The Profiles of Blood Pressure and Blood glucose Level among the Elderly in "Y" Village, Gresik, Indonesia

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Abstract

Elderly people is someone who has the age of 60 years or more. In old age physiological functions decrease due to degenerative processes (aging), resulting in many non-communicable diseases. Non-communicable diseases in the elderly include hypertension, stroke, diabetes mellitus and arthritis or rheumatism. The prevalence of hypertension and diabetes in the district of Gresik is quite high. The aims of this community service was to find out the profile of blood pressure and blood glucose levels of the elderly in "Y" Village, Gresik District. This study was a descriptive study with a cross-sectional design. The sampling method uses accidental sampling technique, which is 60 elderly people who come at the health examination. Sixty elderly people measured blood pressure and blood glucose level. The measurement results showed that the elderly blood pressure in Y village had 50% blood pressure in the hypertension stage 1 and 2, 23% in the pre-hypertension category, and 27% had normal blood pressure. While the results of measuring 22% of blood glucose levels had blood glucose level in the Diabetes Melitus category which is ≥200 mg / dl, 58% have blood glucose levels in the category of 90-199 mg / dl and 20% had normal blood glucose levels. This study concludes that most of the elderly in Y Village are suffering from hypertension and having non-DM blood glucose level. Conclusion of this research is elderly people in Y Village has hypertension and blood glucose level in the category of not yet diabetes.

Keywords: *blood glucose level, diabetes, elderly people, hypertension*

Introduction

Elderly people are individuals with the age of 60 years and above. The rise of life expectancy in Indonesia is an indicator of successful country development in several aspects, including health. The rise of life expectancy is linear with the rising number of elderly people. Indonesia should be aware of the possibility of triple burden: the rise of birth rate, disease burden (infectious or non-infectious) and burden of productive age group towards the non-productive age group. Most of the elders are belonged to non-productive group and have experienced degradation in physical, social, and psychological qualities. Age development causes decrease in physiological function due to degenerative process which triggers non-infectious disease among the elderly. The common infectious diseases among the elderly include hypertension, stroke, diabetes mellitus, and rheumatism. The prevalence of hypertension and diabetes among the elderly in Gresik is quite high. Based

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on the health profile of East Java in 2017, the percentage of hypertension patient in Gresik reached 35.36%. In addition, according to Basic Health Research in 2018, Gresik ranked in the 5th position with highest patient of diabetes in East Java[1].

World Health Organization (WHO) classified elderly into several age groups. Middle age: 45–59 years old; elderly: 60–74 years old; old: 75–90 years old; and very old: >90 years old. Physiological changes in the cell rate, organ, and organ system are experienced by the elderly[2]. Based on the results of Basic Health Research in 2013, the most common disease in old age is non-communicable diseases which include hypertension, arthritis, stroke, Chronic Obstructive Pulmonary Disease (COPD) and Diabetes Mellitus (DM)[3, 4].

Alteration in cardiovascular system is one of the causes which increase the hypertension risk among the elderly. Old-age group tends to have higher blood pressure. Aging process caused changes in the connective tissues of artery, vein, and myocardium and caused degradation in elasticity. Aging process also increase nerve enhancement and norephinephrin rate, thus increasing the risk of arteriolar constriction and blood vessel resistance[5]. Hypertension is the increase of systolic blood pressure higher than 140 mmHg and diastolic blood pressure higher than 90 mmHg in rest condition. Increase in blood pressure for long period and uncontrollable manner may lead to liver failure, heart coronary disease, and stroke without early detection and sufficient treatment[6, 7].

Age is one of the risk factors for diabetes mellitus. Metabolism disturbance in blood glucose is caused by the damage in insulin secretion by beta cell and the increase of insulin resistance. It resulted in the increase of blood glucose[5]. Hypergli Hyperglycemia is the increase of blood glucose above the normal limit. The normal range of blood glucose level is 80-200 mg/dl. Hyperglycemia is a common sign of DM besides other typical symptoms such as polyuria, polydipsia, and polyphagia[8].

Hypertension and diabetes are untreatable diseases which can be controlled. Therefore, examination of blood pressure and blood glucose level should be done regularly. In general, people will ask for health examination only when they experience health disturbances. In addition, the health workers have little knowledge on the prevalence of diabetes in Y Village. The activity of blood pressure and blood glucose level examination is conducted to obtain the data about the blood pressure and blood glucose level for early detection of hypertension and diabetes among the elderly in Y Village, Gresik. The examination did not require payment to attract more people to check their health. The examination data is then given to the village health workers to let them know the condition of the blood pressure and blood glucose level among the elderly in that village.

Y Village is one of the villages in Gresik with 31 Neighborhood Association and 8 Citizen Association and divided into three hamlets. Based on the Data of Village Profile of 2014, the number of elderly inhabitants in Y village made up 9% of the total 3,000 population[9].

Based on the background, this research is aimed at discovering the profiles of blood pressure and blood glucose level among the elderly in Y Village, Gresik. The result of this research will provide information about blood pressure and blood glucose status to the subjects to increase their awareness on the importance of checking their health regularly. In addition, the examination results given to the health workers in Y Village can be followed up by the regional government to design a promotive, preventive, and curative program for hypertension and diabetes especially for the elderly people in Y Village, Gresik.

Method

This study is a descriptive research with cross-sectional design. Sample is taken using accidental sampling technique by involving 60 elderly people who check their health at the examination program. The research is conducted in Y Village Community Building, Gresik on July 2019.

Blood pressure is measured using aneroid tensimeter and stethoscope. The data of blood pressure examination is classified using JNC VII criteria[10]. On-time blood sugar level is measured using glucometer (smart check blood glucose meter) in capillary blood. The data of on-time blood sugar examination is classified using the criteria issued by Perkeni[8]. The collected data is processed using Microsoft Excel. The data is analyzed with descriptive approach to explain or describe the characteristic of each research variable. The analysis produce frequency distribution and percentage of each variable.

Results And Discussion

Respondents' Characteristics

Table 1. The Distribution of Respondents' Age and Sex in Y Village in 2019

Characteristic	Number	Percentage (%)
Age (years)		
45-59	27	45
60-74	31	52
75-59	2	3
Sex		
Male	8	13
Female	52	87

The observation produced the data of blood pressure and blood sugar examination of 60 elders. Samples' characteristics based on age and sex are described in Table 1. Based on Table 1, most respondents belonged to the 60–74 age group, with the number of 52%. The number indicated that the elderly population in Y Village is generally healthy because they were still able to attend the health examination program. 45–59 years old people is counted for 45%. This group is classified as productive-age group. The members of this group in Y Village are still active and productive, so they still pursuing their career. Lastly, there were 3% belonged to the 75-90 years of age.

Based on the sex classification, most of the respondents were female, counted for 87%. The number of male elders is counted for 13%. The proportion is in corresponds with the data issued by The Ministry of Health of the Republic of Indonesia in 2015 that there are more female elders than male which indicate higher life-expectancy among female elders[4].

Blood Pressure Profile

Normal blood pressure is indicated by systolic pressure of <120 mmHg and diastolic pressure of <80 mmHg[10]. Blood pressure is categorized as pre-hypertension with systolic pressure of 120-139 mmHg or diastolic pressure of 80-89 mmHg. Meanwhile, first-degree hypertension is shown by systolic pressure of 140-159 mmHg or diastolic pressure of 90-99 mmHg. Second-degree blood pressure is indicated by systolic pressure of ≥160 mmHg or diastolicpressure of ≥100 mmHg.

Table 2. Distribution of Respondents' Blood Pressure in Y Village in 2019

Systolic/Diastolic Blood Pressure (mmHg)	Number	Percentage (%)
<120 /<80	16	27
120-139 /80-89	14	23
140-159 /90-99	12	20
≥160/≥100	18	30

Table 2 shows that 50% elders are suffered from hypertension, 20% with first-degree hypertension and 30% with second-degree hypertension. Meanwhile, 23% of the elderly were having pre-hypertension; and 27% others have normal blood pressure. The diagnosis of hypertension can be stated if the measurement shows systolic blood pressure of ≥ 140 mmHg and/or diastolic blood pressure of ≥ 90 mmHg in the repeating examination. Systolic blood pressure is the main indicator in deciding the diagnosis of hypertenstion[8].

Table 3. The Distribution of Blood Pressure based on Respondents' Age in Y Village in 2019

Blood Pressure	45-59 (years)		60-74 (years)		75-90 (years)	
	Number	%	Number	%	Number	%
<120 /<80	4	15	12	39	0	0
120-139 /80-89	6	22	6	19	0	0
140-159 /90-99	11	41	3	10	1	50
≥160/≥100	6	22	10	32	1	50

Based on Table 3, the number of patients with first-degree and second-degree hypertension in 45–59 age group is 41% and 22%, respectively. Meanwhile, the number of patients with first-degree and second-degree hypertension 60–74 age group is 41% and 22%, respectively. In 75-95 age group, 50% were suffering from first-degree hypertension and 50% were suffering from second-degree hypertension. Age is one factor which influence blood pressure. Older the age, higher the risk of hypertension.

The mean of systolic blood pressure and diastolic blood pressure in 45–59 age group is 127 mmHg and 83 mmHg, respectively. The mean of systolic blood pressure and diastolic blood pressure in 60–74 is 128 mmHg dan 83 mmHg, respectively. The mean of systolic blood pressure and diastolic blood pressure in 75–90 age group is 135 mmHg dan 90 mmHg, respectively.

The above results are in corresponds with Basic Health Research published in 2013, the prevalence of hypertension among the elderly is rising along with the increase in age. In age group of 55–64, the prevalence of hypertension is 45.9%; 65–74 is 57.6%; and among 75 years above, the prevalence is 63.8%[3, 4]. The rise of hypertension risk in age group of 55–59 is 2.18 times; 65–69 is 2.45 times; and >70 age group is 2.97 times. The rise occurred due to the loss of elasticity which increase the peripheral resistance and blood pressure[11].

The Profile of Blood Glucose Level

Table 4. The Distribution of Blood Glucose Level among Respondents in Y Village in 2019

Blood Glucose (mg/dl)	Number	Percentage (%)
<90	12	20
90-199	35	58
≥200	13	22

The grouping of blood glucose level is based on the criteria issued by Perkeni[8]. The criteria are used to measure on-time blood glucose level in capillary blood. 20% of the respondents showed blood glucose level less than 90 mg/dl or normal level as long as the subject does not experience hypoglycemia. 58% of the respondents showed blood glucose level of 90–199 mg/dl. The blood glucose level is categorized as DM. The group needs further identification for symptoms and risk factors to prevent increase in blood glucose level, known as hyperglycemia. Blood glucose level above 200 mg/dl fulfills the criteria of DM diagnosis. Research results showed that 22% of the elders belonged to DM criteria. It is due to the fact that 50% of elderly people experience increase in blood glucose level caused by disturbance of glucose metabolism[2].

Tabel 5. The Distribution of Blood glucose Level based on Age among the Respondents in Y Village in 2019

Blood glucose (mg/dl)	45-59 (years)		60-74 (years)		75-90 (years)	
	Number	(%)	Number	(%)	Number	(%)
<90	6	22	5	16	1	50
90-199	13	48	22	70	0	0
≥ 200	8	29	4	12	1	50

Based on Table 5, from 27 individuals belonged to age group of 45–59, 22% respondents showed non-DM blood glucose level; 48% showed uncertain-of-DM blood glucose level; and 29% showed DM blood glucose level. From 31 individuals belonged to age group of 60–74, 16% respondents showed non-DM blood glucose level; 70% showed uncertain-of-DM blood glucose level; and 12% showed DM blood glucose level. Meanwhile, among 31 respondents belonged to 75–90 age group, 50% respondents showed non-DM blood glucose level and 50% respondent showed DM blood glucose level.

The mean of blood glucose level in 45–59 age-group is 160 mg/dl with the lowest level of 53 mg/dl and highest level of 453 mg/dl. The mean of blood glucose level in 60–74 age-group is 136 mg/dl, with the lowest level of 62 mg/dl and highest level of 337 mg/dl. The mean of blood glucose level in 75–90 age-group is 163 mg/dl, with the lowest level of 73 mg/dl and highest level of 253 mg/dl.

Diagnosis of diabetes can be stated if the measurement of on-time plasma glucose showed the level of ≥200 mg/dl with common symptoms such as polydipsia, polyphagia, and decrease in body weight with unknown reason[8]. Diabetes patients are mostly belonged to the age-group of 55–64 years and 65–74 years. The data is in correspond with the research result as most of the DM-categorized blood glucose level found in the range of 45–59 years and 60–74 years. There is a differet in the age category. Age is one of the risk factors which increase the rise of blood glucose in infodatin diabetes in 2018. The prevalence of diabetes is increased as the age developed. Disturbance in blood glucose setting is due to homeostasis disorders or disruption in the production of beta cell in the pancreas and the rise of insulin resistance. Insulin resistance can be caused by changes in fat composition in elderly body in the form of low muscle mass and high fat tissue due to bad diet[2].

CONCLUSION AND SUGGESTION

This study concludes that the profile of blood pressure among the elderly in Y Village is 50% showed blood pressure categorized as first-degree and second-degree hypertension, 23% categorized as pre-hypertension, and 27% showed normal blood pressure. The profile of blood glucose level among the elderly in Y Village is 22% showed blood glucose level categorized as DM, 58% categorized as non-DM, and 20% showed normal blood glucose level. The data indicates increase in blood glucose level for most of the elders and specific intervention is needed to control diabetes mellitus in Y Village.

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