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Original Article

Examination of Total Cholesterol Levels in the Elderly with Hypertension (Case Study at Abiansemal I Health Center, Badung Regency-Bali)

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ABSTRACT

An elderly person is someone who is 60 years or older. As we age, changes in the structure and function of cells, tissues, and organ systems occur in the body, increasing the risk of hypertension. Hypertension is a multifactorial disease that can be caused by cholesterol. Hypercholesterolemia can clog peripheral blood vessels, thereby triggering hypertension. The purpose of this study was to describe total cholesterols levels among elderly individuals with hypertension at Abiansemal I Health Center, Badung Regency, Bali. This type of study used is descriptive research using non-probability techniques, purposive sampling. Total cholesterol levels were measured using the POCT method in 44 elderly participants with hypertension; 14 individuals had borderline cholesterol levels, and 17 individuals (38,6%) had high total cholesterol levels. Based on the characteristics of the respondent's dominant gender with High cholesterol levels in women were 10 people (22,7%). Based on Body mass index (BMI) is dominant among respondents with high total cholesterol levels in the normal BMI category there were 11 people (25,0%). It can be concluded that most elderly individuals with hypertension at Abiansemal I Community Health Center had high total cholesterol levels.

Introduction

A person who has reached the age of 60 years or more is referred to as elderly. Aging is the final phase of life that affects three main dimensions: biological, social, and economic. The population aged 60 years and above is the fastest-growing in the world that caused by fertility declining and life expectancy increasing. As age increase, changes occur in the structure and cell function, tissue and organ system (Larandang, Sudirman, & Yani, 2019). A common disease that suffered by elderly is hypertension. Hypertension is the third leading cause of death after stroke and tuberculosis. The prevalence of hypertension in the elderly at range 60-74 years is 63,2%. In Bali, there were 555,184 cases of hypertension. Badung Regency ranked sixth with a percentage of 29,33% (Kemenkes RI, 2018).

Citation: .....

Hypertension is defined as a systolic pressure ≥140 mmHg and a diastolic pressure ≥90 mmHg. In common, several factors that contribute to high blood pressure are age, gender, physical activity, genetic, and high cholesterol level. One of the external factors that can trigger hypertension is elevated cholesterol levels (Naue, Doda, & Wungouw, 2016).

Cholesterol is one of element in fat formation, is produced and regulated in the liver. Hypercholesterolemia can cause atherosclerosis, a condition characterized by the hardening and narrowing of artery walls as a result of an inflammatory response (Fadilah, 2021). Hypertension prevention can be achieved by quitting smoking, limiting excessive consumption of sugar, salt, and fat, increasing physical activity, and undergoing regular laboratory examinations such as cholesterol testing.

Research that had been done by Permatasari, Suriani, & Kurniawan, (2022) indicated that 93,8% of patients aged ≥40 years had high cholesterol levels along with high blood pressure. According to a preliminary study that was conducted by the researcher at Abiansemal I Health Center, it is found 532 cases of elderly hypertension were found from January to October 2023. Based on the description above, the study aimed to determine the profile of cholesterol levels in elderly patients with hypertension at Abiansemal I Health Center.

Methods

This study employed a descriptive research design to assess total cholesterol levels among elderly patients with hypertension at Abiansemal I Health Center, Badung-Bali. The Research was conducted from February to April 2024. The population in the research were all the elderly with hypertension within the Abiansemal I Health Center coverage area. The sampling technique used in this research was non-probability sampling. The sample consisted of 44 elderly participants with hypertension, whose total cholesterol levels were measured using the POCT method.

The type of data collected in this research was primary and secondary data. Primary data were obtained from the total measurement result, body mass index (BMI) assessment, and interview data results with respondents at Abiansemal I Health Center Badung-Bali. Secondary data were obtained from medical reports at Abiansemal I Health Care Badung-Bali.

Data obtained from interviews, BMI assessments, and total cholesterol measurements were grouped, analyzed, and presented in tables and narrative form. The analysis was descriptive, aiming to explain or describe each variable in the form of frequency distributions and percentages.

Results

Table 1. Characteristic of research respondent

No	Respondent Characteristic	Total (person)	Percentage (%)
A	Gender		
1	Male	18	40,9
2	Female	26	59,1
B	IMT		
1	Underweight (17,0-<18,5 kg/m^2)	(+)	(+)
2	Normal (18,5-25,0 kg/m^2)	(+)	(+)
3	Obesity (≥27,0 kg/m^2)	(+)	(+)

As shown in Table 1, most respondents were female (26 individuals; 59,1%). In terms of BMI, 29 respondents (65,9%) were in the normal category and 11 (25,0%) were categorized as obese.

Table 2. Total cholesterol level results

No	Total Cholesterol	Total (person)	Percentage (%)
1	Normal (<200 mg/dl)	13	29,6
2	Borderline (200-239 mg/dl)	14	31,8
3	High (≥240 mg/dl)	17	38,6
	Total	44	100

Based on table 2, dominan result shows that 17 respondent (38,6%) had high total cholesterol level.

Table 3. Total cholesterol level result by gender

Total Cholesterol Level Category	Gender			
	Male		Female	
	Total (person)	Percentage (%)	Total (person)	Percentage (%)
Normal (<200 mg/dl)	6	13,6	7	16
Borderline (200-239 mg/dl)	5	11,3	9	20,4
High (≥240 mg/dl)	7	16	10	22,7
Total	18	40,9	26	59,1

Based on table 3, the dominant group of respondents result with high cholesterol level were female, totaling 10 individuals (22,7%).

Table 4. Total cholesterol level results by BMI

Total Cholesterol Level Category	BMI					
	Underweight (17,0-<18,5 kg/m^2)		Normal (18,5-25,0 kg/m^2)		Obesity (≥27,0 kg/m^2)	
	n	%	n	%	n	%
Normal (<200 mg/dl)	1	2,3	9	20,4	3	6,8
Borderline (200-239 mg/dl)	1	2,3	9	20,4	4	9,1
High (≥240 mg/dl)	2	4,5	11	25,0	4	9,1
Total	4	9,1	29	65,8	11	25,0

Based on table 4, the dominant respondent result shows that 11 respondents (25,0%) with high total cholesterol levels were in the normal BMI.

Discussion

The results in Table 1 showed that the majority of respondents in this study were female. The number of respondents was 26 individuals (59,1%). Compared to male respondents, females have shown a higher risk of hypercholesterolemia because several hormones produced by females during menopause affect blood pressure. The ageing process leads to slower metabolism and reduced physical mobility, causing fat accumulation in the body (Rahayu, Mendrofa, & Bo'ne, 2023). In this study, the researcher also found that male respondents, totaling 18 individuals (40%). This may be due to lifestyle factors among males, such as smoking, stress, coffee consumption, and irregular eating habits, which contribute to hypertension (Purwono et al., 2020).

In this study, there were 11 respondents (25,0%) with BMI obesity category. Most individuals with hypertension are overweight. However, those with normal or low body weight can also develop hypertension. Due to a decline in basal metabolism, the nutritional requirements for carbohydrates and fat decrease with age. In older adults, metabolism is lower. It is caused by low physical activity. As a result, the excessive calories will be stored as fat, which results in obesity (Sumardiyono et al., 2018).

Respondents with BMI in the normal category totaled 29 individuals (65,9%). The finding is consistent with the study by Rahmatillah, Susanto, & Nur (2020), which reported that most elderly individuals have a BMI in the normal category. Several factors can contribute to a normal BMI, such as specific dietary patterns, regular physical activity, and excessive sodium intake, which may still lead to high blood pressure despite having a normal BMI (Rahmatillah, Susanto, & Nur, 2020).

A BMI in the underweight category was found in 4 respondents (9,1%), it is caused of the lack of calories needed by the body to produce energy (Sumardiyono et al., 2018).

The result in Table 2 shows that 14 respondents (31, 8%) had borderline total cholesterol levels, while the high level dominant was 17 individuals (38,6%). The findings of this study are consistent with those of Permatasari, Suriani, & Kurniawan (2022), who reported that elevated total cholesterol levels significantly increase the risk of hypertension. Hypertension is caused by the high cholesterol level in the blood (hypercholesterolemia). It happened because of a peripheral blood vessel being blocked, reducing blood supplies to the heart. Cholesterol buildup leads to the arterial walls thickening due to cholesterol plaque formation. As the arterial walls thicken, they lose elasticity and become stiff, which can result in hypertension (Permatasari, Suriani, & Kurniawan, 2022).

The results also show that 13 total respondents (29,6%) had normal total cholesterol levels. Normal cholesterol levels may be attributed to some elderly individuals maintaining a healthy and balanced diet. Furthermore, the fatty consumption is still limited on a daily basis, allowing these elderly individuals to remain active in their daily activities, such as exercising and actively participating in a monthly elderly health post (Posyandu Lansia)

The result shown in Table 3 indicates that borderline to high cholesterol levels were found dominantly in females. The total respondents was 19 individuals. This finding is consistent to research by Swastini (2021) that showed dominant respondents who have higher cholesterol were female. During menopause, estrogen production decreases, thus leads to significantly hormonal changes. Cholesterol levels in the body is causing the increase of LDL cholesterol (bad cholesterol) and a decrease of HDL cholesterol (good cholesterol) (Mathavan & Pinatih, 2017).

The result also showed that male respondents had borderline to high cholesterol levels. It was 12 individuals. It was caused by an extrinsic factor such as smoking. Free radical released from cigarettes will increase oxidative stress, which can also increase lipid peroxidation, especially LDL (Bekti, Suwarriana, & Arjani, 2022).

The results in table 4 show that respondents with high total cholesterol levels with the underweight BMI category, were 2 individuals (4,5%) and 11 individuals (25%) in the normal BMI category. In addition, borderline total cholesterol levels were found in 1 respondent (2,3%) in the underweight BMI category. Borderline and high total cholesterol level in the underweight BMI category, caused by an increase in total cholesterol levels in the blood. The increasing of total levels of cholesterol in the underweight are often related to dietary intake rich in cholesterol, such as high saturated food, particularly animal fat. Continuous consumption of such foods over a long period can lead to increased cholesterol levels in the body, even without visible obesity (Asni, Ardiansah, & Dian, 2019).

This finding is consistent to research by Wahyuni & Diansabila (2020), which showed that high total cholesterol levels are not always influenced by BMI. High cholesterol is not necessarily caused by obesity. Other factors, such as smoking, medication use, physical activity, and daily patterns high in cholesterol, such as meat, offal, and egg can increase blood cholesterol level (Wahyuni & Diansabila, 2020).

The research also showed that the respondents with normal BMI and cholesterol level in the obesity category is 3 individuals (6,8%). Most of the obese respondents have a normal cholesterol level because they consume good cholesterol. Beside, the respondents also regularly physical activities such as sports, at least 3 times a week, with the time length is 45 minutes.

Conclusions

High cholesterol levels were most frequently found among female respondents (22,7%) and those with a normal BMI (25%). Elderly individuals with hypertension are advised to undergo regular cholesterol examinations at available healthcare facilities.

Author contributions

KAAPT, HSB, and IGAAD contributed to the study's concept and design. IGAAD assisted with experimental studies and data acquisition. HSB managed the literature search, data analysis, and statistical analysis. All authors participated in manuscript preparation and HSB responsible for editing and review. All authors have read and agreed to the published version of the manuscript.

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Ethical approval statement

The study received ethical approval from the Ethics Committee of Poltekkes Kemenkes Denpasar with certificate number No.DP.04.02/F.XXXII.25/0061/2023.

Conflicts of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Supplementary materials

No supplementary material available.

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