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CORRELATION BETWEEN THE MOBILITY OF THE ABOVE CAGE AND THE BELOW THORAX CAGE TOWARD THE ELDERLY LUNG VITAL CAPACITY.

ABSTRACT

Introduction: The elderly will experience changes and decreases in all their body systems, one of them is the respiratory system. The changes that occur are a decrease in respiratory muscle mass and tone which will affect the decrease of thorax expansion. This is will be affected on the elderly lung vital capacity.
Purpose: To find out the correlation between the mobility of the thorax cage and the vital capacity of the lung**Methods:** The method used in this research is a cross-sectional analysis involving 20 elderly (10 men and 10 women). Measurements use the midline to measure the mobility of the thorax cage and a spirometer to measure the capacity of lungs vital.**Results**: The research data were normally distributed based on the results of the Shapiro Wilk test. Based on the results of the multiple correlation test, it was found that there was a strong positive correlation, and significant the correlation value is 0.784 and sig = 0.000.
Conclusion: There is a strong correlation between upper and lower thorax cage mobility on the elderly lung vital capacity.

Keywords: Correlation, Thorax Cage Mobility, Lung Vital Capacity, Elderly

INTRODUCTION

Entering old age will be followed by changes and decreases in all body systems, one of them is the cardiopulmonary system. Pulmonary changes that occur in the elderly include decreased muscle mass and tone leading to decreased lung expansion and decreased chest wall compliance due to osteoporosis and calcification of costal cartilage.[1] Several morphological changes reduce the respiratory efficiency of the chest wall and diaphragm in the elderly. The cross-sectional area of the intercostal muscles begins to decrease after 50 years old, this reduction is greater in the expiratory muscles.[2] Maximum static inspiratory and expiratory pressure decreases with aging, reflecting a decrease in respiratory muscle strength.[3]

A decrease in the ability of the respiratory system and the strength of the respiratory muscles will affect the ability of the thoracic cage to expand and contract during breathing, which is called thoracic expansion. The expansion of both the upper and lower thoracic will experience a decline when a person begins to enter the elderly. [2.4]The measurement of thoracic expansion can be used as a measure to determine the function of respiration. Thorax expansion measurement was done quantitatively by using the midline. Measurements were made at the peak of inspiration and maximum expiration. [5,6]
Increasing the expansion of the thorax cage will affect respiratory control, coughing ability, and lung vital capacity.[7] The lung vital capacity is the maximum volume of air that able released by the lungs after maximum inspiration.[8] measurement of lung vital capacity can give important information about the

strength of respiratory muscles.[9,10] Based on the background, hence the researchers want to know a correlation between the mobility of the thorax cage and the vital capacity of the lungs in the elderly.

METHOD

This study was used a correlation research method with a multiple correlation design. This research was conducted from 5 up to 6 June 2020 in Sulangai Village, Badung Regency. The sample of this study was the elderly who were taken from the population in the village by using the purposive sampling technique. The sample criteria are male and female, amounting to 20 people with an age range of 60-75 years, and in good health. Data collection techniques are tests and measurements with the Midline instrument to measure the expansion of the upper and lower thorax in units of centimeters, the Spirometer brand of Riester to measure the vital capacity of the lung.The data analysis included: descriptive statistical test (age, gender, chest expansion, and lung vital capacity), linearity test, and multiple correlation test with a significance value of $p < 0.05$.

RESULT

Based on the results of descriptive analysis, the mean sample age was 68.4 ± 5.78, that each male and female were 10 people. In the upper thorax expansion data, the mean was 86.25 ± 7.51, while the lower thorax expansion data obtained a mean of 79.20 ± 7.24. In addition, it was also found that the male thorax expansion was greater than women (Figure 1). The mean vital lung capacity in the sample was 1.18 ± 4.17 (Table 1).Based on the results of multiple correlation analyses of the upper thorax expansion variable, lower thorax expansion with vital lung capacity in the elderly, a correlation coefficient is 0.784. the R Square value is 0.614 and the p-value is 0.000. with a significance of 5% (Table 2).The R-value is 0.784 shows the magnitude of the correlations between upper and lower thorax expansion with the lung vital capacity in the elderly. The simultaneous contribution of upper and lower thorax expansion toward the lung vital capacity was 61.4%. The p-value of 0.000 ($p < 0.05$) shows a significant correlation between upper and lower thorax expansion with lung vital capacity in the elderly.

DISCUSSION

Based on the research data, it shows that the overall average expansion of the upper and lower thorax in the sample of male elderly is higher than female elderly. This is by the results of previous studies has been conducted by Adedoyin and Adeleke who was stated that the chest expansion of men was significantly higher than women.11 This is likely due to differences in the structure of respiration anatomy between men and women.[12,13]Based on the results of the research data, shows that the entire sample has less value on the lung vital capacity. This value continues to decline in line with age and occurs in both male and female samples. the research was conducted by Abdullah *et al*, shows that lung function changes in line with age addition.14 A significant decrease in lung function occurs at the age of more than 60 years old.15 This is due to changes in the airway, possibly followed by weakness in the muscles of the respiratory. [14,15]

Research by Lee *et al*. shows that lung capacity will decrease with age addition. This is due to changes in the structure of the thorax and weakness of the respiratory muscles. These changes will cause a decrease in the expansion of the thorax. [4]

According to Park *et al*., Increasing the mobility of the thorax cage will affect respiratory control, coughing ability, and lung vital capacity.

The results of this study show a strong correlation between the mobility of the thorax cage (upper and lower thorax expansion) and the lung vital capacity in the elderly. The results of this study are reinforced by Amatya and Pun's research, that the measurement of lung function with a spirometer statistically has a strong correlation to thorax expansion.[16] While the results of Putri *et al* study shows that normal chest development will increase thorax expansion, affecting muscle tone. Inspiration and expiration, and can increase the amount of air in and out of the lungs so that able to increase the volume and vital capacity of the lung. [17]

The research was conducted by Reddy *et al*., who Showed that measurements of upper and lower thorax expansion have interrater and interrater reliability and reproducibility in healthy subjects, smokers, and COPD. Upper and lower thorax expansion correlate with pulmonary function parameters as measured by a spirometer.[5] The same thing also supported by the research was conducted by Wahyudi and Indah regarding breathing exercises in divers who states that the results after training can lead to an increase in VO2 max value, an increase in lung vital capacity, and an increase in thorax expansion.18 The highest VO2 max has the best thorax capacity expansion and VO2 max itself has a close correlation with the lung vital capacity, so indirectly thorax expansion has an increasing or decreasing effect on the lung vital capacity.

The results of other studies that also support this correlation are the research was conducted by Nadhilah *et al*., Which in her study with a sample of the elderly stated that there is a correlation between the lung vital capacity with the mobility of the thorax.20 If the expansion of the thorax decreases hence the lung vital capacity will also decrease and so will the on the contrary.18,19,20 This is also closely related to the statement that the lung vital capacity is the maximum air total that can be exhaled strongly after maximum inspiration.4

CONCLUSION

This study shows that there is a strong correlation between the mobility of the upper and lower thorax cages with the lung vital capacity in the elderly. And it is significant with a positive direction. In the implementation of this research, the subject was used is still limited, for that in future research it will be necessary to do by increasing the number of research subjects and covering a wider area.

CONFLICT OF INTEREST

There was no conflict of interest in the preparation of this article.

FUNDING

There is no funding from any agency.

ETHICAL CONSIDERATION

This study was approved by the ethics committee of Dhyana Pura University. The research procedure carried out was accepted by all research samples by signing informed consent.

AUTHOR CONTRIBUTION

All authors contributed equally to the completion of this article.

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ATTACHMENT

TABLE

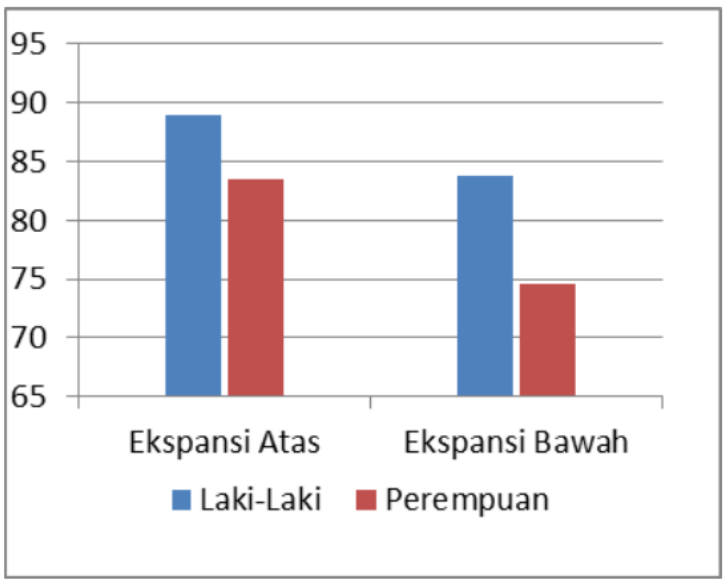
Table 1. Data of sample characteristic

Characteristic	Mean±SD	N(%)
Age	68.4±5.78	
Sex		
Male		10 (50)
Female		10 (50)
Upper Exspantion	86.25±7.51	
Lower Exspantion	79.20±7.24	
Lung Vital Capacity	1.18±4.17	

Table 2. The Result of Multiple Correlation Test Between Upper and Lower Thorax Expantion with Lung Vital Capacity

R Value	R Square	P Value
0.784	0.614	0.000

Picture



Picture 1. Comparation Male and Female Thorax Expantion