **demographic factors** among bronchial asthma patients in the experimental group. The analysis aims to identify potential correlations that may influence the effectiveness of the respiratory care bundle across different patient profiles. **Table 7** presents a detailed breakdown of these associations, offering insights into how factors such as **age, gender, marital status, education level, occupational background, and smoking habits** may impact dyspnoea outcomes post-intervention.

n=30

S.no.	Demographic variables		Post-test level		`t` value	`p` value
			Moderate	Severe		
1.	Age (years)	20-30	3	3	5.386 (df=4)	0.250 Not significant
		31-40	3	3		
		41-50	2	9		
		51-60	1	5		
		61-80	1	0		
2.	Gender	Male	5	9	0.067 (df=1)	0.550 Not significant
		Female	5	11		
3.	Marital status	Unmarried	2	3	1.875 (df=3)	0.599 Not significant
		Married	7	13		
		Separated	0	3		
		Widow	1			
4.	Educational status	No proper education	2	4	4.196 (df=4)	0.380 Not significant
		Primary education	0	4		
		Secondary & Higher secondary	2	5		
		Diploma	5	4		
		Graduate & post-graduate	1	3		
5.	Occupational status	Unemployed	2	1	2.281 (df=3)	0.5816 Not significant
		Private employee	5	11		
		Govt. employee	1	1		
		Factory worker/ labourers/daily wages/farmers	2	7		
6.	Family income	6000-18000	2	9	3.186 (df=2)	0.203 Not significant
		18001-30000	5	4		
		30001-50000	3	7		
7.	Smoking habits	Non-smoker	3	9	4.286 (df=3)	0.232 Not significant
		Passive smoker	5	4		
		Chain smoker	0	7		
		Ex- smoker	2	3		
8.	Allergic factors	House dust mite	1	1	0.321 (df=3)	0.956 Not significant
		Pollen	4	8		
		Fungal spore	3	6		
		Pet	2	5		
9.	Seasonal attacks	Yes	5	10	0.005 (df=1)	0.650 Not significant
		No	5	10		
10.	Duration of illness	<less than 2 yrs	1	6	6.136 (df=2)	0.04* Significant
		2-5 yrs	5	16		
		>than 5 yrs	2	0		

The table above illustrates the association between pre-test dyspnoea levels and demographic variables in the experimental group. Among these variables, the presence of other co-morbidities showed a significant

relationship with pre-test dyspnoea levels. The chi-square value for this association was 12.039 with 2 degrees of freedom, which was statistically significant at $p < 0.002$.

V. DISCUSSION

The findings of this study are examined in light of the stated objectives, supported by related research to validate their significance.

Objective 1: Evaluating Pre-Test and Post-Test Dyspnoea Levels

The first objective focused on comparing **dyspnoea levels before and after intervention** among bronchial asthma patients in both experimental and control groups. The results align with prior research by **Natasha Shetty and Stephen Rajan Samuel (July 2020)**, which assessed the impact of diaphragmatic breathing exercises and incentive spirometry on respiratory function in stroke patients. Their study highlighted how reduced respiratory muscle strength compromises lung function, increasing the risk of complications such as chest infections and impaired oxygenation. Through respiratory muscle training, substantial improvements were observed, with flow-oriented incentive spirometry demonstrating superior effectiveness in enhancing pulmonary function and maximal respiratory pressures[9].

Objective 2: Assessing the Impact of the Respiratory Care Bundle

The second objective evaluated the effectiveness of a structured **respiratory care bundle** in alleviating dyspnoea among asthma patients. Findings from this study align with research conducted by **Aby Thankachan (October 2018)**, which examined a quasi-experimental approach to respiratory care interventions for bronchial asthma patients at selected hospitals in Pudukkottai. Using the Modified Borg Dyspnoea Scale, this study revealed a statistically significant reduction in dyspnoea post-intervention, reinforcing the efficacy of structured respiratory care. Additionally, chi-square analysis identified a meaningful correlation between dyspnoea improvement and illness duration, suggesting that patients with longer illness history benefitted significantly from the intervention[10]. These findings validate the hypothesis that structured respiratory care strategies can effectively reduce dyspnoea symptoms, leading to improved breathing comfort for bronchial asthma patients. Hence, hypothesis H_3 is supported.

Objective 3: Association Between Dyspnoea Levels and Demographic Variables

The third objective explored whether **post-intervention dyspnoea levels correlated with specific demographic factors** among asthma patients in the experimental group. Results from **chi-square analysis** confirmed a **statistically significant relationship between dyspnoea levels and the duration of illness** (**$p < 0.05$**), indicating that patients with **prolonged asthma history responded more favourably** to the respiratory care bundle. However, other **demographic variables showed no notable association**, leading to acceptance of **hypothesis H_4**.

VI. CONCLUSION

This research demonstrated the impact of the respiratory care bundle on dyspnoea scores and respiratory functioning in patients with bronchial asthma. The respiratory care bundle was found to be highly effective in reducing dyspnoea levels among these patients. The findings of this study are consistent with clinical studies on the effectiveness of respiratory care bundles.

Limitations: The study was limited to evaluating the effectiveness of the respiratory care bundle only on the level of dyspnoea among patients with bronchial asthma. It focused solely on acute asthmatic patients, with the intervention provided for a period of 5 days, and the overall study duration was limited to 6 weeks.

Conflict of interest: None

Source of funding: Self-funded

Ethical clearance: Obtained from the Ethical Committee of Ved Nursing College, Panipat on 3 May 2023, with Reference No. VNC (383(II))/23.

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