PREVALENCE AND RISK FACTORS OF THE HYPERTENSION OF TRUNYAN VILLAGE, BALI IN 2019

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ABSTRACT

Introduction: Hypertension is the cause of 7.5 million deaths, equivalent to 12.8% of total deaths based on WHO data. Trunyan Village currently has limited access to health services, low public awareness of maintaining personal health and environmental health, and no descriptive or analytical data discussing hypertension prevalence and risk factors. **Methods:** Therefore, this study aims to determine hypertension prevalence and risk factors in Trunyan Village, Bangli. This study used a cross-sectional design, with the subject selection method using simple random sampling and blood pressure status as a dependent variable. The interview was conducted on 55 people, which used a questionnaire. **Result:** Data analyzed used the chi-square test, and the relationship between variables was considered significant with a p-value <0.05. The prevalence of hypertension in Trunyan Village is 52.7%, with female dominance (65.5%) and age ≤50 years (52.7%). There is a significant relationship between hypertension and age (p<0.01; PR=3.50), the habit of consuming sweet foods (p=0.02; PR=0.54), and family history of hypertension (p<0.01; PR=1.91). **Conclusion:** It can be concluded that hypertension has a significant relationship with risk factors for age, habits of consuming sweets foods, and a family history of hypertension. Further research needs to be carried out with a larger sample size to obtain more representative results.

Keywords: Bali, hypertension, prevalence, risk factors, Trunyan village

INTRODUCTION

Hypertension is one of the most critical risk factors for cardiovascular disease and is estimated to cause 12.8% of deaths (WHO, 2020). According to the JNC (Joint National Committee) VII, hypertension is defined as systolic blood pressure value ≥140 mmHg and/or diastolic blood pressure ≥90 mmHg. A non-communicable disease has become a significant health challenge for developing countries and developing economies (Natalia, Diana ; Hasibuan, 2015). Hypertension was a considerable disease because it caused various heart failure complications, ischemic heart disease, left ventricular hypertrophy, renal failure, stroke, retinopathy, and peripheral arteries (intermittent claudication) (Nuraini, 2015).

The World Health Organization stated that the highest prevalence of hypertension sufferers in 2013 was in Africa (46% of the adult population). The lowest was in America (35% of the total adult population). Overall, in high-income countries, hypertension reaches 35% of the total adult population and 40% of the adult population (Pinto & Martins, 2017). Data and Information Center of the Ministry of Forestry of the Republic of Indonesia stated that Indonesia's hypertension sufferers reached 65,048,110 people in 2013. Meanwhile, 840,851 patients with hypertension were detected in Bali (Rohaendi, 2008).

Trunyan is one of the traditional villages in Bali, located in Kintamani. The inhabitants of this village are indigenous Balinese because there are very few migrants living in this village. Trunyan Village still has quite a lot of health problems, such as (1) a limited number of health workers, (2) limited availability of

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health facilities and infrastructure, (3) low public awareness of personal health and environmental health as seen from the habit of littering and the community which still uses the lake to defecate, wash clothes, wash livestock, and even bathe children (4) the absence of landfills and garbage trucks (Gunatama et al., 2017). Besides that, the community is also dominated by the elderly. It is because young people in Trunyan Village tend to migrate outside the village. The lack of access to health services has led most people to use plants to make traditional medicines such as fever, coughs, skin diseases, and even headaches (Sudirga, 2012). People in this village are also unaware of a healthy diet, physical activity, and risk factors for hypertension (Ministry of Health, 2013). There is still limited descriptive and analytic data to discuss the Trunyan Village community's health conditions. Therefore, this study aimed to determine the prevalence and risk factors for hypertension in Trunyan Village.

METHODS

This study used a quantitative descriptive study design to determine the prevalence and risk factors for hypertension in Trunyan Village, Kintamani District, Bangli Regency in 2019. This research was conducted simultaneously with complementary medical service in the Trunyan Village area, Kintamani District, Bangli Regency. The sample size was calculated using the total sampling technique. Every individual who came to the complementary medical service would be included as a research respondent after agreeing to the informed consent during the study period.

The hypertension variable will be obtained by measuring blood pressure, the Joint National Committee (JNC) VII. The respondent's blood pressure was measured twice, and then the recorded value was the average calculation result. The blood pressure measurements will be grouped into hypertension and not hypertension. Respondents were classified as hypertensive if they had ≥140 mmHg of systolic blood pressure and≥90 mmHg of diastolic blood pressure. Other variables, such as patient characteristics and risk factors, were obtained from questionnaires using the interview method. Researchers will give respondents questions and then record their answers on the questionnaire to minimize their understanding of the items. All data were analyzed using a data analysis program. Univariate analysis of proportions was used for respondent characteristics and risk factors variables. The bivariate analysis evaluated the relationship between risk factors and hypertension with a significant p-value<0.05 using a chi-square test. Ethics approval has been obtained from the ethics committee of the Faculty of Medicine, Universitas Udayana. No.757/UN14.2.2.VII.14/LT/2020

RESULT

This study obtained 55 samples that met the inclusion criteria. Based on the respondents' characteristics in table 1, it was found that 19 people (34.5%) were male, while many 36 people (65.5%) were female. Based on the age distribution, 26 people (47.3%) were >50 years old, while 52.7% were ≤50 years old. The prevalence of hypertension sufferers in Trunyan Village, Kintamani District, Bangli Regency is 52.7%.

Table 1. Characteristics of Respondents

Characteristic	N (%)
Sex	
Male	19 (34.5%)
Female	36 (65.5%)
Age	
>50 years old	26 (47.3%)
≤50 years old	29 (52.7%)
Blood pressure	
Hypertension	29 (52.7%)
Normotension	26 (47.3%)

Several risk factors for hypertension were reviewed in this study: obesity, smoking, sweet, salty, fatty foods, consumption of fibrous foods, exercise routines, stress levels, and genetic history. Based on the cross-tabulation result (Table 2), respondents who experienced hypertension were dominated by females aged over 50 years. They did not have a smoking habit, were not obese, did not smoke, did not have the habit of consuming sweet and salty foods, and did not have a family history of hypertension. In addition, most respondents who experienced hypertension had the habit of consuming fatty, fibrous foods, exercising regularly, and under stressful conditions.

Table 2. Relationship between Risk Factor and Blood Pressure

Risk Factor	**Blood Pressure**		**P-*value***	**PR (95% CI)**
	Hyper-tension n (%)	**Normo tension n (%)**		
Sex				
Female	19 (65.5)	17 (65.4)	0.99	0.99 (0.58-1.80)
Male	10 (34.5)	9 (34.6)		
Age				
>50	22 (75.9)	4 (15.4)	<0.01*	3.50 (1.80-6.82)
≤50	7 (24.1)	22 (84.6)		
Obesity				
Yes	14 (48.3)	11 (42.3)	0.65	1.12 (0.68-1.84)
No	15 (51.7)	15 (57.7)		
Smoking				
Yes	4 (50)	4 (50)	0.86	0.94 (0.44-1.97)
No	25 (53.2)	22 (46.8)		
Consumption of Sweet Foods				
Yes	10 (34.5)	17 (65.4)	0.02*	0.54 (0.31-0.95)
No	19 (65.5)	9 (34.6)		
Consumption of Fatty Foods				
Yes	17 (58.6)	22 (84.6)	0.06	0.58 (0.36-0.91)
No	12 (41.4)	4 (15.4)		
Consumption of Fibrous Foods				
Yes	27 (93.1)	23 (88.5)	0.55	1.35 (0.44-4.07)
No	2 (6.9)	3 (11.5)		
Risk Factor	**Blood Pressure**		**P-*value***	**PR (95% CI)**
	Hyper-tension n (%)	**Normo tension n (%)**		
Consumption of Salted Foods				
Yes	14 (48.3)	15 (57.7)	0.48	0.83 (0.50-1.38)
No	15 (51.7)	11 (42.3)		
Exercise Routine				
Yes	18 (62.1)	16 (61.5)	0.96	1.01 (0.60-1.69)
No	11 (37.9)	10 (38.5)		
Stress				
Yes	19 (65.5)	16 (61.5)	0.75	1.08 (0.63-1.85)
No	10 (34.5)	10 (38.5)		
Family History				
Yes	14 (48.3)	4 (15.4)	<0.01*	1.91 (1.20-3.04)
No	15 (51.7)	22 (84.6)		

**significant relationship with chi-square test (p-value <0.05)*

Risk factors that had a significant relationship with hypertension were the respondent's age ($p<0.01$), the habit of consuming sweet foods ($p=0.02$), and family history of hypertension ($p<0.01$).

DISCUSSION

This study involved 55 respondents as the research sample. The prevalence of hypertension is 52.7%, with the dominance of the sample of women with hypertension compared to men. This study showed that hypertension status is more dominant in female respondents (65.5%) compared to male respondents (34.5%). This is in line with the RISKESDAS 2007 and 2013, which show that hypertension is more common in women. The 2007 and 2013 RISKESDAS results compared the prevalence of hypertension in females and males, respectively, namely 31.3%: 22.8% for 2007, and 31.9%: 28.8% for 2013 (Ministry of Health, 2013). However, Widia and Sudhana's study in 2013 in Klungkung Regency Bali showed contradictory results. In this study, it was found that the prevalence of hypertension in men was more (63.9%) than in women (36.1%) (Widia, 2015). Based on the bivariate analysis, the relationship between the risk of hypertension and sex showed a p-value = 0.99, which means there was no statistically significant relationship. Similar results were also shown by research on the correlation between the prevalence of hypertension and gender by Adnyani and Sudhana with 146 respondents ($p=0.24$) and research in Palembang with 91 respondents ($p=0.22$) (Adnyani & Sudhana, 2014).

Sex has an essential role in blood pressure regulation that men have a higher risk than women at a productive age. However, a woman's risk will increase at the age ≥45 years of menopause. During a productive period, women have high estrogen hormone levels, which increases High-density Lipoprotein (HDL) levels. Nevertheless, at menopause, there is a decrease in the hormone estrogen, an increase in visceral androgens, and adipose, causing an increase in inflammatory cytokines such as TNF-α and NF-kB, which will lead to increased renal vascular resistance and hypertension (Widia, 2015).

This study results showed that the prevalence of hypertension is higher in the age group >50 years old (75.9%) than ≤50 years (24.1%). Based on the bivariate analysis, the relationship between the risk of hypertension and age showed a p-value<0.01, which means statistically significant. The prevalence ratio (PR) value of 3.50 indicated that the risk of hypertension in older individuals would be 3.5 times higher than in young people. The same results of a case-control study with 106 respondents in Rembang Regency that those over 60 years of age have a risk of hypertension 11.34 times greater than those under 60 years of age (Kartikasari et al., 2012). Azhari's research also supported this result in 2017 at the Public Health Center of Makrayu Palembang. That study showed the relationship between age and hypertension prevalence ($p=0.01$) (Azhari, 2017). Hartanti and Mifbakhuddin's research in 2015 also stated a significant relationship between the risk of hypertension and age in 22 respondents in Ringin Village ($p<0.01$) (Hartanti & M, 2015). Research in Sidemen Village Bali with 146 respondents also showed a significant relationship between hypertension and age (p-value=0.05). The increase in prevalence was directly proportional to the increase in age is influenced by a decrease of arteries elasticity and a reduction in regulation of the baroreceptor reflex (Adnyani & Sudhana, 2014).

Table 3 showed that in the hypertension group, 48.3% were obese (p-value=0.65, which means no statistically significant relationship between the risk of hypertension and obesity. Sulastri, Elmatris, and Ramadhani's research in 2012 showed a different result with a p-value<0.05 (Sulastri et al., 2012). However, Rohkuswara and Syarif's study in 2016 stated that respondents with obesity had a risk of 1.7 times for suffering from grade II hypertension than individuals who are not obese after controlling for age, family history hypertension, and physical activity (Rohkuswara & Syarif, 2017).

Research in Palembang also shows similar results: respondents heavily overweight and obese have a greater risk of developing hypertension, which is 2.5 times and 1.9 times higher (Kartikasari et al., 2012). Based on the theory, individuals weighing more than 20 pounds based on the calculation of ideal body weight will have a more significant blood pressure of around 2-3 mmHg than individuals with ideal body weight (Kaplan, 1994). Obese individuals have an increased need for oxygen to transport nutrients to body tissues. Therefore, there is compensation for increased pressure on the artery walls.

This study indicated that the normotension and hypertension groups have the same number based on the smoking habit. Based on the bivariate analysis, the p-value was 0.86 ($p>0.05$), which means no statistically significant relationship between smoking history and hypertension risk. This study contradicted Narayana and Sudhana's research in the Pekutatan Community Health Center in 2013. It stated that Respondents who smoke have a higher risk of hypertension than respondents who do not smoke. (Narayana, 2015). Umbas, Tuda, and Numansyah's research at Kawangkoan Health Center also stated a significant relationship between risk of hypertension and smoking ($p=0.01$) (Umbas, 2019). The nicotine in cigarettes can affect a person's blood pressure, either through the formation of atherosclerotic plaques (Amanda & Martini, 2018).

This study found no relationship between the risk of hypertension and consumption of fatty foods (p-value=0.06). This study's results contradicted the research conducted by Manawan in Minahasa Regency with a p-value<0.01 (Manawan et al., 2016). High saturated fat intake will trigger dyslipidemia, which can cause atherosclerosis increasing resistance of the walls of blood vessels, which later triggers an increase in heart rate, leading to hypertension.

According to the results of the statistical tests, sweet foods were seen to have a relationship with the onset of hypertension in Trunyan Village. This study showed a significant relationship between the risk of hypertension and consuming sweet foods (p-value=0.02). This study's results contradicted the research conducted by Rawasiah, Wahiduddin, and Rismayanti in 2014 at the Pattingallong Health Center. The study showed that 52.8% of people with hypertension consumed excess sweet food, with a p-value =0.41 (Rawasiah et al., 2014). Consuming foods with high fructose doses (≥74 grams/day or the equivalent of 2.5 bottled sweet drinks per day) will result in a higher energy intake and cause microvascular changes (Jalal et al., 2010).

The association between added sugar intake and blood pressure remained significant even after controlling confounding factors that could influence blood pressure increase, such as physical activity, BMI, total calorie intake, and antihypertensive drugs (Mansoori et al., 2019). A meta-analysis study showed that higher sugar intake significantly increased 7.6 mmHg of systolic blood pressure and 6.1 mmHg of diastolic blood pressure (Te Morenga et al., 2014). Raben et al. showed that consuming sucrose for ten weeks increased 3.8 mmHg of systolic blood pressure and 4.1 mmHg of diastolic blood pressure (Raben et al., 2002). There is a recommendation from the Dietary Approaches to Stop Hypertension (DASH) to maintain heart health by limiting added sugar intake to nine teaspoons/week for individuals following a 1600 kcal diet.

Based on fiber foods consumption, this study showed no significant relationship between the risk of hypertension and the consumption of fibrous foods with a p-value=0.55. Kholifah et al. (2015) showed that consuming fiber foods had a negative association with systolic pressure and had no relationship with diastolic pressure ($p>0.05$) in hypertensive patients (Kholifah et al., 2015). Prakosa's research with 72 respondents showed that the frequency of fruit and vegetable consumption was relatively high (2-6 times/week) does not have a statistically significant relationship with the prevalence of hypertension. In theory, it is stated that fruits containing flavonoids and potassium have a role in improving endothelial function and controlling the heart's electrical activity to lower blood pressure (Prakosa et al., 2014).

This study showed no relationship between the risk of hypertension and salty foods' consumption (p-value=0.48). A case-control study in Karanganyar Regency with 310 respondents indicated that individuals who habitually consume salty foods risk hypertension by 3.95 times higher than individuals who do not have this habit (Sugiharto et al., 2007). According to several studies, a decrease in sodium intake of approximately 1.8 grams/day can reduce blood pressure by four mmHg (systolic) and two mmHg (diastolic). High salt intake will cause the kidneys to respond by increasing salt excretion through urine. However, sodium excretion exceeding the kidney's ability threshold will cause retention and increase intravascular volume. Besides that, there will also be an increase in the antidiuretic hormone release, indirectly increasing blood pressure (Ramadhini & Suryati, 2018).

The risk factor for hypertension based on exercise routine showed p-value=0.96, which means no significant relationship. The results of this study indicated that respondents who regularly exercise have high blood pressure. This condition is caused by respondents who routinely exercise are dominated by those over 50 years of age and have a family history of hypertension. Aris Sugiharto et al. showed a statistically significant relationship between exercise routines and hypertension prevalence (p-value<0.01). Individuals who do not regularly exercise have a 4.73 higher risk of developing hypertension than individuals who routinely exercise (Sugiharto et al., 2007). The study conducted at the Petang Health Center, with 112 elderly respondents, also showed results contrary to this study. The study found that the elderly who did not regularly exercise had a risk of suffering from hypertension 1.42 times greater than the elderly who regularly (p-value=0.02) (Bin Mohd Arifin & Weta, 2016). Physical activity is associated with reducing obesity and triggering new capillary vessels (Kartikasari et al., 2012).

Based on the stress variable, it was found that respondents who experienced stress had more hypertension (65.5%) compared to respondents who did not experience stress. This was in line with Ajiningtyas et al., which showed that 20% of respondents with mild stress category experienced hypertension, 90.9% of respondents with moderate stress category experienced hypertension, and 92.3% of respondents experienced severe stress with hypertension (Ajiningtyas, 2019). The same results were obtained from Rusnotoa and Hermawan's research, which involved 81 respondents in which 22 respondents in the moderate work stress category and 43 respondents in the severe work stress category experienced hypertension. (Hermawan et al., 2018).

The relationship between stress and hypertension had a p-value=0.75, which means no significant association. A study in Padang with 64 respondents showed a positive correlation between stress levels and hypertension degrees. Higher stress levels will cause an increase in the degree of hypertension ($p<0.01$; $r=0.48$). The physiological stress response will increase the pulse rate, hormone adrenaline release, and blood pressure (Saleh et al., 2014).

The study results on the variable family history of hypertension showed that 48.3% of respondents who had a family history of hypertension had hypertension ($p<0.01$). This was also supported by Adam et al., which involved 89 respondents, showing that 57.3% of respondents who had hypertension had a family history of hypertension (p-value<0.01) (Adam et al., 2018). Therefore, a family history of hypertension has a significant relationship with hypertension. The PR value of 5.13 indicates that a person with a family history of hypertension will have a five times greater risk of hypertension. A similar study also showed that family history was one of the hypertension risks (p<0.01; OR= 6.29) (Sugiharto et al., 2007). Shep's study stated that individuals with one parent who suffers from hypertension have a 25% risk of developing hypertension. However, individuals with both parents who have hypertension will have a 60% risk of developing hypertension (Sheps, 2005).

CONCLUSION

The prevalence of hypertension in Trunyan Village was 52.7%. The risk factors that have a statistically significant relationship with hypertension are age, habitually consuming sweet foods, and a family history of hypertension. This study has limitations due to the small number of samples and the interview method to assess risk factors in respondents having the possibility of bias because it is subjective and without further examination. Other researchers who wish to research in similar fields are advised to use the case-control method and increase the number of samples to be more representative.

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111

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