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Article

Analysis of Factors Associated with the Risk of Hypertension in Aceh Embarkation Hajj Pilgrims

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Abstract: Hypertension is one of the health problems, especially for hajj pilgrims, because hypertension is one of the entry points or risk factors for diseases such as heart disease, kidney failure, diabetes mellitus, and stroke. In 2024, cases of hajj pilgrims suffering from hypertension were 1,822 people (38.66%). This study aims to analyze the factors related to the incidence of hypertension in hajj pilgrims at the Aceh Embarkation. Quantitative research with a Cross Sectional Study approach using secondary data. The population is all hajj pilgrims at the Aceh Embarkation in 2024 totaling 4,713 people. The research sample is the total population. Bivariate data analysis with the chi-square test and multivariate with logistic regression. The results of the study obtained variables that have a significant relationship with hypertension are age (OR = 3.5; 95% CI: 3.08–3.95; p-value = 0.0001), family history (OR = 2; 95% CI: 1.74-2.25; p-value = 0.0001). Obesity (OR = 1.3; 95% CI: 1.14–1.44; p-value = 0.0001), diabetes (OR = 1.5; 95% CI: 1.28–1.75; p-value = 0.0001) and poor physical fitness OR = 1.7; 95% CI: 1.48–1.89; p-value = 0.0001). The conclusion of this study is that the age variable is the most dominant variable with the incidence of hypertension in the Aceh Embarkation Hajj pilgrims.

Keywords: factors, risks, hypertension, Hajj pilgrims

1. Introduction

The pilgrimage journey is one of the pillars of Islam that must be performed once in a lifetime. This worship is carried out in the month of Dzulhijjah and involves millions of pilgrims from various countries gathering in Mecca. However, the pilgrimage, which requires optimal physical condition, can pose health risks, including hypertension [1].

Hypertension is a health issue that often does not show clear symptoms, which is why it is often referred to as a "silent disease [2]. Hypertension is a health issue that often does not show clear symptoms, which is why it is often referred to as a "silent disease (WHO, 2020). Common symptoms often experienced by individuals with hypertension include headaches, fatigue, discomfort in the neck, dizziness, irregular heartbeat, and tinnitus [3].

The global data indicates that the prevalence of hypertension among Hajj pilgrims in 2023 reached approximately 12.2% of 285,467 participants involved in 26 studies between 1993 and 2018 [4]. In Indonesia, around 34% of the 221,000 Hajj pilgrims who departed in 2023 experienced hypertension, showing an increase from previous years [5]. At the Aceh embarkation, the prevalence of hypertension among pilgrims has significantly increased in recent years, with the figure reaching 52.37% in 2023 [6].

In 2022, the total number of Hajj pilgrims from the Aceh embarkation was 2,023, with a high-risk category (risti) consisting of 546 males (27%) and 930 females (46%), resulting in

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a total of 1,386 high-risk pilgrims or 68.51%. Regarding health conditions, the number of pilgrims with hypertension was 735 (36.33%) and those with a history of diabetes mellitus was 651 (32.18%). The number of pilgrims deemed unfit to fly was [6].

In 2024, the total number of pilgrims from the Aceh embarkation was 4,713, with the number of male pilgrims slightly decreasing to 1,480 (38.17%), while the number of female pilgrims increased to 2,397 (61.83%), resulting in a total of 3,877 pilgrims or 100%. Regarding health conditions, the number of pilgrims with hypertension decreased to 1,822 (38.66%), while the number of pilgrims with a history of diabetes mellitus increased to 2,733 (57.99%). The number of pilgrims deemed unfit to fly increased to 3 people [7].

In 2024, data from Siskohatkes recorded 15 cases of death among Hajj pilgrims from the Aceh embarkation in Saudi Arabia, with diagnoses including Cardiogenic Shock, Severe Sepsis with Septic Shock, Septic Shock, ARDS, Cardiac Arrhythmia, and Other Shock. These diagnoses show a significant correlation with hypertension, which, if unmanaged, can worsen cardiovascular conditions, increase the risk of cardiogenic shock, and lead to serious complications such as severe sepsis [7].

This study aims to analyze the factors of age, gender, family history, obesity, history of diabetes mellitus, and physical fitness related to the incidence of hypertension among Hajj pilgrims departing from the Aceh embarkation in 2024. By understanding these risk factors, it is hoped that more effective prevention and intervention strategies can be developed to reduce the burden of hypertension on Hajj pilgrims and improve their health quality during the preparation and execution of the Hajj pilgrimage.

2. Literature Review

Hypertension, or high blood pressure, is a chronic condition in which the pressure against the arterial walls increases. A person is said to have hypertension if their systolic blood pressure exceeds 140 mmHg and diastolic blood pressure exceeds 90 mmHg, as evidenced by two measurements taken five minutes apart in a calm state [8].

Hypertension is a serious health issue that can lead to severe complications such as heart disease and stroke. Hajj pilgrims with a history of hypertension have a higher risk of comorbidities and are 1.85 times more likely to experience death compared to those without a history of hypertension [9].

Risk factors for hypertension can be classified into two main categories: non-modifiable factors and modifiable factors. Non-modifiable factors include age, gender, family history, and ethnicity, which influence an individual's tendency to develop hypertension. Meanwhile, modifiable risk factors include obesity, diabetes, lack of physical activity, smoking habits, salt consumption, fat intake, alcohol consumption, and stress. By adopting a healthier lifestyle, individuals can mitigate these risk factors and potentially reduce the risk of hypertension over time [10]

3. Proposed Method

This quantitative research employs a Cross Sectional Study approach using secondary data, specifically health data of pilgrims in 2024. The population in this study consists of all pilgrims from the Aceh embarkation in 2024 aged ≥ 18 years, totaling 4,713 individuals. The research sample is the entire population. Bivariate data analysis will be conducted using chi-square tests and multivariate analysis using logistic regression.

4. Results

Table 1. Descriptive Analysis

Variable	n	%
Hypertension		
Hypertension	1831	38,8
Non-hypertension	2882	61,2
Age		
≥ 60 years	1905	40,4
< 60 years	2808	59,6
Gender		
Male	1831	38,8
Female	2882	61,2
Family History		
Yes	1301	27,6
No	3412	72,4
Obesity		
Obesity/ overweight	2631	55,8
Not obese	2082	44,2
Diabetes Mellitus		
Present	785	16,7
Absent	3928	83,3
Physical fitness		
Not Good	2872	60,9
Good	1841	39,1

Based on Table 1 shows that 38.8% of respondents suffered from hypertension, 61.2% did not have hypertension, 59% of respondents were <60 years old, 61.2% of respondents were female, 72.4% had no family history of hypertension, 55.8% of respondents were obese/overweight, 83.3% did not suffer from diabetes and 60.9% of respondents had poor physical fitness.

Table 2 Analysis of the Relationship between Independent Variables and Hypertension among Hajj Pilgrims from the Aceh Embarkation

Variable	Hypertension				Total		OR (95%CL)	P value
	Hypertension		No Hypertension					
	n	%	n	%	n	%		
Age								
≥ 60 years	1073	56,3	832	43,7	1905	100	3.5 (3.08 – 3.95)	0,0001
< 60 years	1587	57,4	770	42,6	2763	100		
Gender								
Male	691	37,7	1140	62,3	1831	100	0,9 (0,82-1,05)	0,224
Woman	1140	39,6	1742	60,4	2882	100		
Family History								
Yes	661	50,8	6640	49,2	1301	100	2 (1,74-2,25)	0,0001
No	1170	34,3	2242	65,7	3412	100		
Obesity								
Obesity/ Overweight	1090	41,4	1541	58,6	2631	100	1,3 (1,14-1,44)	0,0001
Not obese	741	35,6	1341	64,4	1082	100		
Diabetes								
Yes	369	47,0	416	53,0	785	100	1,5 (1,28-1,75)	0,0001
No	1462	37,2	2446	62,8	3928	100		

Physical fitness								
Not good	1250	43,5	1622	56,5	2872	100	1,7 (1,48-1,89)	0,0001
Good	581	31,6	1260	68,4	1841	100		

Based on Table 2, the bivariate analysis shows that the variables significantly associated with hypertension are age (OR=3.5; 95% CI: 3.08–3.95; p-value = 0.0001), family history (OR=2; 95% CI: 1.74-2.25; p-value = 0.0001). Obesity (OR=1.3; 95% CI: 1.14–1.44; p-value = 0.0001), diabetes (OR=1.5; 95% CI: 1.28–1.75; p-value = 0.0001), and poor physical fitness (OR=1.7; 95% CI: 1.48–1.89; p-value = 0.0001).

Table 3. Multivariate Analysis $p < 0.05$

Variable	p-value	OR	95% CI		
Age	0,0001	3,94	3,448	-	4,510
Family History	0,0001	2,47	2,152	-	2,855
Obesity	0,0001	1,52	1,341	-	1,739
Diabetes Mellitus	0,0001	1,48	1,260	-	1,755
Physical fitness	0,0001	1,44	1,267	-	1,651

Based on Table 3, it explains the multivariate analyzed variables, namely the most dominant factor related to hypertension among Hajj pilgrims from the Aceh embarkation. The statistical test results indicate that the most dominant factor associated with hypertension is age ≥ 60 years (OR=3.9; 95%CI = 3.448 – 4.510; p-value = 0.001), thus the risk of suffering from hypertension is almost 4 times more dominant compared to other variables.

5. Discussion

1. Relationship Between Age and Hypertension Incidence

The results of this study indicate that there is a relationship between age and the incidence of hypertension among Hajj pilgrims. With an Odds Ratio (OR) of 3.5, this means that Hajj pilgrims over the age of 60 have a 3.5 times higher risk of developing hypertension compared to those aged 60 and below. The results show that age is a significant risk factor for the incidence of hypertension among Hajj pilgrims, where the older a person is, the higher their risk of hypertension.

A study in China showed that the risk of developing systolic hypertension continues to increase with age, from 35 to 79 years, with a significant peak occurring in middle-aged individuals [11]. In Germany, the prevalence of hypertension among individuals aged 65 to 94 years was recorded at 73.8%, with higher figures in older age groups [12].

A study in Pakistan found that the highest prevalence, at 32%, occurred in the age group of 38 to 47 years, while this prevalence significantly decreased in older age groups [13]. A study in Switzerland reported that over a ten-year period, about 26.8% to 30.3% of adults aged 35 to 75 suffered from hypertension, with age being a significant risk factor [14].

Although the research indicates that age is an important factor in the incidence of hypertension, it is also important to consider that lifestyle factors, such as levels of physical activity and obesity, play a crucial role in the development of hypertension across different age groups.

2. The Relationship Between Gender and the Incidence of Hypertension

The results of this study indicate that there is no relationship between gender and the incidence of hypertension among Hajj pilgrims. With an Odds Ratio of 0.9, it can be concluded that men have a 10% lower risk of hypertension compared to women. However, since this value is close to 1 and the results are not significant, this indicates that gender is not a major risk factor in the incidence of hypertension among Hajj pilgrims.

Men have a higher overall prevalence of hypertension compared to women; however, women experience a significant increase in menopause, which contributes to the higher rates of hypertension in older age groups [15]. A study noted that 39% of women and 45% of men

experienced hypertension over 26 years, with normal high blood pressure being a stronger indicator for women [16].

Current guidelines do not support different blood pressure targets for men and women, although differences in prevalence and hypertension outcomes have been observed [17]. Women are also underrepresented in clinical trials, leading to a lack of sex-specific data regarding treatment effectiveness [18].

In terms of hypertension risk, women experience a faster increase in early adulthood, while men show a slower but longer-lasting increase [11]. The Kora-age study also indicated that awareness and treatment of hypertension are influenced by gender, with men having a slightly higher prevalence compared to women [12].

Overall, although this study highlights the differences based on gender in the incidence of hypertension, there is a need for more inclusive studies to better understand these differences and improve hypertension management strategies.

3. The Relationship Between Family History and the Incidence of Hypertension

The results of this study indicate a relationship between family history of hypertension and the incidence of hypertension among Hajj pilgrims. Pilgrims with a family history of hypertension have a risk that is 2 times higher for developing hypertension compared to those without a family history of hypertension. This finding suggests that having a family history of hypertension is a significant factor in increasing the risk of hypertension among Hajj pilgrims.

Several studies have shown a strong correlation between family history and hypertension, with p-values indicating significance [19]. Research conducted in various populations, such as in Northern Sumatra and Ternate, emphasizes that family history is a common risk factor across all age groups [20].

Family history also interacts with lifestyle factors, such as diet and physical activity, which can influence the risk of hypertension. Awareness of family history can help individuals take preventive health actions, such as regularly checking blood pressure and making lifestyle changes [19]. On the other hand, while family history is an important factor, other elements such as diet and activity also play significant roles, necessitating a multifactorial approach to prevent hypertension [20].

4. The Relationship Between Obesity and the Incidence of Hypertension

Obesity is a major risk factor for hypertension, especially among Hajj pilgrims, due to the complex interaction between excess weight and blood pressure regulation. The results of this study indicate a relationship between obesity and the incidence of hypertension among Hajj pilgrims. Pilgrims who are obese have a risk that is 1.3 times higher for developing hypertension compared to those who are not obese. This finding reinforces that obesity acts as a risk factor for hypertension among Hajj pilgrims, although the increase in risk is not as significant compared to other factors such as diabetes mellitus..

Obesity is widely recognized as a risk factor for hypertension. For instance, a study in South Asia showed that abdominal obesity can increase the risk of hypertension by 31 to 105% compared to non-obese individuals [21]. Research involving older adults also revealed a strong relationship between obesity and hypertension, with a p-value of 0.000, indicating that obesity is a significant risk in this demographic group [22].

Although there is often a correlation between obesity and hypertension, some studies also indicate that other factors such as lifestyle and genetic predisposition influence the risk of hypertension. In some populations, obesity can even serve as a protective factor against hypertension, highlighting the importance of a deeper and more nuanced understanding of this relationship [22].

A longitudinal study in Northern China found that individuals who remained obese over time had a 30.10% increased risk of hypertension [23]. Research in the United States also showed that different patterns of obesity, such as abdominal and complex obesity, significantly increase the risk of hypertension, with an odds ratio reaching 3.28 for complex obesity [24].

These findings highlight the complexity of the relationship between obesity and hypertension, indicating that while obesity is a risk factor, its impact can vary depending on demographic factors and current lifestyle.

5. The Relationship Between Diabetes Mellitus and the Incidence of Hypertension

The results of this study indicate that there is a relationship between diabetes mellitus and the incidence of hypertension among Hajj pilgrims. With an Odds Ratio (OR) of 1.5, pilgrims with diabetes mellitus have a 50% higher risk of developing hypertension compared to those without diabetes mellitus. This result can be interpreted that diabetes mellitus contributes as a risk factor for hypertension among Hajj pilgrims.

The prevalence of hypertension in patients with type 2 diabetes mellitus (T2DM) is up to three times higher compared to those without diabetes [25]. Research shows that individuals with both diabetes and hypertension have a 1.7 times higher risk of cardiovascular disease (CVD) compared to those without either condition [26]. The combination of diabetes and hypertension can accelerate the occurrence of cardiovascular complications, including kidney dysfunction [27].

Regular health check-ups have a significant impact on the incidence of both conditions, with increased screening related to lower rates of hypertension and diabetes [28]. Therefore, effective management of diabetes and hypertension is crucial to reduce the risk of CVD and improve patient health outcomes [26].

Although the coexistence of diabetes and hypertension can pose serious health risks, some studies suggest that increased awareness and the implementation of treatment strategies can reduce this risk. This highlights the importance of proactive health management in addressing these issues.

6. The Relationship Between Physical Fitness and the Incidence of Hypertension

The results of this study indicate that there is a relationship between physical fitness and the incidence of hypertension among Hajj pilgrims. With an Odds Ratio (OR) of 1.7, this means that Hajj pilgrims with poor physical fitness have a 1.7 times higher risk of developing hypertension compared to those with good physical fitness. This study shows that poor physical fitness is a risk factor for the incidence of hypertension among Hajj pilgrims.

A case-control study shows that low physical activity significantly increases the risk of hypertension, with an Odds Ratio (OR) of 5.500, emphasizing that physical activity is an important lifestyle factor influencing hypertension risk [29]. Among Korean adults, lower physical strength is associated with higher blood pressure, underscoring the importance of maintaining physical fitness to prevent hypertension [30].

Additionally, cardiorespiratory fitness plays a crucial role in reducing the risk of hypertension. Long-term studies show that an increase of one standard deviation in age-appropriate cardiorespiratory fitness is inversely related to the incidence of hypertension, with a hazard ratio of 0.79 [31].

Although evidence strongly supports the role of physical fitness in reducing the risk of hypertension, it is important to note that other lifestyle factors, such as diet and stress levels, also play a crucial role in blood pressure management. This study has limitations in that the analysis focuses solely on factors related to the incidence of hypertension among Hajj pilgrims from the Aceh embarkation.

This limitation implies difficulties in generalizing the research findings to pilgrims from other embarkations or to a broader population. Variations in demographic characteristics, culture, and health behaviors among different embarkations may influence the prevalence and risk factors of hypertension that may not be measured in this study.

5. Conclusions

The conclusion of the study is that there is a relationship between age, family history, obesity, diabetes mellitus and physical fitness with hypertension. The age variable is the most dominant variable with the incidence of hypertension in the Aceh Embarkation Hajj pilgrims. It is expected that the health service and its staff can prevent the incidence of hypertension in the Aceh Embarkation Hajj pilgrims, so what must be done is to explain the importance of taking medication for pilgrims who already have a history of hypertension, recommend consumption of low-salt, high-fiber, and potassium-rich foods such as fruits and vegetables, recommend light exercise such as walking before leaving so that the body gets used to physical activity

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