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Effect of Active Assisted Range of Motion Exercises in Management of Severe COPD Patients at Nasser Hospital, Gaza: A Study Protocol for Quasi-Experimental Study

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ABSTRACT

Background: Chronic obstructive pulmonary disease is a leading cause of morbidity and mortality worldwide, characterized by progressive airflow limitation and respiratory symptoms. The disease burden continues to increase in developing regions, including Palestine, where challenges in healthcare infrastructure limit access to comprehensive management. To examine the effect of active-assisted range of motion exercises combined with standard care on dyspnea, cough, sputum production and pulmonary function among patients with severe chronic obstructive pulmonary disease at Nasser Hospital, Gaza.
Methods: This quasi-experimental study will use a convenience sampling method among severe chronic obstructive pulmonary disease patients admitted to the male and female medical departments at Nasser Hospital in Khan Younis, Southern Gaza Strip. A power analysis has determined an effect size of 0.58, requiring a total sample of 158 participants (79 in each group) to achieve adequate statistical power. Participants diagnosed with severe chronic obstructive pulmonary disease will be allocated into two groups: (1) the intervention group, which will receive active-assisted range of motion exercises in addition to standard treatment, and (2) the control group, which will receive standard treatment only.
Results: The study findings are expected to provide a promising results in advocating the utilisation of active-assisted range of motion exercises into pulmonary rehabilitation programs among patients with severe chronic obstructive pulmonary disease.
Conclusion: This study findings will support integrating active-assisted range of motion exercises into severe chronic obstructive pulmonary disease pulmonary rehabilitation in resource-limited settings.

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INTRODUCTION

Chronic Obstructive Pulmonary Disease (COPD) is a major global health burden and one of the leading causes of morbidity and mortality. The disease burden is growing in developing regions, including Palestine, where healthcare infrastructure challenges limit access to comprehensive management. According to the World Health Organization (1), COPD is a progressive, life-threatening lung condition characterized by airflow limitation, shortness of breath, and frequent exacerbations. Beyond its physiological impact, COPD imposes substantial social and economic burdens, leading to reduced productivity, early retirement, disability, and diminished quality of life (2,3). Individuals affected by COPD often experience symptoms such as dyspnoea, chronic cough, wheezing, and fatigue, which can hinder their ability to perform daily activities (4). Consequently, many patients face social isolation due to limitations in participating in physical or social activities.

Pulmonary rehabilitation (PR), particularly exercise therapy, is effective in improving lung function and quality of life among patients with COPD but remains underutilized locally. This is due to limited availability of comprehensive treatment modalities and PR services in Gaza further complicates the management of severe COPD. Given these challenges, low-cost and accessible interventions such as structured exercises are increasingly recognized for their potential to alleviate symptoms, enhance functional capacity, and improve overall quality of life. Active assisted range of motion (AAROM) exercises, involving therapist-assisted joint mobilization, may represent a feasible rehabilitation modality to improve functional status among severe COPD patients unable to perform independent exercises. This study aims evaluates AAROM's effectiveness on clinical outcomes in severe COPD in incorporating such rehabilitation into routine COPD care.

METHODS

Study Design

This study will employ a quasi-experimental, pre-test–post-test non-equivalent control group design using a convenience sampling technique to examine the effects of AAROM exercises among patients with severe COPD.

Setting

The study will be conducted in male and female medical departments at Nasser Hospital in Khan Younis, Gaza Strip. This 300-bed hospital is one of the largest hospitals in the Gaza Strip, owned by Gaza Ministry of Health.

Study Participants and Sample Size

The target population of this study are severe COPD patients who are admitted to the male and female medical departments. The participants will be eligible for this study if they are (a) adult patients with severe COPD, (b) confirmed through a spirometry test (30% ≤ FEV1 <50% predicted), (c) expected to be admitted for four days or more, (d) patients who are willing to participate in the study (written informed consent will be obtained prior to study commencement), able to communicate in English language or Arabic.

Patients will be excluded from study participation if they meet one or more of the following criteria: (a) disabilities due to musculoskeletal or neurological problems because it limits, prevent or contra-indicate exercises and interfere with the ability to perform the exercises, (b) severe comorbidities such as unstable cardiovascular diseases, cancer, organ failure, other respiratory conditions, (c) active lung infection because it could interfere with participants performance during the exercise sessions, (d) cognitive impairment or inability to cooperate because it can affect the patient's ability to understand instructions and carry out the intervention as required, (e) unstable COPD, and (f) undergone recent thoracic surgery.

The total sample size for this study will be calculated based on data from Torres-Sánchez et al. (5). Using the G*Power 3.1 software, the estimated effect size is 0.58, indicating that a total of 158 participants (79 in each group) will be required to achieve adequate statistical power. To account for a possible 10% dropout rate (approximately 16 participants), the total sample size will be increased to 174 participants, with 87 participants assigned to the intervention group and 87 to the control group.

Research Instruments

This study will use a set of research instruments targeting pulmonary function,

dyspnea severity, and cough and sputum symptoms. Pulmonary function tests (PFTs) will provide objective measurements of lung capacity and airflow limitation, while the dyspnea severity score (DSS) (5) will quantify the subjective experience of shortness of breath. In addition, the cough and sputum assessment questionnaire (CASA-Q) (6) will evaluate the presence, severity, and impact of cough and sputum production. Data will be collected systematically at baseline and then daily for 7 days for both intervention and control groups to evaluate the effectiveness of AAROM exercises in improving respiratory function and symptom management in severe COPD patients.

Primary Outcome

The primary outcome of this study by assessing pulmonary function in COPD that will be identified as forced expiratory volume in one second (FEV_1), forced vital capacity (FVC), and the FEV_1/FVC ratio.

Dyspnea Severity Score (DSS)

The DSS was developed by Gondos et al. (5), is a validated numerical scale for quantifying the severity of dyspnea in patients with respiratory conditions. Shortness of breath will be measured in both groups at baseline (day one) and post-intervention (at discharge or day seven at the latest) using the DSS[5]. It assesses seven dimensions: exercise tolerance, speech, cooperation, cyanosis, SpO_2, breathing, and heart rate/rhythm, with scores ranging from 0 to 21. Score 0 being no dyspnea and 21 being the worst dyspnea (the higher scores indicating greater dyspnea severity).

The DSS (5) can be used to monitor changes over time, evaluate treatment effectiveness, and guide therapeutic decisions. Classification of severity: mild dyspnea (0–3), moderate (4–6), severe (7–9, requiring active respiratory support), and very severe (≥10, immediate life-threatening condition requiring ICU admission).

Cough and Sputum Assessment Questionnaire (CASA-Q)

Cough and sputum symptoms, as well as their impact on daily life, will be assessed using the CASA-Q (6) at baseline and post-intervention. The CASA-Q is a validated and reliable tool specifically designed for individuals with COPD (6). It contains 20 items across four domains: cough symptoms (3 items), sputum symptoms (3 items), cough impact (8 items), and sputum impact (6 items). Responses are recorded on a 5-point Likert scale, ranging from "never" to "always" for frequency or "not at all" to "a lot/extremely" for intensity. Each domain is scored separately, with raw scores rescaled to a 0–100 scale. Higher scores indicate fewer or less severe symptoms and lower impact. While CASA-Q does not provide formal severity categories, the scoring has been categorized into five groups based on Deslée et al. (7): 0–20, 21–40, 41–60, 61–80, and 81–100 for each domain.

ETHICAL STATEMENT

Ethical approval was obtained from the institutional research committee [IIUM/313/DDPGRRl/13/13/12/7 (G2123181)] and permission was sought from the Palestinian Ministry of Health (MOH) prior to data collection.

DATA COLLECTION

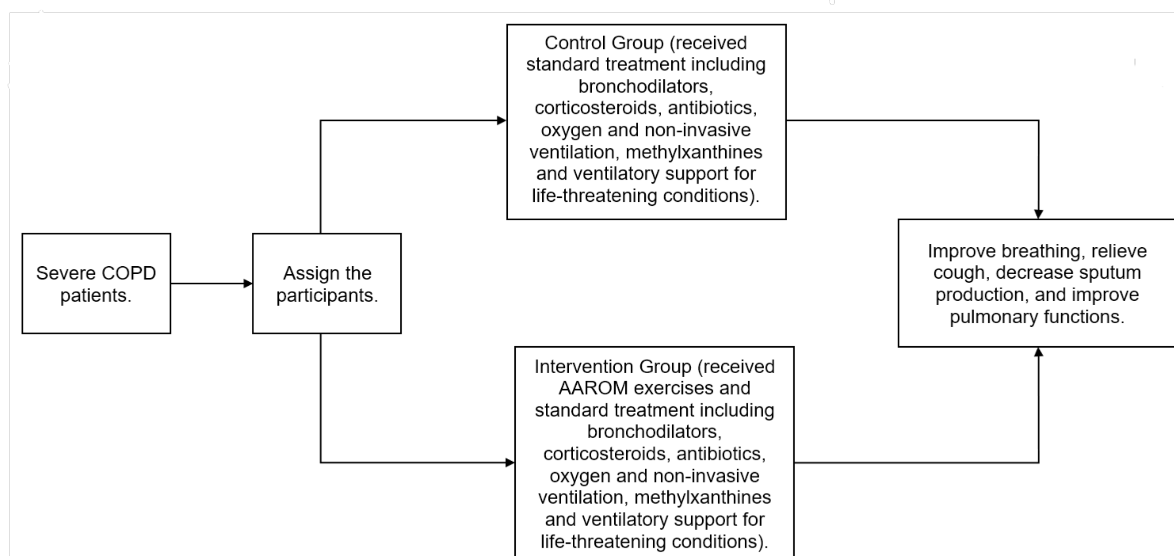
Data will be collected for participants in both the intervention and control groups on the first day of admission (baseline) and daily for seven day or until discharge. Potential participants will be screened daily using a recruitment checklist. Eligibility will be confirmed by reviewing spirometry results and documented admission diagnoses to ensure a diagnosis of severe COPD. Verbal communication will assess each patient's ability to understand and follow instructions. Medical and surgical history, along with physical examination findings, will be reviewed to exclude patients with disabilities, severe comorbidities, active lung infections, unstable COPD, or recent thoracic surgery. Cognitive status will be evaluated through interaction with the patient and confirmed via medical records. Patients meeting all inclusion criteria will be approached for participation.

Prior to obtaining informed consent, participants will receive detailed information regarding the study's purpose, data collection procedures, potential risks and benefits, and their right to withdraw at any time without penalty. Once written informed consent is obtained, participants will be assigned to either the intervention or control group. Participants in the intervention group will receive an information sheet detailing the AAROM exercises while participants in the

control group will receive standard treatment (**Figure** 1). Only patients assessed on the first day of hospital admission will be included to ensure consistency in timing of interventions and assessments.

At baseline (day one of admission), all participants in both the intervention and control groups will undergo pre-test assessments, including PFTs, DSS and CASA-Q scores. Participants will be assisted to perform fifteen (15) exercises within six (6) sets of upper and lower limbs AAROM exercises. The time required for each exercise is approximately one minutes (repeat the exercise 10 times and holding the limb 3 seconds), so the participant will need approximately 14 minutes to perform the right and left upper AAROM exercises and 16 minutes to perform the right and left lower AAROM exercises. The duration of the exercises will be about 30 minutes. The AAROM exercises will be repeated daily until patient discharge or on day seven of recruitment. Post-test assessment will be evaluated of pulmonary function, shortness of breath, cough, sputum production to compare between the control and intervention groups.

Figure 1: Flowchart of the Study



DATA ANALYSIS

The data will be analysed using data collection sheet will be reviewed and checked for completeness and consistency prior to data entry. Data will be processed, coded, entered, cleaned, interpreted, and analysed using the Statistical Package for Social Sciences (SPSS) version 25.0. Descriptive statistics, including frequencies, percentages (%), means, and standard deviations (SD), will be used to summarize participants' demographic and clinical characteristics. Inferential statistical tests will be applied to examine differences between and within groups. A p-value of less than 0.05 will be considered statistically significant.

DISCUSSION

Respiratory diseases, COPD remain a significant public health concern in Palestine. In 2022, respiratory diseases ranked sixth among the ten leading causes of death in the Gaza Strip, accounting for 4.3% of total deaths across all age groups, with a mortality rate of 12 per 100,000 population (8). At Nasser Hospital, the estimated number of patients with severe COPD admitted to both male and female medical departments ranges from 110 to 135 cases per month (9). Despite this burden, national data on chronic noncommunicable diseases, including COPD, remain limited and fragmented in terms of completeness, quality, and coverage. Previous reports have highlighted gaps in disease surveillance, inadequate patient record systems, and low data accuracy within the Palestinian Health Information Centre registry, resulting in a scarcity of reliable epidemiological data, particularly in the Gaza Strip (10,11). Moreover, the absence of locally developed, evidence-based clinical practice guidelines for COPD further challenges the effective management of the disease, potentially contributing to suboptimal patient outcomes. In this context, PR has been widely demonstrated to improve functional capacity,

symptom burden, and quality of life among patients with COPD (12). Evidence also suggests that AAROM exercises may benefit patients with severe COPD by improving respiratory symptoms and functional outcomes. However, PR programs, including structured AAROM exercises, are not routinely implemented in Palestinian hospital settings (13). Patients with severe COPD often experience significant limitations in independently performing physical activities due to shortness of breath, pain, discomfort, and muscle weakness, which further restricts their participation in conventional exercise-based rehabilitation (14). Consequently, the effectiveness of AAROM exercises as a feasible and adaptable intervention for this population remains underexplored in the Palestinian context. This study seeks to address this gap by introducing AAROM exercises as part of the management strategy for severe COPD and evaluating their effectiveness in improving clinical outcomes among patients in Palestine. Therefore, this study will introduce the AAROM exercises as a part of the management of severe COPD and examine its effectiveness of AAROM exercise on severe COPD patients in Palestine.

CONCLUSION

Active assisted range of motion exercises are a valuable adjunct in the management of severe COPD, enhancing clinical outcomes and lung function. Health administration must prioritize the incorporation of such rehabilitative strategies in hospitals to address the significant burden of COPD in Palestine and similar low-resource settings. Policies fostering rehabilitation services and capacity building will improve patient care quality and reduce health system strain.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest regarding this research.

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AUTHOR CONTRIBUTIONS

FFAE: Drafting the manuscript.
AD: Reviewed the manuscript and approved the final version.
NAMA: Reviewed the manuscript.

REFERENCES

1. WHO. Chronic obstructive pulmonary disease (COPD) [Internet]. World Health Organization. 2022. Available from https://www.who.int/news-room/fact-sheets/detail/chronic-obstructive-pulmonary-disease-(COPD)
2. Ur Rehman A, Hassali MA, Muhammad SA, Shakeel S, Chin OS, Ali IBH, et al. Economic Burden of Chronic Obstructive Pulmonary Disease Patients in Malaysia: A Longitudinal Study. PharmacoEconomics. 2020;5(1):35–44. Available from https://doi.org/10.1007/s41669-020-00214-x
3. Rehman AU, Muhammad SA, Tasleem Z, Alsaedi A, Dar M, Iqbal MO, et al. Humanistic and socioeconomic burden of COPD patients and their caregivers in Malaysia. Scientific Reports. 2021;11(1). Available from https://doi.org/10.1038/s41598-021-01551-5
4. Torres-Sánchez I, Valenza MC, Sáez-Roca G, Cabrera-Martos I, López-Torres I, Rodríguez-Torres J. Results of a Multimodal Program During Hospitalization in Obese COPD Exacerbated Patients. COPD: Journal of Chronic Obstructive Pulmonary Disease. 2015;13(1):19–25. Available from https://doi.org/10.3109/15412555.2015.1043428
5. Gondos T, Szabó V, Sárkány G, Sárkány A, Halász G. Estimation of the severity of breathlessness in the emergency department: a dyspnea score. BMC. Emergency Medicine. 2016;17(1). Available from https://doi.org/10.1186/s12873-017-0125-6
6. Patalano F, Hache C, Pethe A, Kaur H, Leidy NK, Arsiwala T, et al. Performance of the Cough and Sputum Assessment Questionnaire (CASA-Q) in COPD: Evidence from Clinical and Online Patient Interaction Studies. International Journal of Chronic Obstructive Pulmonary Disease. 2022;Volume17:3087–3096. Available from https://doi.org/10.2147/copd.s381131
7. Deslée G, Burgel P, Escamilla R, Chanez P, Court-Fortune I, Nesme-Meyer P, et al. Impact of current cough on health-related quality of life in patients with COPD. International Journal of Chronic

Obstructive Pulmonary Disease. 2016;Volume 11:2091–2097. Available from https://doi.org/10.2147/copd.s106883

8. Palestinian Central Bureau of Statistics Palestine in Figures 2023; 2023. Available from: https://www.pcbs.gov.ps/Downloads/book2693.pdf
9. Palestinian Ministry of Health. Chronic obstructive pulmonary disease statistics [Dataset]. In Patient Services Department, Nasser Hospital, Palestine; 2024.
10. Mosleh M, Aljeesh YI, Dalal K. Burden of Chronic Diseases in the Palestinian Healthcare Sector Using Disability-Adjusted Life Years (DALY), Palestine. Diversity and Equality in Health and Care. 2016;13(3), 261–268. Available from: https://doi.org/10.21767/2049-5471.100061
11. Massad S, Dalloul H, Ramlaw A, Rayyan I, Salman R, Johansson L. Accuracy of mortality statistics in Palestine: a retrospective cohort study. BMJ Open. 2019;9(4), e026640. Available from: https://doi.org/10.1136/bmjopen-2018-026640
12. Cleveland Clinic. COPD Guidelines For Exercise & Pulmonary Rehab: Cleveland Clinic. (cited 14 September 2018,). Available from: https://my.clevelandclinic.org/health/articles/9450-copd-exercise--activity-guidelines
13. Al-Faqawi MS, Abuowda YZ, Elmassry AEM, Böttcher B. Management of Chronic Obstructive Pulmonary Diseases (COPD) Exacerbation. A Clinical Audit in Nasser Hospital, Gaza-Strip, Palestine. Journal of US-China Medical Science. 2017;14(4). Available from https://doi.org/10.17265/1548-6648/2017.04.003
14. Albarrati AM, Gale NS, Munnery MM, Cockcroft JR, Shale DJ. Daily physical activity and related risk factors in COPD. BMC Pulmonary Medicine. 2020;20(1). Available from: https://doi.org/10.1186/s12890-020-1097-y