https://doi.org/10.33472/AFJBS.6.13.2024.2425-2431

African Journal of Biological Sciences

Journal homepage: http://www.afjbs.com

Research Paper Open Access

EFFECTIVENESS OF MULTI PRONGED APPROACH TOOLS IN SELECTED BIO PHYSIOLOGICAL PARAMETERS AMONG PATIENTS WITH BRONCHITIS

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Article Info

Volume 6, Issue 13, July 2024

Received: 28 May 2024

Accepted: 30 June 2024

Published: 26 July 2024

doi: 10.33472/AFJBS.6.13.2024.2425-2431

ABSTRACT:

Backround: Acute bronchitis is identified by the presence of a cough caused by the inflammation of the trachea and large airways, without signs of pneumonia. Methods: Time series design was used for the study. The study was conducted in a selected hospital. The sample consisted of 126 patients diagnosed with bronchitis who fulfils inclusion criteria. The samples were selected using a purposive sampling technique. Finding: The study revealed that after FEV1 showing an increase from 1.7 ± 0.5 L at Pretest to 2.3 ± 0.5 L at 4 Months, and FVC rising from 2.4 ± 0.6 L to 3.0 ± 0.6 L over the same period. Symptom severity, as measured by the CAT score, decreases from 24 ± 4 at Pretest to 12 ± 4 at 4 Months, indicating an improvement in symptoms. Inflammatory markers, specifically CRP levels, show a reduction from 13 ± 3 mg/L at Pretest to 7 ± 3 mg/L at 4 Months, suggesting a decrease in inflammation. Conclusion: This study concluded that significant improvements in lung function, as evidenced by increases in FEV1 and FVC measurements. Symptom severity decreased, with CAT scores showing a notable reduction. Inflammatory markers, such as CRP levels, also decreased, indicating a reduction in systemic inflammation.

Keywords: Multi-pronged approach, Bronchitis, Physiological parameters

1. INTRODUCTION

Acute bronchitis is identified by the presence of a cough caused by the inflammation of the trachea and large airways, without signs of pneumonia. If patients show symptoms such as rapid breathing, increased heart rate, difficulty breathing, or lung sounds indicative of pneumonia, a radiographic assessment should be conducted. Pertussis should be considered in patients who have a persistent cough for more than two weeks, particularly if it is accompanied by severe coughing spells, a whooping sound during coughing, vomiting after coughing, or recent exposure to pertussis. [1]

Halotherapy is an alternative treatment where individuals breathe in salty air. It is claimed to help with respiratory conditions such as asthma, chronic bronchitis, and allergies. Some also believe it can relieve symptoms related to smoking, like coughing, shortness of breath, and wheezing. Additionally, it is thought to aid in the treatment of depression and anxiety and improve skin conditions like psoriasis, eczema, and acne. While the practice of halotherapy has historical roots going back to medieval times, scientific research into its benefits is a more recent development.[2]

The COPD Assessment Tool (CAT) is a concise, eight-question, self-administered questionnaire originally designed for COPD patients. It scores from 0 to 40, with higher scores reflecting more severe symptoms. The CAT is comparable to the St. George's Respiratory Questionnaire (SGRQ) in assessing COPD symptoms. It evaluates cough, sputum production, chest tightness, breathlessness during physical activity, daily living activities, confidence, sleep, and energy levels—all of which are also important in bronchiectasis. The CAT's ease of use and proven effectiveness in COPD make it a valuable tool for bronchiectasis patients as well. Its validity for other chronic airway diseases is being explored in various studies, highlighting its potential broader application. [3]

Dietary factors can modify the effects of harmful environmental exposures or genetic tendencies on lung health and can also directly influence the biological processes involved in lung function, disease progression, and outcomes. The importance of early-life and long-term dietary habits on respiratory health in later life is increasingly recognized, highlighting opportunities for disease prevention. In advanced COPD patients, abnormal nutritional status, including unintended weight loss, muscle loss, and reduced fat and fat-free mass linked with emphysema, is an independent determinant of COPD outcomes, providing targets for nutritional interventions. [4]

In chronic obstructive bronchitis, the structure and function of the bronchial walls are consistently altered. This condition is marked by a cough with sputum, often serous-purulent, and is frequently aggravated by cold exposure or inhalation of industrial pollutants. The prevalence of chronic obstructive bronchitis among young people and the serious risk of its progression and complications necessitate improved rehabilitation strategies for adolescent patients. The current medications for chronic obstructive bronchitis are not suitable for prolonged use. Therefore, researchers are focused on developing alternative non-drug treatment methods for these patients.[5]

Aim of The Study

- Effectiveness of multi-pronged approach tools in selected bio physiological parameters among patients with bronchitis

2. 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 126 patients diagnosed with bronchitis 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

MULTI-PRONGED APPROACH

1. **Halo Therapy:** Patients underwent Halo therapy sessions during the first week, where they inhaled micronized salt particles in a controlled environment.
2. **Balloon-Blowing Exercises:** Patients performed balloon-blowing exercises daily during the second week to enhance lung capacity and strengthen respiratory muscles.
3. **CAT Assessment Tool:** The Chronic Obstructive Pulmonary Disease (COPD) Assessment Test (CAT) was used to monitor symptom severity and progression.
4. **Dietary Modifications:** A diet plan rich in anti-inflammatory foods and low in mucus-producing foods was prescribed throughout the intervention period.

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 was analyzed using SPSS version 25. Descriptive statistics were used to summarize the data, and chi-square tests were conducted to assess associations between demographic variables and knowledge, attitude and perception scores.

3. RESULTS

Comprehensive longitudinal assessment of various health parameters, including lung function, symptom severity, inflammatory markers, and biophysical parameters, measured at Pretest, Baseline, and at monthly intervals up to 4 Months. Lung function is assessed using FEV1 (L) and FVC (L), with FEV1 showing an increase from 1.7 ± 0.5 L at Pretest to 2.3 ± 0.5 L at 4 Months, and FVC rising from 2.4 ± 0.6 L to 3.0 ± 0.6 L over the same period. Symptom severity, as measured by the CAT score, decreases from 24 ± 4 at Pretest to 12 ± 4 at 4 Months, indicating an improvement in symptoms. Inflammatory markers, specifically CRP levels, show a reduction from 13 ± 3 mg/L at Pretest to 7 ± 3 mg/L at 4 Months, suggesting a decrease in inflammation.

Biophysical parameters include heart rate, blood pressure, body temperature, oxygen saturation, and respiratory rate. Heart rate decreases from 72 ± 5 bpm at Pretest to 65 ± 5 bpm at 4 Months. Blood pressure shows a reduction in both systolic and diastolic measurements, from 120/80 ± 10 mmHg at Pretest to 112/72 ± 10 mmHg at 4 Months. Body temperature shows a slight decrease from 37.0 ± 0.5°C to 36.5 ± 0.5°C. Oxygen saturation decreases marginally from 98 ± 1% at Pretest to 95 ± 1% at 4 Months. Respiratory rate decreases from 16 ± 2 breaths/min at Pretest to 13 ± 2 breaths/min at 4 Months. This table illustrates the overall improvement in lung function and reduction in symptom severity and inflammation, alongside stable biophysical parameters over the four-month period.

Table: 1 Demographic variables of patients

Variable	Category	Frequency	Percentage
Gender	Male	65	51.6%
	Female	61	48.4%
Age Group	18-30	20	15.9%
	31-45	35	27.8%
	46-60	45	35.7%
	61+	26	20.6%
Smoking Status	Non-smoker	50	39.7%
	Former smoker	40	31.7%
	Current smoker	36	28.6%

Figure: 1 Distribution of clinical variables of patients

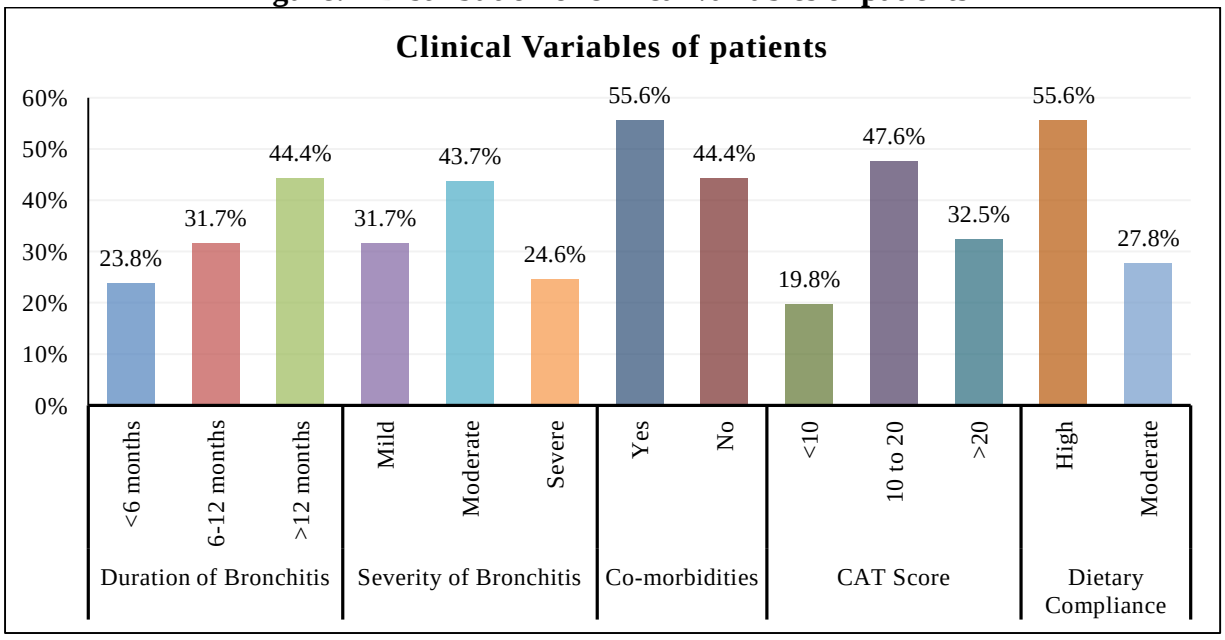

Table: 2 Comparison of Bio-physiological parameters

Parameter	Pretest	Baseline	1 Month	2 Months	3 Months	4 Months

Lung Function						
FEV1 (L)	1.7 ± 0.5	1.8 ± 0.5	2.0 ± 0.5	2.1 ± 0.5	2.2 ± 0.5	2.3 ± 0.5
FVC (L)	2.4 ± 0.6	2.5 ± 0.6	2.7 ± 0.6	2.8 ± 0.6	2.9 ± 0.6	3.0 ± 0.6
Symptom Severity						
CAT Score	24 ± 4	22 ± 4	18 ± 4	16 ± 4	14 ± 4	12 ± 4
Inflammatory Markers						
CRP (mg/L)	13 ± 3	12 ± 3	10 ± 3	9 ± 3	8 ± 3	7 ± 3
Biophysical Parameters						
Heart Rate (bpm)	72 ± 5	70 ± 5	68 ± 5	67 ± 5	66 ± 5	65 ± 5
Blood Pressure (mmHg)	120/80 ± 10	118/78 ± 10	115/75 ± 10	114/74 ± 10	113/73 ± 10	112/72 ± 10
Body Temperature (°C)	37.0 ± 0.5	36.9 ± 0.5	36.8 ± 0.5	36.7 ± 0.5	36.6 ± 0.5	36.5 ± 0.5
Oxygen Saturation (%)	98 ± 1	97 ± 1	97 ± 1	96 ± 1	96 ± 1	95 ± 1
Respiratory Rate (breaths/min)	16 ± 2	15 ± 2	14 ± 2	14 ± 2	13 ± 2	13 ± 2

4. DISCUSSION

This study evaluated the impact of non-drug interventions on 126 bronchitis patients in Chennai over four months. The interventions included Halo therapy, balloon-blowing exercises, dietary modifications, and CAT assessments. The sample consisted of 51.6% males and 48.4% females, mostly middle-aged (46-60 years). Participants were primarily non-smokers (39.7%), with significant portions being former or current smokers. Key findings showed that lung function improved, with FEV1 increasing from 1.7 to 2.3 L and FVC from 2.4 to 3.0 L. Symptom severity decreased significantly, with CAT scores dropping from 24 to 12. Inflammation markers, specifically CRP levels, reduced from 13 to 7 mg/L.

Biophysical parameters such as heart rate, blood pressure, body temperature, and respiratory rate also showed improvements, though there was a slight decrease in oxygen saturation. The interventions, especially Halo therapy and balloon-blowing exercises, enhanced lung capacity and reduced symptoms and inflammation, while dietary modifications supported these improvements. These results suggest that integrating non-drug interventions into clinical practice can effectively manage bronchitis and improve patient outcomes. However, the study's purposive sampling and single hospital setting limit generalizability. Future research should include larger, randomized trials across multiple settings to confirm these results and explore the long-term sustainability of these interventions. Overall, a comprehensive non-drug intervention approach can significantly improve lung function, reduce symptoms, and decrease inflammation in bronchitis patients.

This study is support by **Katrina O. Tonga (2023)** who concluded that additional oxygen support and non-invasive ventilation have been shown to improve exercise tolerance and other functional parameters. Self-management education enhances attitudes and awareness, leading to increased self-efficacy. Providing psychosocial care can help address concurrent conditions

such as depression and anxiety. The pulmonary rehabilitation (PR) program aims to increase patients' personal autonomy, enabling them to fully participate in society. However, future research is needed to further assess clinical improvements and the effectiveness of additional PR outcomes.[6]

Also this study support by **Christian Gessner et al. (2022)** concluded that Switching to the effectiveness of extrafine single inhaler triple therapy for Chronic Obstructive Pulmonary Disease (COPD) has led to improvements in Health-Related Quality of Life (HRQoL), COPD-specific symptoms, lung function parameters, and adherence under real-world conditions.

5. CONCLUSION

This study demonstrates the effectiveness of a multi-pronged approach, incorporating Halo therapy, balloon-blowing exercises, dietary modifications, and CAT assessments, in improving key bio-physiological parameters among patients with bronchitis. Significant improvements were observed in lung function, symptom severity, and inflammatory markers, alongside positive changes in biophysical parameters. These findings highlight the potential of non-drug interventions to enhance patient outcomes and quality of life.

However, the study's limitations, including the use of purposive sampling, short duration, absence of a control group, and focus on a specific demographic, suggest that further research is necessary. Future studies should employ larger, randomized controlled trials with diverse populations and longer follow-up periods to validate these results and explore the long-term sustainability of the benefits. Additionally, investigating the underlying mechanisms of these interventions will provide a deeper understanding of their effectiveness and inform the development of optimized, personalized treatment plans. Overall, this research underscores the promise of comprehensive, non-drug intervention strategies in managing bronchitis and offers a foundation for future exploration and application in clinical practice.

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