



Effect of Body Positions on Lungs Volume in Asthmatic Patients: A Cross-sectional Study

**Wai Wai Myint¹, Mila Nu Nu Htay^{2*}, Htoo Htoo Kyaw Soe², Low Renjue¹,
Gan Shirying¹, Nur Syamimi binti Yuan¹ and Aaron Balanti Mojini¹**

¹Universiti Malaysia Sarawak (UNIMAS), Kota Samarahan, Sarawak, Malaysia.

²Melaka-Manipal Medical College (MMMC), Bukit Baru, Melaka, Malaysia.

Authors' contributions

This work was carried out in collaboration between all authors. Authors WWM, MNNH managed literature search. Authors LR, GS, NSBY, ABM managed for data collection and author HHKS performed data analysis. Authors LR, GS, NSBY and ABM wrote the initial draft of the manuscript. Authors WWM, MNNH and HHKS managed literature search and advised for initial draft of the manuscript. Author WWM wrote final draft of the manuscript. All authors read and approved the final manuscript.

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ABSTRACT

Aim: The purpose of our research was to investigate the effect of different body positions on lungs volume by conducting pulmonary function test (PFT) values of the asthmatic patients. The objectives were (1) to assess the correlation between pulmonary function and posture in adult patients with asthma, (2) to determine the best position with higher lungs volume that was preferable for the asthmatic patients to relieve the asthma attack and for rehabilitation approach.

Study Design: Cross-sectional study.

Place and Duration of Study: This study was conducted in the Reconstructive and Rehabilitative Center at University Malaysia Sarawak (UNIMAS) between December 2015 and June 2016.

Methodology: The total of 30 participants was recruited in this study. Among them, 15 participants were asthmatic patients and 15 participants were non-asthmatic, control persons. All the

*Corresponding author: E-mail: dmlnh@gmail.com;

participants were between 19-25 years of age and they were enrolled after they had signed a written consent. Participants were selected using the inclusion criteria and Spiro Excel PC based pulmonary function test (PFT Medicaid Systems) were administered. Spirometer measurements (FVC, FEV1) were taken in the standing, sitting and supine positions. Each measurement was taken two times and the average values were analyzed. The order of the body positions was randomized.

Results: In the asthmatic group, the best position was supine with a mean±standard deviation (SD) of FEV1/FVC, 77.93±17.37. Whereas, in control group, the best position was standing with a mean±SD of FEV1/FVC, 90.12±5.97.

The second best positions were sitting position in the asthmatic group (75.37±16.37) and supine position in control group (89.70±8.79). Finally, the standing position had the lowest lungs function in the asthmatic group (73.63±17.08) and sitting position in control group (88.53±11.17).

Conclusion: Our study showed that supine was the best position for measuring FEV1 and FVC of asthmatic participants. Therefore, supportive positions such as supine or leaning to the wall are suggested to improve pulmonary function of the patients, especially during asthmatic attack.

Keywords: Asthma; lungs volume; body position; spirometry; FEV1/FVC.

1. INTRODUCTION

An estimated 235 million people are suffering from asthma globally and this number will reach 400 million people by the year 2025 [1]. In Second National Health and Morbidity Survey, an estimated 4.2% of Malaysians were having asthma in 1996 [2]. Although the prevalence of asthma is low among Malaysians, the cost for treatment and management of asthma is enormous and unaffordable by some families in Malaysia. It is beneficial to use the physical position as a rehabilitative method to improve the lungs function in asthmatic patients in Malaysia.

Positions determine the different lungs volumes when individual are in standing, sitting and supine position. According to Hojat and Mahdi, the length and activity of respiratory muscles change in different positions. The changes of respiratory muscles affect the ventilation and perfusion, in particular, the maximum air exchange that occurs in response to gravity [3]. The different body positions have influenced on the lungs volume and muscle length-tension relationship. These factors have the effect on the mean expiratory pressure and peak expiratory flow [4-6].

The best position for ventilation to improve the lungs function in the asthmatic patients is still needed to explore in Malaysia. Our research group decided to carry out a research study to determine body position that brings about bigger lungs volume by using Forced Vital Capacity (FVC) as an indicator. The purpose was to investigate the changes of lungs function for different positions in asthmatic and non-asthmatic participants. Thus, the determined

body position can be used as a rehabilitative approach for asthmatic patients in Malaysia.

2. MATERIALS AND METHODS

This research was carried out by collecting two groups of participants, each of them consists of 15 participants of both genders within the age group of 19-25 years. We selected that age range because our study area was in UNIMAS campus and more availability of control participants within that range. The researchers conducted this study in the Rehabilitation Clinic at the Faculty of Medicine, UNIMAS.

Group number one consisted of asthmatic participants exclusively, while group number two consisted of non-asthmatic participants as the control group. These asthmatic participants were recruited from UNIMAS who had been diagnosed as the asthmatic patient by the UNIMAS clinic. The medical officer at UNIMAS clinic confirmed the diagnosis of asthma by age of onset, clinical history of reversible and variable airways obstruction and by using spirometer while the normal participants were recruited around UNIMAS campus. In order to recruit asthmatic participants, we gained the ethical approval from the UNIMAS clinic to get their medical information and received the formal informed consent from the participants. They were filtered before proceeding with this research study. We excluded patients with active infection, had medication within the past 6 weeks, with cardiovascular and neurovascular diseases, restrictive lungs diseases, or had the history of abdominal or thoracic surgery, and smokers. This was to prevent uneventful things from occurring.