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Differences in the Nutritional Status of the Elderly with Hypertension in Rural and Urban Areas

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ABSTRACT

Individuals with excess weight are more likely to experience increased blood pressure compared to those with normal weight. Hypertension is particularly prevalent among the elderly population. Additionally, the living environment whether urban or rural can influence the nutritional status of elderly individuals with hypertension. This study aims to compare the nutritional status of elderly individuals with hypertension residing in rural and urban areas. A quantitative comparative cross-sectional design was employed, and purposive sampling was used to select 152 participants. Data collection included measurements of body weight using digital scales, height or knee height using a stadiometer, and blood pressure using a digital sphygmomanometer. The results, analyzed using an independent t-test, revealed a significant difference in the nutritional status of elderly individuals with hypertension between rural and urban areas (p-value = 0,007), with a mean difference of 1,476. The findings indicate that the nutritional status of elderly individuals in rural areas is better compared to their urban counterparts. This difference is influenced by food intake and physical activity levels. Elderly individuals with hypertension in rural areas tend to consume homegrown foods and agricultural products, contributing to their healthier status. They should continue engaging in physical activities like gardening or farming. In contrast, elderly individuals in urban areas face challenges due to the availability of ready-to-eat or processed foods. It is essential for them to adopt healthier dietary habits and increase physical activity through walking or participating in community-based health programs to improve their nutritional and overall health status.

Keywords: Elderly, Hypertension, Nutritional Status, Rural, Urban

1. Introduction

Hypertension is a cardiovascular disease often referred to as "the silent killer" (Triyanto, 2014). It is one of the most common diseases among the elderly due to age-related changes such as reduced arterial elasticity, increased peripheral vascular resistance, thickening and stiffness of heart valves, and a decline in the heart's ability to pump blood efficiently (Mulyadi et al., 2019). According to the WHO Global Report on Hypertension in 2023, the number of hypertensive adults nearly doubled globally over the last three decades, rising from 650 million in 1990 to 1.3 billion in 2019. Among individuals over the age of 50, the prevalence of hypertension reaches nearly 49%, or approximately 1 in every 2 individuals, with comparable rates among men and women (WHO 2024, n.d.). In Indonesia, the prevalence of hypertension among the elderly is 34.1%. Specifically, the province of Bali ranks 16th in terms of hypertension prevalence, with a rate of 29.97%. Within Bali, the Jembrana district reports a high blood pressure prevalence of 30.25%, while the city of Denpasar records a rate of 24.46% (Lembaga Penerbit Badan Litbang Kesehatan, 2019).

Nutritional Status is one of the risk factors for hypertension (Rihiantoro & Widodo, 2018). Overweight individuals are more likely to experience elevated blood pressure compared to those with normal or underweight conditions (Al Fariqi, 2021). This association is primarily due to excess visceral fat tissue, which contributes to insulin and leptin resistance. Visceral fat also plays a role in altering the secretion of molecules and hormones such as adiponectin, leptin, resistin, TNF-α, and IL-6, ultimately leading to high blood pressure (Konsensus InaSH 2016, 2016). Nutritional status is commonly assessed using anthropometric measurements, particularly the Body Mass Index (BMI). The BMI serves as a tool to monitor the nutritional status of adults by calculating weight in kilograms divided by the square of height in meters (Par'i et al., 2017).

The type of residential area—rural or urban—can significantly influence lifestyle factors related to the nutritional status of the elderly. Elderly individuals in rural areas are often engaged in farming activities, as they typically own farmland or plantations managed by their families (John et al., 2012). Their diets mainly consist of agricultural products, such as vegetables and homegrown crops (Kim & Bae, 2020). In contrast, elderly individuals in urban settings are more likely to work in industries, private services, or as retirees (John et al., 2012). According to Kim and Bae (2020), urban elderly populations are more inclined to consume fast foods and fatty foods. Additionally, urban elderly tend to have a higher intake of calcium-rich foods such as milk, phosphorus sources like meat, fish, eggs, and nuts, as well as potassium, compared to their rural counterparts. The environmental context, whether rural or urban, influences the lifestyle and dietary habits of elderly individuals, which in turn affects the management of hypertension. This study aims to compare the differences in nutritional status and hypertension prevalence among elderly individuals residing in rural and urban areas. The findings of this research will serve as a basis for developing appropriate nursing interventions tailored to the specific needs of elderly populations in different residential settings.

2. Methods

This research employs a quantitative comparative approach using a cross-sectional research design. The study focuses on two distinct research areas: Pemecutan Kelod Village, Denpasar City, Bali Province, representing an urban setting, and Gumbrih Village, Jembrana District, Bali Province, representing a rural setting. The research was conducted over a six-month period from January to June 2024. The population for this study comprises 324 elderly individuals in the urban area and 313 elderly individuals in the rural area. The sample size was determined using the Slovin formula with a 10% margin of error, resulting in 76 elderly participants from each area. To obtain the sample, the study involved elderly groups within community health programs (Posyandu Lansia), ensuring comprehensive representation. A proportionate stratified random sampling technique was employed to account for the differing membership sizes of each elderly group within the community health services (Posyandu Lansia). Inclusion criteria required respondents to be available for participation, while exclusion criteria disqualified elderly individuals suffering from diabetes mellitus or arthritis. Research instruments included a digital scale for measuring body weight, a stadiometer for measuring height or knee height, and a digital sphygmomanometer for measuring blood pressure. Ethical approval for the study was granted by the Research Ethics Commission of the Udayana University Medical Faculty, under approval number 1137/UN14.2.2.VII.14/LT/2024. Data collection was facilitated by four trained enumerators serving as research assistants. The reliability of perceptual measurements was assessed using Cohen's Kappa, yielding a value of 0.999, indicating excellent inter-rater reliability. Statistical analysis was performed using an independent t-test to evaluate the research hypotheses.

3. Results

Table 1 provides an overview of the respondents' characteristics, focusing on the age of elderly individuals and the duration of hypertension. The data indicate that the average age of elderly individuals in rural areas is 70.70 years, while in urban areas it is 67.22 years. The average duration of hypertension among the elderly is 6.46 years in rural areas and 5 years in urban areas.

Table 1 Characteristics of Respondents based on Age of Elderly and Duration of Elderly Suffering Hypertension in Rural and Urban Area (n=152)

Variable	Rural		Urban	
	Mean±SD (Year)	Min-Max (Year)	Mean±SD (Year)	Min-Max (Year)
Age of Elderly	70,70±7,298	60-90	67,22±5,124	60-83
Duration of Hypertension	6,46±4,556	2-30	5,00±2,315	1-10

Table 2 Characteristics of Respondents based on Gender, Education Level, Job, Income, and Duration of Hypertension in Elderly in Rural and Urban (n=152)

Variable	Rural		Urban	
	Frequency (f)	**Percentage (%)**	**Frequency (f)**	**Percentage (%)**
Gender				
Male	35	46,1	27	35,5
Female	41	53,9	49	64,5
Total	76	100	76	100
Education Level				
Elementary School	40	52,6	12	15,8
Junior High School	8	10,5	13	17,1
Senior High School	0	0	26	34,2
Bachelor	0	0	21	27,6
No School	28	36,8	4	5,3
Total	76	100	76	100
Job				
Farmers	37	48,7	0	0
Trader	23	30,3	17	22,4
Entrepreneur	1	1,3	21	27,6
Retiree	0	0	19	25,0
Housewife	5	6,6	9	11,8
Unemployed	10	13,2	10	13,2
Total	76	100	76	100
Income				
<Minimum District/City Rate Income	76	100	69	90,8
≥ Minimum District/City Rate Income	0	0	7	9,2
Total	76	100	76	100
Duration of Hypertension				
1-5 years	43	56,6	48	63,2
6-10 years	25	32,9	28	36,8
>10 years	8	10,5	0	0
Total	76	100	76	100

Table 2 highlights the gender distribution and occupational status of the respondents in rural and urban areas. The majority of elderly individuals in both rural and urban settings are female. Most elderly individuals in rural areas work as farmers, whereas their urban counterparts are predominantly entrepreneurs. Additionally, elderly individuals in both rural and urban areas report an income below the Minimum Wage Rate (UMK) for districts/cities in Bali.

Table 3 Nutritional Status and Blood Pressure of Elderly with Hypertension in Rural and Urban (n=152)

Variable	Rural		Urban	
	Mean±SD	**Min-Max**	**Mean±SD**	**Min-Max**
Nutritional Status	22,52±2,478	15,58-31,30	23,99±3,9842	14,33-38,67
Systolic Blood Pressure	156,33±15,691	140-210	158,75±12,204	140-192
Diastolic Blood Pressure	90,78±9,929	70-112	93,91±12,807	65-118

Table 3 presents central tendency data related to the nutritional status and blood pressure variables among hypertensive elderly individuals in rural and urban areas.

Table 4 Distribution of Nutritional Status and Blood Pressure in Elderly with Hypertension in Rural and Urban (n=152)

Variable	Rural		Urban	
	Frequency (f)	Percentage (%)	Frequency (f)	Percentage (%)
Nutritional status (kg/m^2)				
Underweight (<18,5)	5	6,6	6	7,9
Normal (18,5-22,9)	37	48,7	22	28,9
Overweight (23-24,9)	24	31,5	18	23,7
One Degree Obesity (25-29,9)	9	11,8	26	34,2
Obesity Second Degree (>30)	1	1,3	4	5,3
Total	76	100	76	100

Table 4 Continued

Variable	Rural		Urban	
	Frequency (f)	Percentage (%)	Frequency (f)	Percentage (%)
Degree of Blood Pressure				
Degree One Hypertension	54	71,1	35	46,1
Second Degree Hypertension	22	28,9	41	53,9
Total	76	100	76	100

Table 4 outlines the distribution of nutritional status and blood pressure levels among the elderly. In rural areas, the majority have normal or overweight nutritional status, while in urban areas, the most common nutritional status is obesity grade 1. Regarding blood pressure, the majority of rural elderly have grade 1 hypertension, whereas urban elderly predominantly experience grade 2 hypertension.

Table 5 Analysis of the Difference in Nutritional Status in Elderly with Hypertension in Rural and Urban (n=152)

Home of Elderly	N	Mean±SD	p-value	Mean Different (95% CI)
Nutritional Status of Urban Elderly	76	23,99±3,984	0,007	1,476 (0,413-2,540)
Nutritional Status of Rural Elderly	76	22,52±2,478		
Total	152			

Table 5 explains the differences in nutritional status between elderly individuals with hypertension in rural and urban areas. Statistical analysis revealed a significant difference, with a p-value of $0.007 < \alpha$ and a mean difference of 1,476.

4. Discussion

The study results indicate that the average age of respondents falls within the young elderly category. Young elderly individuals tend to be more enthusiastic, are more active in various activities, and demonstrate higher awareness regarding the importance of maintaining their health compared to the old elderly. Suharti et al. (2015) found that young elderly individuals are generally more active and capable than their older counterparts. They can actively participate in activities such as Posyandu Lansia (integrated community health services for the elderly) and serve as role models for the younger generation. A study by Redy et al. (2023) revealed a majority of respondents were aged 60–74 years, comprising 39 individuals (76.5%), whereas only 12 respondents (23.5%) were in the 75–90 age group.

Furthermore, the study found that most respondents, both in rural and urban areas, were female. Women tend to exhibit greater attention to health concerns, are more proactive about addressing health issues, and actively participate in social activities such as Posyandu Lansia. Consequently, the majority of elderly individuals who visit the Posyandu Lansia are women. As noted by Putri (2018), women have an inherent maternal responsibility toward their families and themselves, particularly regarding health. Supporting this, Astriani et al. (2021) reported that female visitors are more likely than male visitors to access Posyandu Lansia services. This is attributed to women's heightened sensitivity to health issues, their ability to take full advantage of Posyandu Lansia services, and their influential role in promoting the use of such health facilities.

The results of this study indicate that the educational level of the elderly in urban areas is generally higher than that of their counterparts in rural regions. Urban areas tend to have better access to school facilities, making education more readily available for elderly individuals. In contrast, elderly individuals in rural areas often face greater challenges in accessing education due to longer distances to schools. Rural elders may need to travel through several villages to reach a school, which often discourages them from pursuing education. Instead, they are more likely to engage in work and assist their families in generating income, as the time and effort required to attend school is perceived as impractical. According to Rahayu (2019), distance to school is a significant obstacle for children in rural areas, whereas proximity to schools in urban areas facilitates access to education and enhances the learning experience.

The findings indicate that respondents in rural areas predominantly work as farmers, while those in urban areas are more likely to be private entrepreneurs. The educational level of elderly individuals in urban areas is generally higher than that of their rural counterparts, resulting in greater employment opportunities for urban elders. According to a study by Andini et al. (2013), older adults in rural areas are more likely to remain employed compared to those in urban areas. In rural regions, 75% of the elderly population has never received formal education, while in urban areas, 65% of those with an elementary school (SD) education are employed

in agriculture. Conversely, in urban areas, elderly individuals are more commonly engaged in processing industries and trade.

The majority of respondents in both rural and urban areas earn incomes below the Minimum District/City Wage Rate (UMK). In 2023, the UMK for Jembrana District is IDR 2,738,698, and for Denpasar City, it is IDR 2,994,646. Most rural elderly fall below the UMK due to their reliance on farming, which is affected by harvest yields and unpredictable weather conditions. Similarly, many elderly in urban areas earn below the UMK, as not all are employed in formal jobs. However, urban elders often engage in informal activities, such as working as housewives, merchants, or remaining unemployed. Aqil (2023) explains that formal employment in urban areas tends to offer higher incomes compared to informal work, which is more prevalent in rural regions. Additionally, the limited availability of work opportunities in rural areas further restricts the income potential of the elderly population.

Respondents in both rural and urban areas mostly report a long history of hypertension, typically ranging between 1 to 5 years. Notably, rural elderly individuals are more likely to experience hypertension for over 10 years, whereas their urban counterparts generally have a shorter duration of hypertension, ranging from 6 to 10 years. Upon being diagnosed with hypertension, elderly individuals in urban areas are more likely to adopt lifestyle changes, maintain their health proactively, and utilize healthcare services such as Posyandu Lansia for regular blood pressure monitoring. These preventive measures often contribute to a shorter duration of hypertension in urban areas, typically not exceeding ten years. In contrast, elderly individuals in rural areas often delay seeking healthcare until their condition becomes severe or life-threatening, largely due to limited access to healthcare services. Consequently, rural elderly populations tend to experience hypertension for a prolonged period, often exceeding ten years. According to a study by Sanjana et al. (2022), senior citizens in rural areas face significant challenges in accessing health services and regular blood pressure monitoring. This lack of consistent surveillance contributes to a prolonged duration of hypertension. Conversely, urban areas benefit from adequate healthcare infrastructure, facilitating easier and more consistent access to health services, which aids in better management of hypertension.

The findings of this study reveal significant differences in blood pressure and nutritional status among elderly individuals with hypertension residing in rural and urban areas. In rural areas, the majority of respondents (54 individuals, 71.1%) exhibit blood pressure levels consistent with first-degree hypertension. In urban areas, a higher proportion of respondents (41 individuals, 53.9%) experience second-degree hypertension. The average nutritional status of elderly individuals in rural areas is 22.52 kg/m², with the majority (37 individuals, 48.7%) categorized as having normal nutritional status. In contrast, the nutritional status in urban areas averages 23.99 kg/m², with the majority (26 individuals, 34.2%) classified as having first-degree obesity. Statistical analysis using an independent t-test yielded a p-value of 0.007, indicating a statistically significant difference in the nutritional status of elderly individuals with hypertension between rural and urban areas. These differences may be attributed to variations in physical activity, dietary patterns, and access to healthcare facilities between these regions.

The physical activity levels of elderly individuals in urban areas tend to be milder compared to their counterparts in rural areas. In urban settings, the elderly often engage in light activities such as spending their free time gathering with family, supervising grandchildren, or participating in recreational exercises, which are typically performed infrequently, such as once a month. Conversely, elderly individuals in rural areas, the majority of whom work as farmers, are engaged in strenuous daily activities. These include tending to crops, maintaining gardens, and performing other agricultural tasks essential for food production or supplementing their income. According to Putra et al. (2018), elderly individuals in urban areas predominantly consist of retirees who fill their free time with light activities such as recreation, staying at home, and using electronic devices (e.g., watching television, using gadgets, chatting on WhatsApp, making video calls, and sharing updates on social media). In contrast, rural elderly populations, primarily farmers, engage in physically demanding activities such as hoeing, tending crops, and walking long distances to and from fields. These daily physical activities serve as a form of exercise, strengthening cardiac muscles, improving peripheral vascular resistance, and potentially preventing hypertension (Marleni et al., 2020).

Elderly individuals in rural areas meet their dietary needs primarily by consuming plants grown in their home gardens. In contrast, elderly individuals in urban areas fulfill their daily food intake by consuming fast food, which often contains unknown levels of sodium and sugar. This dietary habit potentially increases the risk of hypertension. In line with the study by Harlina et al. (2018), differences in eating patterns have been observed between elderly individuals with hypertension in urban and rural areas. Specifically, elderly individuals with hypertension in urban areas consume high-risk foods an average of 2.2 times per day, compared to their rural counterparts, who consume high-risk foods an average of 1.6 times per day. Research by Astutik et al. (2021) further highlights that elderly individuals in urban areas tend to consume fast food and

lead sedentary lifestyles, contributing to decreased physical activity. These lifestyle changes, combined with increased dietary fat intake and reduced physical activity, result in higher nutritional status levels, often categorized as overweight or obese in urban areas compared to rural areas. Consequently, due to the variation in eating patterns between rural and urban elderly populations, it is recommended to implement the Dietary Approaches to Stop Hypertension (DASH) diet program. The DASH diet is an evidence-based nutritional approach designed to help individuals with hypertension manage their condition. The core principles of the DASH diet emphasize increased consumption of vegetables and fruits, dietary fiber (30 grams per day), and essential minerals such as potassium, magnesium, and calcium, while limiting salt intake. The primary goal of the DASH diet is to regulate blood pressure and prevent hypertension-related complications (Suprayitna et al., 2023).

In rural research areas, access to healthcare services for the elderly is often limited due to the presence of only one Posyandu Lansia located at the village center. This geographic barrier poses challenges in accessing healthcare. In urban areas, however, Posyandu Lansia is organized in every neighborhood, ensuring greater accessibility for all elderly residents. According to the research by Supriyanto et al. (2020), out of 25 respondents, 16 elderly individuals did not visit the Posyandu Lansia regularly due to the long distance, negatively affecting their willingness and interest in seeking healthcare services. As a result, many elderly individuals in rural areas are unable to visit the Posyandu Lansia consistently.

5. Conclusion

This study concludes that significant differences exist in the nutritional status of elderly individuals with hypertension in rural and urban areas. Elderly individuals with hypertension in rural areas predominantly exhibit a normal nutritional status, whereas those in urban areas are more likely to fall into the one-degree obesity category. These disparities are closely linked to differences in dietary habits and physical activity levels between the elderly in rural and urban environments.

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