

## Conference Paper

# Factors Related to the Incidence of Hypertension Among Prospective Pilgrims in Medan, Indonesia During Embarkation Period 2016

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### Abstract

Hypertension is a silent, invisible killer that rarely causes symptoms. This study was designed to determine the predominant risk factors of hypertension among prospective pilgrims in Medan, Indonesia during embarkation period 2016 that took time less than 24 hours. Study of possible risk factors for hypertension conduct in Medan, Indonesia during embarkation period using secondary data obtained from Integrated Computerized Hajj Health System. Secondary data collected from involved a total 6.597 prospective pilgrims as the eligible subject. The incidence of hypertension among prospective pilgrims in Medan, Indonesia (26.2%) is higher than its prevalence (25.8%) and in North Sumatera (24.7%). Chi-Square bivariate analysis with Odds Ratio resulted in the incidence of hypertension related to age, gender, education, work, diabetes mellitus, and overweight/obesity. Logistic regression analysis exhibited diabetes Mellitus disease (OR=1.918 [95% CI: 1.613-2.280] p=0.001) as the predominant risk factor of hypertension after being controlled by age, overweight/obesity, gender, education, and work. These results indicated that optimal strategy needed to reduce modifiable risk factors of hypertension by carrying out the medical examination for prospective pilgrims earlier than nowadays, e.g., 1-2 years before embarkation period since the results expected of behavior changes to prevention and control of hypertension. Health officer should pay more attention to those with age  $\geq 60$  and diabetes melitus to prevent the incidence of hypertension in Arab Saudi.

**Keywords:** hypertension, Integrated Computerized Hajj Health System, risk factor, odds ratio.

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## 1. Introduction

Hypertension is the third leading cause of death after stroke and tuberculosis, reaching 6.7% of the mortality population at all ages in Indonesia [1]. Long-term hypertension can cause damage to the kidneys, coronary heart disease and stroke, premature death and dysfunction [2]. Hypertension is the leading cause of cardiovascular disease (CVD) that accounts for 31% of deaths worldwide [3]. CVD is also the leading cause of death rate for pilgrims, reaching 23.8% of all pilgrims in Saudi Arabia [4], 41.59% death of pilgrims [5]

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and also 58.8% death of Medan, Indonesia pilgrims in 2016 [6]. Indonesia Health Ministry [5] also revealed 45.16% of hajj pilgrims diagnosed for hypertension.

Over 1 billion people are living with hypertension. In 2008, globally, the overall prevalence of hypertension in adults aged 25 and above was around 40%. It was highest in the African Region (46%) and lowest in the Region of the Americas (35%), In the South-East Asia Region, 36% of adults have hypertension [7]. In 2007, the prevalence of hypertension in Indonesia was 31.7% with the highest in South Kalimantan (39.6%) and the lowest in West Papua (20.1%). In 2013, its prevalence was decreased to 25.8%, highest in Bangka Belitung (30.9%), and lowest in Papua (16.8%) [2]. In North Sumatera, the prevalence of hypertension was 24.7% in 2013 [8]. The pilgrim proportion who had circulation disease group that generated from Integrated Computerized Hajj Health System was 54.02% in 2016, increased sharply from the previous year as 33.75% [6].

In most cases, the cause of hypertension not known. It usually doesn't have symptoms and is called "the silent killer." Conditions that are known to increase the risk of getting hypertension was described as risk factors of hypertension [9]. It falls into two categories, unmodifiable and modifiable [10]. The purpose of this study was to determine the predominant risk factors of hypertension among prospective pilgrims in Medan, Indonesia during embarkation period 2016. The embarkation period took time less than 24 hours, begun when prospective pilgrims enter Hajj Dormitory until flight time to Arab Saudi.

## 2. Methods

The was a secondary data analysis study of possible risk factors for hypertension was conducted in Medan, Indonesia during embarkation period using secondary data obtained from Integrated Computerized Hajj Health System. Data collected from the final report that showed health examination result from 6.597 prospective pilgrims as an elective subject from all districts in North Sumatera in 2016. The exclusion criteria included those who were not able to fly to Arab Saudi based on the examination result. Integrated Computerized Hajj Health System-generated data on age, gender, education, and work as unmodifiable risk factors. Smoking, diabetes mellitus, overweight/obesity, and hypercholesterolemia became modifiable risk factors. Data on the system resulted from an inspection report during the embarkation and pre-embarkation period. Age, gender, education, and work were started using letters, but the smoking habit code into TRUE/FALSE in the system. Diseases were coded based on ICDX as I10-I15 for hypertension, E10-E14 for Diabetes Mellitus, E66 for overweight/obesity and E78.0-E78.5 for hypercholesterolemia. Incidence status of hypertension was obtained from the cause of outpatient and inpatient report during the embarkation after being inputted into the system.

The data collected was analyzed, and findings described regarding proportions and their 95% confidence intervals. Univariate analysis was carried out separately for each factor. Bivariate analysis using Chi-square method was carried to test the differences between each element and the incidence of hypertension with Odds Ratio. Multivariate analysis using logistic regression analysis was taken to determine the predominant risk

factors of hypertension among prospective pilgrims. The probability level of less than 0.05 considered significant.

### 3. Results

The study revealed that 26.2 % of subjects had diagnosed as hypertension. Among 6.597 items, 32.8% of them were  $\geq 60$  years old, 39.8 % were male, 48.3% educated in middle level, 44.3% were formal workers, 8% were smokers, almost 10% diagnosed to Diabetes Mellitus, 1.5% were obesity or overweight and 5.3% diagnosed to hypercholesterolemia (Table 1). Age group  $\geq 60$  had a risk to be attacked by hypertension 1.98 times higher compared to age group  $< 60$  (95% CI: 1.767-2.217) and statistically significant with  $p=0.001$ . The result of the bivariate analysis also indicated gender, education level, work, diabetes melitus, and overweight/obesity showed substantial differences between each factor and the incidence of hypertension (Table 2). The result also indicated current smoking habit and hypercholesterolemia did not show significant differences between each element and the prevalence of hypertension (Table 2).

Multivariate analysis using logistic regression analysis exhibited diabetes melitus disease as the predominant risk factor of hypertension after being controlled by age, overweight/obesity, gender, education, and work. Prospective pilgrims with diabetes melitus had risk 1.918 times (95% CI: 1.613-2.280,  $p=0.001$ ) higher than those who not diagnosed as diabetes melitus after being controlled by age, overweight/obesity, gender, education, and work. Also, those with age  $\geq 60$  years had risk 1.787 times (95% CI: 1.568-2.036,  $p=0.001$ ) after being controlled by overweight/obesity, gender, education, and work.

As a result, the incidence of hypertension among prospective pilgrims in Medan, Indonesia (26.2%) is higher than its prevalence in Indonesia (25.8%) and in North Sumatera, Indonesia (24.7%) [8]. In this study, the more senior age group shows a higher risk to the incidence of hypertension. WHO ([7]) revealed that the prevalence of hypertension is higher in men than women in the world, but the prevalence of hypertension in women tends to be higher than for men in Indonesia [8]. In this study, female and male had a similar risk to hypertension and statistically significant.

A higher level of education associated with greater awareness of health and diseases. Multiple studies have shown that training significantly reduces the prevalence of illness [12]. Amu [13] reported that low education level had contributed to the risk of hypertension as an advanced study to Basic Health Researches 2013. In this study, the risk of prospective pilgrims with low education level was 1.6 times higher than those with high education level. Work as social determinants have an impact on behavioral risk factors and in this way influence the development of hypertension [11]. This study shows that work associated with the incidence of hypertension.

Early detection and treatment of hypertension and other risk factors, as well as public health policies that reduce exposure to behavioral risk factors, have contributed to the gradual decline in mortality due to heart disease and stroke in high-income countries as conducted Finland since 1972. Within five years, many positive changes already observed in the form of dietary changes, improved hypertension control, and smoking reduction. Accordingly, a decision was made to expand the interventions nationally.

TABLE 1: Univariate analysis.

Variable	Number	%
<b>Hypertension</b>		
No	4.871	73.8
Yes	1.726	26.2
<b>Age</b>		
< 60	4.435	67.2
≥ 60	2.162	32.8
<b>Gender</b>		
Female	3.969	60.2
Male	2.628	39.8
<b>Education level</b>		
High	1.595	24.2
Middle	3.187	48.3
Low	1.815	27.5
<b>Work</b>		
Not working	2.044	31.0
Informal	1.352	20.5
Formal	2.924	44.3
Retired worker	277	4.2
<b>Current smoking habit</b>		
No	6.064	91.9
Yes	533	8.1
<b>Diabetes Melitus</b>		
No	5.961	90.4
Yes	636	9.6
<b>Overweight/Obesity</b>		
No	6.498	98.5
Yes	99	1.5
<b>Hypercholesterolemia</b>		
No	6.249	94.7
Yes	348	5.3

Now, some 35 years later, the annual cardiovascular disease mortality rate among the working age population in Finland is 85% lower compared to the standards in 1977 [11]. In this study, however, current smoking habit contributed a protective effect to the risk of hypertension (OR=0.923[95% CI: 0.752-1.133, p=0.475]). Potential sources of bias include the self-reported health-related behaviors to current smoking habit while the history of smoking habit or length of smoking habit not obtained in this study.

Hypertension is more prevalent in people with Type 1 and Type 2 diabetes than in the non-diabetic population (whether they are overweight or not), as a consequence of kidney damage and insulin resistance respectively [14]. In England, as many as 70%

TABLE 2: Distribution of hypertension.

Variable	Incidence of hypertension				Total	OR	95% CI		p
	No		Yes						
	n=4.871 (73.8%)	%	n=1726 (26.2%)	%	n=6.597				
<b>Age</b>									
< 60	3,474	78.33	961	21.67	4,435	R			
≥ 60	1,397	64.62	765	35.38	2,162	1.980	1.767	2.217	0.001
<b>Gender</b>									
Female	2,979	75.06	990	24.94	3,969	R			
Male	1,892	71.99	736	28.01	2,628	1.171	1.047	1.309	0.006
<b>Education level</b>									
High	1,245	78.06	350	21.94	1,595	R			
Middle	2,377	74.58	810	25.42	3,187	1.212	1.051	1.398	0.008
Low	1,249	68.82	566	31.18	1,815	1.612	1.381	1.882	0.001
<b>Work</b>									
Not working	1,497	73.24	547	26.76	2,044	R			
Informal	1,013	74.93	339	25.07	1,352	0.916	0.783	1.072	0.273
Formal	2,201	75.27	723	24.73	2,924	0.899	0.790	1.023	0.106
Retired worker	160	57.76	117	42.24	277	2.001	1.547	2.590	0.001
<b>Current smoking habit</b>									
No	4,470	21.90	1,594	78.10	6,064	R			
Yes	401	75.23	132	24.77	533	0.923	0.752	1.133	0.475
<b>Diabetes Melitus</b>									
No	4,486	75.26	1,475	24.74	5,961	R			
Yes	385	60.53	251	39.47	636	1.983	1.674	2.349	0.001
<b>Overweight/ Obesity</b>									
No	4,807	73.98	1,691	26.02	6,498	R			
Yes	64	64.65	35	35.35	99	1.555	1.026	2.356	0.048
<b>Hypercholesterolemia</b>									
No	4,629	96.62	1,620	3.38	6,249	R			
Yes	242	69.54	106	30.46	348	1.252	0.989	1.583	0.070

of adults with Type 2 diabetes have hypertension, doubling the risk of a cardiovascular event [15]. Hypertension and diabetes are closely linked, and one cannot manage appropriately without attention to the other [11]. In this study, prospective pilgrims with diabetes melitus had a higher risk than those who not diagnosed with diabetes.

Overweight and obesity increase the risk of cardiovascular disease and diabetes. It also increases the risk of getting hypertension [9]. In 2008, the global prevalence of obesity had nearly doubled since 1980 [11]. It well documented that levels of overweight and obesity have increased over the last decade. In the UK, about two-thirds of men

TABLE 3: Multivariate analysis.

Variable	B	p-value	OR	95% CI	
Diabetes Melitus	0.651	0.001	1.918	1.613	2.280
Age	0.580	0.001	1.787	1.568	2.036
Overweight/Obesity	0.514	0.018	1.671	1.092	2.558
Gender	0.203	0.003	1.226	1.069	1.405
Education Level (Middle)	0.123	0.130	1.131	0.964	1.327
Education Level (Low)	0.377	0.000	1.458	1.197	1.777
Informal Worker	-0.296	0.001	0.744	0.622	0.889
Formal Worker	0.001	0.993	1.001	0.846	1.184
Retired Worker	0.296	0.047	1.344	1.004	1.800

and over half of women are either overweight (BMI of 25- 29.9kg/m<sup>2</sup>) or obese (BMI of 30kg/m<sup>2</sup>) [16]. Rahajeng [17] found there was a risk of hypertension among people with overweight or obesity. In this study, prospective pilgrims with obesity/overweight had risk 1.555 times higher than those with normal BMI. There is an increasing body of evidence to support various lifestyle changes to prevent hypertension including reducing salt intake, increasing fruit and vegetable intake, increasing habitual physical activity to recommended levels, keeping alcohol intake within recommended benchmark limits, smoking reduction and control weight [10].

The global prevalence of high cholesterol was 39%, and the incidence of diabetes was 10% in adults over 25 years [18]. Feryadi et al. [19] revealed that some of the profile lipids affected hypertension incident at Minangkabau Ethnic in Padang, especially total cholesterol and triglycerides. However, HDL and LDL did not have significant relation with hypertension incident. In this study, hypercholesterolemia was not statistically significant with the incidence of hypertension.

Indonesia government had initiated a national programme to promotes and prevents without overriding curative-rehabilitative efforts by involving all components of the nation in developing a healthy paradigm called by GERMAS (*Gerakan Masyarakat Hidup Sehat*). Three activities that can be implemented from self and family and do not require a significant cost in GERMAS perform physical activity 30 minutes per day, eating fruits and vegetables and doing routine health checks (20). To succeed GERMAS, it cannot rely solely on the role of the health sector alone, all levels of ministry and society must support the programme as mentioned in President Instruction of Indonesia Government No. 1 the Year 2017 about Community Movement to Live Healthily.

Medical examination for prospective pilgrims held for three times. First, one at the registration to get portion number, the second one after getting certainty of departure, and last one held at the embarkation [21]. Nowadays, the examination health process held 3 – 6 month before boarding. When the examination process held earlier, it may encourage behavior change for prevention and control of hypertension among the prospective pilgrims as promoted in GERMAS.

## 4. Conclusion

Hypertension is on rising and must be regarded as a significant public health issue. This study provided essential information on the incidence and associated risk factors of hypertension among prospective pilgrims. More than a quarter of this study population was attacked by hypertension during embarkation period that took time less than 24 hours. This study exhibited diabetes melitus disease, age, and overweight/obesity as the predominant risk factors of hypertension after being controlled by gender, education level, and work. Without proper knowledge and intervention programmes, they are at risk of developing hypertension and its complications in Arab Saudi. All people must support the government program to reduce the exposure to behavioral risk factors that proven contributed to the gradual decline in mortality due to hypertension. The main recommendations of this study are:

1. To increase prospective pilgrims' knowledge about risk factor of hypertension so that they will have the willingness to follow screening programs for early detection of hypertension
2. Health officer (from Public Health Office and Ministry of Health) should carry out the medical examination on prospective pilgrims earlier, e.g., 1-2 years before embarkation period, so that the examination result could encourage behavior change for prevention and control of hypertension among the prospective pilgrims as promoted in GERMAS. Nowadays, the medical examination before embarkation carried out about 3 – 6 months before boarding.
3. Health officer should pay more attention to those with age  $\geq 60$  and be diagnosed by diabetes melitus which had been categorized as high-risk pilgrims, to prevent the incidence of hypertension in Arab Saudi.

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