

Differences of lung function in elderly patients with and without hypertension in RSUP Dr. Sardjito Yogyakarta

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ABSTRACT

Background: In the elderly, there is a decrease in lung vital capacity to 68%. The prevalence of hypertension is at the age above 65 years with 13% of the population. The incidence of lung function decline in chronic heart failure and hypertension was found mainly in the elderly.

Aims: The aim of the study was to know the differences in lung function in elderly patients with and without hypertension.

Methods: The Study was cross-sectional, a study in November 2012 until January 2013 of the elderly population over 60 years of research with a sample of 58 people (29 people and 29 groups of hypertensive people without hypertension). Inclusion criteria for the study subjects were elderly patients over 60 years of signing the informed consent, can perform spirometry maneuvers correctly. Data were analyzed by T-test to examine some differences in the mean or median, between the two groups.

Results: In this research, there were no significant difference in lung function as measured by FVC and FEV1 in the elderly with hypertension and without hypertension ($p = 0.984$, 95% CI-0, 13-0,139 for FVC and $p = 0.83$, 95 IK-0, 14-0,116% for FEV1).

Conclusion: There is no significant difference in lung function in the elderly with and without hypertension.

Keywords: elderly, hypertension, pulmonary function

INTRODUCTION

Aging process occurs in elderly, structurally and functionally, called as degeneration.¹ The effect of a cellular aging on a lung function is not fully understood.² Lung function was measured by spirometry to determine the value of FVC (liters) and FEV1 (liters). A Study reported that FVC and FEV1 decreased in the elderly who also had hypertension and cardiovascular disease.³ The prevalence of hypertension in elderly population aged 60-65 years ranged from 60% to 80%. This suggests that the etiology and hemodynamic mechanism of hypertension in the elderly population may relate to different molecular mechanisms such as telomere.⁴ Prevalence of hypertension in elderly group aged 65 years is 13%. It is predicted that the percentage will increase to 20% by the year 2050.⁵

The Cardiovascular Health Study shows that low FEV1 associated with a high incidence of stroke in men with hypertension.⁶ The incidence of lung function declines in chronic heart failure, coronary artery disease and hypertension. It is interesting to determine that cardiovascular disease, hypertension and left ventricular hypertrophy clinically associated with worsening lung function.⁷ Framingham study demonstrated that the decline in lung function, detected by low forced vital capacity (FVC) and forced expiratory volume in the first second (FEV1), associated with coronary heart disease and hypertension.⁸ Relationship between hypertension and pulmonary function is often observed in the last decade, especially in the elderly where arterial elasticity contributes to this mechanism.⁹

This study aims to determine the difference of lung function in elderly patients with and without hypertension.

LITERATURE REVIEW

Ageing Theory

Terminology defines that elderly is individual ages over 60 years and characterized by a variety of physiological changes and mental function.¹⁰ The aging process triggers some changes in the respiratory system that results in a decrease in lung function.¹¹ In the elderly population cellular changes occur. These mechanisms include the decline in lung function.² Forced expiratory volume in the first second (FEV1) deteriorated by aging is greater than the decline of forced vital capacity (FVC) and the ratio of FEV1 and FVC also decreases with age.⁷ Lung Function and Hypertension Spirometry test are the main objective examination to determine disorder in respiratory system,¹² including measurement of FVC, FEV1, and forced expiratory.¹³ In the elderly there is an increase of systolic blood pressure resulting in increased after-load cardiac volume ensuring a left ventricular hypertrophy (LVH). The decrease of diastolic blood

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pressure causes a decreased coronary perfusion, allowing ischemic heart disease. LVH and ischemic heart disease will then cause systolic and diastolic heart failure.⁵ The background of relationship between lung function decline and hypertension is unknown. It is left ventricular failure that possibly causes vascular and interstitial edema, which lowers compliance of lungs, and produces a decrease in the value of FVC. Another explanation of the mechanism is the effects of the aging process it self.¹⁴

METHODS

Sample Population

The study was conducted cross-sectionally in local setting of “Geriatric Association” (Paguyuban Geriatri) and Pulmonoly Department, Dr. Sardjito Hospital, Yogyakarta, from November 2012 to January 2013. The population was elderly patients aged over 60 years who were capable and independent. Individuals visits Paguyuban Adiyuswo Geriatri Dr. Sardjito

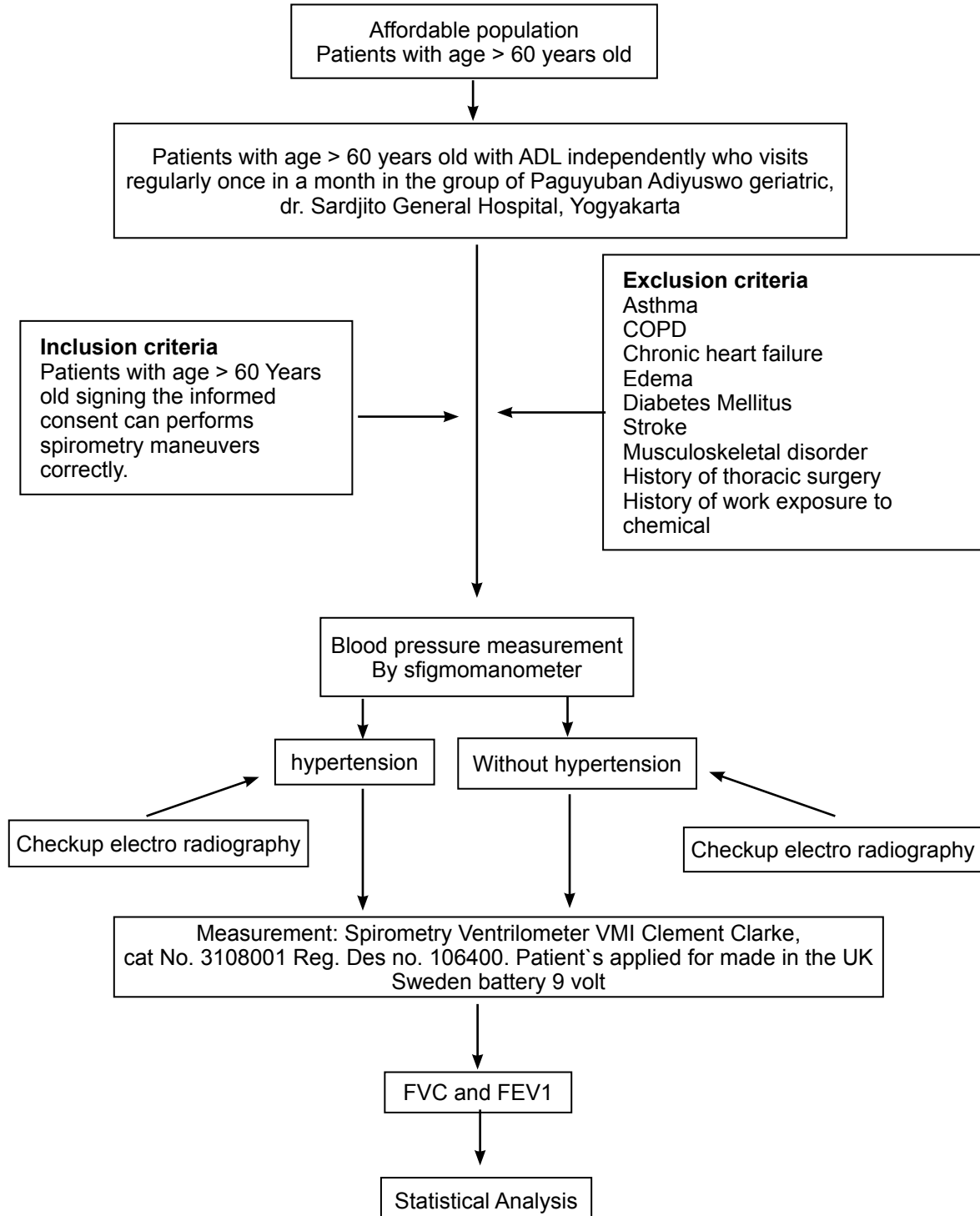


Fig 1. Research design

Table 1. Paired Samples T-test of hypertension and without hypertension group

Parameter	Mean of group with hypertension \pm SB (n = 29)	Mean of group without hypertension \pm SB (n = 29)	P value	95% IK
Age (years)	69,55 \pm 6,99	67,50 \pm 6,67	P = 0, 246	-5.69-1,49
Gender				
Male (n = 16)	12 (41, 38%)	4 (13, 79%)	P = 0,0038	0.062-0,822
Female (n = 46)	17 (58, 62%)	25 (86, 21%)		
Weight (kg)	55,20 \pm 13,31	57,17 \pm 13,31	P = 0,535	-4.34-8.27
Height (cm)	155 \pm 5,91	154 \pm 6,70	P = 0,620	-4.15-2.5
BMI (kg/m ²)	24,01 \pm 5,45	22,95 \pm 4,59	P = 0,473	-3,938-1.985
Waist (cm)				
Male	84,75 \pm 8,22	87,16 \pm 16,79	P = 0,720	-10.948-15.448
Female	83,79 \pm 11,64	87,08 \pm 12,64	P = 0,415	-4.767-11.346
Smoking history (%)				
Yes (n = 4)	2 (6, 89%)	2 (6, 89%)	P = 1	0,13-7,62
No(n = 54)	27 (93, 11%)	27 (93, 11%)		
EKG (%)				
Ischemic (n = 40)	23 (79, 31%)	17 (68, 75%)	P = 0,155	0,845-8,66
Without ischemic (n=18)	6 (20, 69%)	12 (31, 25%)	P = 0,331	0,628-9,03
LVH (n = 12)	4 (13, 79%)	8(27, 56%)		
Without LVH (n = 46)	25 (86, 21%)	21(72, 44%)		
FVC (L)	0,58 \pm 0,25	0,59 \pm 0,26	P = 0,984	-0,13-0,139
FEV1 (L)	0,54 \pm 0,24	0,53 \pm 0,24	P = 0,83	-0,4-0,116
FVC prediction (%)	22,92 \pm 10,36	23,34 \pm 10,66	P = 0,88	-5,11-5,95
FEV1 prediction (%)	38,60 \pm 16,47	34,95 \pm 14,89	P = 0,379	-11,9-4,59

Hospital, Yogyakarta regularly in a monthly basis. Inclusion criteria included signing the informed consent and having capability in doing spirometry maneuvers correctly. Subjects with asthma, chronic pulmonary obstructive disease (COPD), chronic heart failure, edema, diabetes mellitus, stroke, musculoskeletal disorders, the history of thoracic surgery, and regular working with chemical exposure were excluded. After undergoing interview and physical examination study subjects were grouped into hypertensive (blood pressure \geq 140/90) and non hypertensive individuals (blood pressure < 140/90 mmHg). Afterward, spirometry with FVC and FEV1 measurements were carried out.

Statistic Analysis

Student t-test was used to analyze differences of mean or median between the two groups. Significance was accepted with $p < 0.05$.

RESULT AND DISCUSSION

The mean FVC obtained in hypertensive and non- hypertensive group is 0.58 ± 0.25 and 0.59 ± 0.26 , respectively ($p = 0.984$, 95% CI -0.13 - 0.139). The mean FEV1 in groups with and without hypertension was 0.549 ± 0.24 vs. 0.53 ± 0.24 ($p = 0.83$, 95% CI - 0.14 - 0.116). Average value of predicted FVC is 22.92 ± 10.35 vs. 23.34 ± 10.66 ($p = 0.88$, 95% CI -5,11-5,95), while average value of predicted FEV1 is 38.60 ± 16.47 vs. 34.95 ± 14.89 ($p = 0.379$, 95% CI -11, 9-4, 59). This shows that there

is no significant difference to the FVC, FEV1, FVC and predicted FEV1 in the hypertensive and non hypertensive group. This is in contrast to the reports of previous studies despite different age populations. Karunanayake *et al.* (2003) showed that patients with hypertension and cardiovascular disease have a lower lung function. The different result may be caused by different study populations of our present work. Ours included only elderly individuals aged more than 60 years, while previous study had subjects aged 18-79 years, supporting indication that hypertension in elderly patients is distinct from adult patients.⁴ Moreover, ECG results in the two group of the present study showed no significant difference of lung function when determined by the presence of ischemia and LVH. This is in contrast to the report of Enright (1995) showing that in chronic heart failure, hypertension with increased left atrial pressure and left ventricular ischemic lower compliance increased pulmonary arterial pressure. This resulted in a decline in FVC and FEV1. There is a relationship worsening of lung function in patients with chronic heart and hypertension.⁷

CONCLUSION

No significant differences in lung function were found in elderly patient with and without hypertension. However, this study open up an opportunity for further exploration with better study design since the knowledge of lung function in elderly in its relationship to hypertension may provide improved strategy to reduce morbidity, mortality and enhance quality of life.

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