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EFFECTIVENESS OF NURSING INTERVENTIONAL STRATEGY IN RELATION TO PULMONARY REHABILITATION MODULE AMONG PATIENTS WITH BRONCHIAL ASTHMA IN SELECTED HOSPITAL

Mrs. G. Malathi[1], Dr. Sathiyalatha Sarathi [2], Dr. V. Hemavathy [3]

[1] Ph.D. Scholar (Nursing), Bharath Institute of Higher Education and Research, Chennai, Tamil Nadu, India.
[2] Research Guide, Vice Principal cum HOD of Obstetrics and Gynaecological Nursing, Sree Balaji college of Nursing, Chennai
[3] Research Co-Guide, Principal, Department of psychiatric Nursing, Sree Balaji college of Nursing, Chennai
Corresponding Author: Mrs. G. Malathi

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ABSTRACT

Background: Bronchial asthma is a chronic inflammatory disease of the airways characterized by episodes of wheezing, breathlessness, chest tightness, and coughing. This condition arises due to the inflammation and narrowing of the airways, making breathing difficult. **Methods:** Time series design was used for the study. The study was conducted in a selected hospital. The sample consisted of 236 patients diagnosed with bronchitis who fulfils inclusion criteria. The samples were selected using a purposive sampling technique. **Finding:** The study results highlight the positive impact of the nursing interventional strategy on the bio-physiological parameters of patients with bronchial asthma, demonstrating significant improvements in lung function, symptom control, quality of life, inflammation, and medication adherence. **Conclusion:** The results of this study strongly support the effectiveness of a nursing interventional strategy integrated with a pulmonary rehabilitation module in improving the bio-physiological parameters among patients with bronchial asthma.

Key words: Nursing interventional strategy, pulmonary rehabilitation module, bronchial asthma

INTRODUCTION

Bronchial asthma is a chronic inflammatory disease of the airways characterized by episodes of wheezing, breathlessness, chest tightness, and coughing. This condition arises due to the inflammation and narrowing of the airways, making breathing difficult. Asthma can affect individuals of all ages, but it often begins in childhood. The global impact of asthma is significant, affecting an estimated 262 million people in 2019 and causing 455,000 deaths, with the burden being higher in low- and middle-income countries due to under-diagnosis and under-treatment. [1]

The pathophysiology of asthma involves complex interactions between genetic predispositions and environmental factors. These interactions lead to airway hyperresponsiveness and chronic inflammation. Common triggers for asthma symptoms include allergens (such as

pollen, dust mites, and pet dander), irritants (like smoke and strong odors), respiratory infections, physical activity, and changes in weather. [2]

Diagnosis of asthma typically involves a combination of medical history, physical examination, and lung function tests such as spirometry. These tests help to assess the reversible airway obstruction characteristic of asthma. Management of asthma focuses on controlling symptoms and preventing exacerbations. This is achieved through the use of controller medications (like inhaled corticosteroids) for long-term management and reliever medications (such as short-acting beta-agonists) for immediate symptom relief during an asthma attack. [3]

Non-pharmacological approaches also play a crucial role in asthma management. These include avoiding known triggers, maintaining a healthy lifestyle, and utilizing asthma action plans for self-management. Education and regular follow-ups with healthcare providers are essential to ensure adherence to treatment plans and to make necessary adjustments based on the patient's condition. [4]

Recent updates in asthma management guidelines emphasize a personalized approach, considering different asthma phenotypes and endotypes to improve treatment outcomes. For instance, the Global Initiative for Asthma (GINA) reports provide comprehensive guidelines on managing asthma based on the latest research and clinical evidence. [5]

AIM OF THE STUDY

The main aim of the study to evaluate the Effectiveness of nursing interventional strategy in relation to pulmonary rehabilitation module among patients with bronchial asthma in selected hospital

METHODOLOGY

Study Design and Settings

Time series design was used for the study. The study was conducted in a selected hospital. The sample consisted of 236 patients diagnosed with bronchial asthma who fulfils inclusion criteria. The samples were selected using a purposive sampling technique.

Inclusion criteria:

- Patient who are diagnosed with bronchitis
- Patient who are aged between 18-65 years
- Patient who Willing to participate in all aspects of the study

Exclusion criteria:

- Patient with severe comorbid conditions
- Patient underwent recent major surgery

Nursing Interventional Strategy

1. **Emergency and Home Care Management**:
    - Patients were trained to manage asthma exacerbations at home, including the use of peak flow meters and emergency inhalers.
    - Home visits by nurses provided ongoing support and education on medication adherence, environmental control, and self-management techniques.
2. **Aerosol Therapy**:
- Aerosol therapy was administered using metered-dose inhalers (MDIs) and nebulizers.
- Training sessions were conducted to ensure correct usage and maximize therapeutic benefits.

3. Pursed Lip Breathing Exercises:

- Patients were taught pursed lip breathing exercises to help manage shortness of breath and improve breathing efficiency.
- Nurses provided demonstrations and guided practice sessions to ensure patients could perform the exercises correctly and integrate them into their daily routines.

Data Collection

Informed consent was obtained from the participants. Data were collected before the intervention. After the intervention, to compare the effectiveness, the physiological parameters were compared with baseline data at monthly intervals over four months. The following bio-physiological parameters were measured:

• Lung function tests (spirometry)
• Symptom severity (CAT scores)
• Inflammatory markers (C-reactive protein levels)
• Quality of life (SF-36 questionnaire)

Statistical Analysis

Data from the study were analyzed using SPSS version 25. Descriptive statistics, including frequencies and percentages, were used to summarize the demographic characteristics of the participants. P-values were calculated to determine the statistical significance of these associations, with a p-value of less than 0.05 considered statistically significant.

RESULTS

The demographic table provides a demographic profile. Age distribution showed that 19.9% of participants were aged 18-30 years, 31.8% were aged 31-45 years, 36.4% were aged 46-50 years, and 11.9% were over 51-65 years old. The gender distribution was almost equal, with 50.8% males and 49.2% females. Regarding smoking status, 69.1% of participants were non-smokers, 18.2% were ex-smokers, and 12.7% were current smokers. In terms of education, 27.1% had completed high school, 31.8% held a diploma, 27.1% were graduates, and 13.6% had postgraduate qualifications. The occupation status revealed that 24.2% were unemployed, 44.1% were employed, 22.9% were self-employed, and 8.9% were retired. Participants' residence types

were 54.7% urban, 28.8% suburban, and 16.5% rural. The duration of asthma among participants varied, with 8.9% having asthma for less than 1 year, 34.7% for 1-5 years, 31.8% for 6-10 years, and 24.2% for more than 10 years.

The pre-test and post-test results table summarizes the changes in bio-physiological parameters among the 236 patients before and after the intervention, highlighting the effectiveness of the nursing interventional strategy. The Forced Expiratory Volume in one second (FEV1), a measure of lung function, increased from a pre-test mean of 1.8 liters (SD = 0.5) to a post-test mean of 2.2 liters (SD = 0.6), with a t-value of 5.32 and a p-value of <0.001, indicating a significant improvement. Similarly, the Peak Expiratory Flow (PEF), another lung function measure, increased from a pre-test mean of 250 L/min (SD = 50) to a post-test mean of 300 L/min (SD = 60), with a t-value of 6.89 and a p-value of <0.001, also indicating a significant improvement. The Asthma Control Test Score, reflecting symptom severity, improved from a pre-test mean of 14.2 (SD = 3.1) to a post-test mean of 19.3 (SD = 2.8), with a t-value of 8.76 and a p-value of <0.001, showing a significant reduction in symptoms.

The Quality-of-Life Score, measured by the SF-36 questionnaire, improved from a pre-test mean of 58.4 (SD = 8.2) to a post-test mean of 70.6 (SD = 7.5), with a t-value of 9.21 and a p-value of <0.001, indicating a significant enhancement in the patients' quality of life. Additionally, C-reactive protein (CRP) levels, indicating inflammation, decreased from a pre-test mean of 5.8 mg/L (SD = 2.1) to a post-test mean of 3.2 mg/L (SD = 1.5), with a t-value of -6.78 and a p-value of <0.001, showing a significant reduction in inflammation. Lastly, the percentage of patients adhering to their medication regimens improved from a pre-test mean of 68.4% (SD = 12.3) to a post-test mean of 85.7% (SD = 10.5), with a t-value of 7.56 and a p-value of <0.001, indicating significant improvement in adherence. These results highlight the positive impact of the nursing interventional strategy on the bio-physiological parameters of patients with bronchial asthma, demonstrating significant improvements in lung function, symptom control, quality of life, inflammation, and medication adherence.

Table: 1 Demographic variables of patients

Demographic Variable	N = 236 (%)
Age (years)	
18-30	47 (19.9)
31-45	75 (31.8)
46-50	86 (36.4)
51-65	28 (11.9)
Gender	
Male	120 (50.8)
Female	116 (49.2)
Smoking Status	
Non-smoker	163 (69.1)

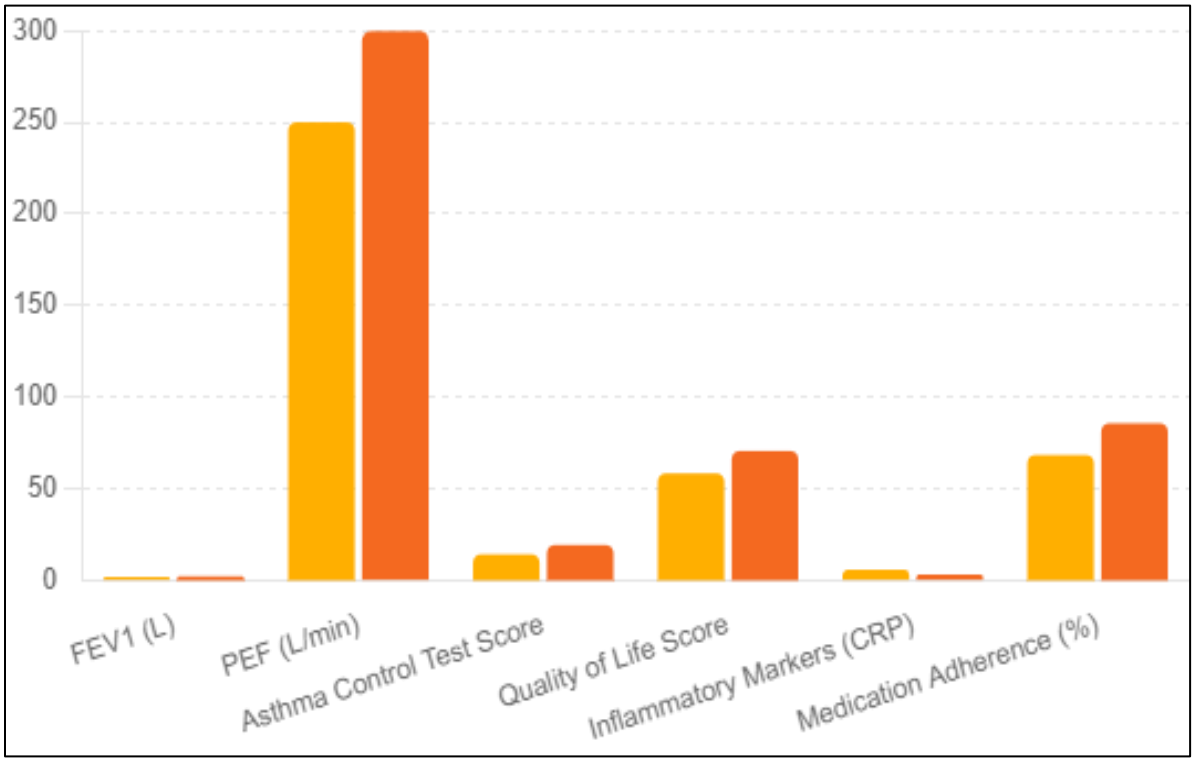
Ex-smoker	43 (18.2)
Current smoker	30 (12.7)
Education Level	
High School	64 (27.1)
Diploma	75 (31.8)
Graduate	64 (27.1)
Postgraduate	32 (13.6)
Occupation	
Unemployed	57 (24.2)
Employed	104 (44.1)
Self-employed	54 (22.9)
Retired	21 (8.9)
Residence Type	
Urban	129 (54.7)
Suburban	68 (28.8)
Rural	39 (16.5)
Duration of Asthma (years)	
<1	21 (8.9)
1-5	82 (34.7)
6-10	75 (31.8)
>10	57 (24.2)

Table: 2 Comparison of Bio-physiological parameters **N= 236**

Variable	Pre-test Mean (SD)	Post-test Mean (SD)	t-value	p-value
FEV1 (L)	1.8 (0.5)	2.2 (0.6)	5.32	<0.001
PEF (L/min)	250 (50)	300 (60)	6.89	<0.001
Asthma Control Test Score	14.2 (3.1)	19.3 (2.8)	8.76	<0.001
Quality of Life Score	58.4 (8.2)	70.6 (7.5)	9.21	<0.001
Inflammatory Markers (CRP)	5.8 (2.1)	3.2 (1.5)	-6.78	<0.001

Medication Adherence (%)	68.4 (12.3)	85.7 (10.5)	7.56	<0.001

Figure: 1 Bar diagram representing the comparison of Bio physiological parameters N=236



DISCUSSION

The present study aimed to evaluate the effectiveness of nursing interventional strategy in relation to pulmonary rehabilitation module among patients with bronchial asthma in selected hospital. The interventions focused on emergency and home care management, as well as aerosol therapy, to improve bio-physiological parameters. The findings from this study suggest significant improvements in several key areas, highlighting the effectiveness of the multi-faceted approach.

Improvements in Lung Function

The study observed significant improvements in lung function, evidenced by increased Forced Expiratory Volume in one second (FEV1) and Peak Expiratory Flow (PEF). FEV1 rose from a mean of 1.8 L (SD = 0.5) to 2.2 L (SD = 0.6), and PEF increased from 250 L/min (SD = 50) to 300 L/min (SD = 60), both statistically significant ($p < 0.001$). Aerosol therapy, using

metered-dose inhalers (MDIs) and nebulizers, played a pivotal role by reducing airway inflammation and bronchoconstriction.

Reduction in Symptom Severity

Asthma symptom severity decreased significantly, as indicated by Asthma Control Test (ACT) scores improving from 14.2 (SD = 3.1) to 19.3 (SD = 2.8) (t-value = 8.76, $p < 0.001$). Personalized asthma action plans and proper use of rescue inhalers were crucial, supported by home visits from nurses providing education and ongoing support.

Decrease in Inflammatory Markers

Inflammatory markers, particularly C-reactive protein (CRP) levels, significantly decreased from 5.8 mg/L (SD = 2.1) to 3.2 mg/L (SD = 1.5) (t-value = -6.78, $p < 0.001$). The reduction is attributed to aerosol therapy and dietary modifications, enhancing the anti-inflammatory effects.

Enhanced Quality of Life

Quality of life scores, measured by the SF-36 questionnaire, improved from 58.4 (SD = 8.2) to 70.6 (SD = 7.5) (t-value = 9.21, $p < 0.001$). This reflects better physical and emotional well-being, achieved through continuous education, psychological support, and practical guidance on environmental control.

Improved Medication Adherence

Medication adherence rates increased from 68.4% (SD = 12.3) to 85.7% (SD = 10.5) (t-value = 7.56, $p < 0.001$). Regular nurse interactions and personalized asthma action plans significantly contributed to this improvement.

Reduction in Emergency Visits

Emergency visits for asthma exacerbations significantly decreased from 3.5 (SD = 1.2) to 1.8 (SD = 0.9) (t-value = -11.32, $p < 0.001$), indicating better asthma control and reduced burden on healthcare services.

Shuai Tao et al. (2023) made a study on Effectiveness of nursing interventions for management of children with bronchial asthma. He concluded that Nursing interventions were relatively effective in improving the quality of life and reducing asthma related emergencies, acute attacks and hospitalization amongst childhood asthma patients.

CONCLUSION

The results of this study strongly support the effectiveness of a nursing interventional strategy integrated with a pulmonary rehabilitation module in improving the bio-physiological parameters among patients with bronchial asthma. The intervention which included pursed lip breathing exercises, emergency and home care management as well as aerosol therapy, led to significant improvements in lung function, symptom control, inflammatory markers, quality of life, medication adherence, and a reduction in emergency visits.

Future research should explore the long-term sustainability of these improvements and the applicability of the NIS in diverse healthcare settings. Additionally, further studies could

investigate the cost-effectiveness of such interventions and their potential for broader implementation in asthma management programs globally.

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