FACTORS ASSOCIATED WITH HYPERTENSION: RESULTS FROM THE INDONESIAN FAMILY LIFE SURVEY-5 IN 2014

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ABSTRACT
Hypertension is still a serious global problem. In developing countries prevalence of hypertension increased from 18,8% in 2002 to 29,6% in 2014. Age, gender, Body mass index (BMI) and education can be the factors associated with hypertension. This study aimed to describe factors associated with hypertension in Indonesia from Indonesian Family Life Surveys (IFLS) wave 5 were conducted in 2014-2015. This crosssectional study analyzed data by using Chi2. Respondents aged > 40 years with complete information was 12.840, obtained from questionnaire-based interview and measurement. The result showed that the prevalence of hypertension was 5.426 (42,26%). The prevalence of hypertension on age 45-59 years old was 2.553 (47,05%), and women was higher 3.078 (56,73%) than men. Furthermore, the most prevalence of hypertension was on Body mass index (BMI) overweight 2.630 (48,47%). Respondents who had the higher level of education has the lowest prevalence of hypertension 425 (7,83%). All these results were statistically significant (P<0,001). The study found that middle-aged people, women, overweight, and lower level of education can be the factors increasing the prevalence of hypertension. Future intervention should emphasize to improve the promotion of healthy life style, education and inspire the population to maintain the ideal body weight.

KEYWORDS
Hypertension, age, gender, BMI, level of education, IFLS 5

INTRODUCTION
Hypertension is one of 10 leading contributors to the global burden of disease. It is the most important modifiable risk factor for cardiovascular disease (CVD) and an independent risk factor for mortality worldwide (Owolabi, Goon, Adeniyi, & Seekoe, 2017). Moreover, it has been described as a silent killer due to its asymptomatic nature among the sufferers. About 9 million people die from hypertension annually (Gao et al.,
Furthermore, in low-income countries hypertension is increasingly affecting young people less than 50 years, many of whom die prematurely as compared to the developed country. It also contributes to half of the coronary heart disease and approximately two-thirds of the cerebrovascular burden disease. As observed in most countries, there is still lack of awareness about growing problem of hypertension (Musinguzi & Nuwaha, 2013). The awareness of hypertension was significantly associated with a higher educational level and BMI (Wu et al., 2015). Unfortunately, the lack of awareness is often coupled with the absence of a clear policy framework for prevention and management (Musinguzi et al., 2018). Reliable informations about the worldwide prevalence of hypertension is essential to the development of international health policies for prevention and control of this condition (Jinwei Wang, Zhang, Wang, Liu, & Wang, 2014). Therefore, effective prevention especially primary prevention, remains the best strategy for reducing the burden of the disease (Fu Liang Zhang et al., 2017).

The problem of hypertension every year cannot be resolved even tends to increase (Sembiring & Utari, 2019). China has experienced a rapid increase in hypertension over the past decades. The prevalence increased from 18.8% in 2002 to 25.2% in 2012 and was reported to be as high as 29.6% in a survey in 2014 (Qin et al., 2018). In Indonesia, the prevalence of hypertension is still high, 47.8% among adults >40 years old. (Hussain, Mamun, Peters, Woodward, & Huxley, 2016; Peltzer & Pengpid, 2018).

There are so many factors that associated with hypertension. Wang et al (2014) reported that high body mass inde (BMI) is one lifestyle factors besides habitual drinking, physical inactivity and nonsteroidal anti-inflammatory drugs (Jinwei Wang et al., 2014). Furthermore, age, gender, and level of education are the important factors associated with hypertension. The prevalence of hypertension increased with increasing of age, higher in women and low education (Hao Wang et al., 2013).

Recent studies showed that the aged specific prevalence of hypertension was 13.0%, 36.7% and 56.5% among persons aged 20 to 44 years, 45 to 64 years, and >65 years respectively(Gao et al., 2013). Men were higher than women (30.1% in men and 28.2% in women), respectively (Hu et al., 2017). The prevalence of hypertension increased with age and decreased with educations level. Body mass index was higher in hypertensive people. The study showed statistically significant P<0.001 (Yang et al., 2016). The risk of BMI for hypertension increased dramatically in middle-aged, especially for men with drinking and smoking habits (Yu et al., 2018). The comparison study of prevalence and awareness about hypertension in China and United States revealed that China has a lower prevalence of hypertension than United Stated. The body mass index was also significantly lower in China than United States(Lu et al., 2018).

In Indonesia, the three top causes of death are stroke (21.2%), ischaemic heart disease (8.9%) and diabetes mellitus (6.5%). Major adult non-communicable disease (NCD) risk factors in Indonesia include current tobacco smoking in 2011 was 35% (67% in men and 3% in women), high blood pressure or hypertension in 2008 was 27.8% (29.1% in men and 26.5% in women), and obesity in 2008 was 4.8% (2.6% in men and 6.0% in women) (World Health Organization, 2018). In the Indonesian family life surveys-5 in 2014-2015, the prevalence of hypertension in Indonesia was 33.4%. Significant linear relationship of hypertension were found with age and BMI (P <0.001). It was concluded that the prevalence of hypertension was high and the awareness was low, and treatment and control were very low (Peltzer & Pengpid, 2018). The other study from IFLS 5 showed the majority of respondents were female (53.8%) and aged <60 years (71.1%). The prevalence of low awareness of hypertension treatment was 87.1% (51.8% in women and 48.2% in men). Being an elderly (OR: 1.60, 95%CI 1.36–1.88), being irregularly blood pressure control (OR: 4.40, 95% CI 3.78–5.13), having depressive symptoms (OR: 1.35, 95% CI
1.12–1.62), having insomnia (OR: 1.31, 95% CI 1.11–1.53), and having low satisfaction with health care (OR: 1.28, 95% CI 1.08–1.51) were associated with low awareness of hypertension treatment. Surprisingly, respondents with strong religiosity (OR: 1.62; 95% CI 1.25–2.09) were more likely to display low awareness of hypertension treatment (Khoiry, Alfian, & Abdulah, 2022). The more study of IFLS 5 reported the prevalence of hypertension in Indonesia was 26.1%, and only 26.9% of those with hypertension were aware of their condition. Approximately 22.5% of hypertensive patients received treatment, but only 28.2% had controlled blood pressure and reached the therapeutic goal. Low socioeconomic groups were more prone to hypertension (CI = −0.047 in urban and CI = −0.075 in rural). In contrast, awareness, treatment, and control of hypertension were more concentrated in higher socioeconomic groups’ (Mashuri, Ng, & Santosa, 2022).

Although there is some evidence of the prevalence of hypertension in Indonesia, little is known regarding the age, gender, BMI, and education level. By using data from the fifth wave of IFLS conducted in 2014-2015, we report on the prevalence of hypertension and its factors (age, gender, BMI, and education level) in Indonesia.

**RESEARCH METHOD**

The design study was cross-sectional using secondary data from The Indonesian family life survey 5 (IFLS 5) conducted in 2014-2015. IFLS is a longitudinal socioeconomic and health survey, representing approximately 83% of the individuals living in 13 of 33 provinces in Indonesia. Ethics approval was obtained from the RAND Corporation. Informed consent was obtained from all respondents before data collection. Data from the IFLS are publicly available and can be accessed through their website (Strauss, Witoelar, & Sikoki, 2016).

Total respondents in the IFLS-5 survey was 58,325 individuals. The sample size was 12,840 individuals restricted age >40 years old with complete information. The independent variable was hypertension. The measurement of blood pressure was using spygnomanometer. The result was the average of the second and third measurement of blood pressure. Hypertensive respondent was obtained if the blood pressure was >=140 mmhg systolic and >=90 mmhg diastolic. Dependent variables included age, gender, body mass index, and education level. Body mass index (BMI) was obtained from the division of body weight (kg) by height squared (m²). Then classified as thin or underweight (BMI <18.5 kg/m²), normal (BMI 18.5-23.9 kg/m²), overweight (BMI 24-30 kg/m²) and obese (BMI >30 kg/m²). Education level was obtained from questionnaire-based interview then classified as no educational level, primary school level, high school level, and diploma/bachelor/post graduate level.

Univariate and bivariate were analyzed using STATA software version 15.0 (Stata corporation, College station, Texas, USA).

**RESULT AND DISCUSSION**

The total sample included 12,840 individuals 40 years and older. The general characteristics of the study population were illustrated in Table 1. The variables were age, gender, BMI, and education level.

**Table 1. General characteristics of the study population variables**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ages</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The study found that the characteristics most frequent were the aged 45-59 (49.14%), female (52.20%), BMI overweight (44.38%), and education level primary school (47.03%). Furthermore, the prevalence of hypertension was 42.26%, described in Figure 1.

![The prevalence of Hypertension](image)

The prevalence of hypertension is still high. The result was in line with the recent study (Shah et al., 2015). The high burden of hypertension is caused by low treatment and control (Lamptey et al., 2017), high consumption of sodium or high salt condiments added during cooking (Bi et al., 2014), according to the nutrition...
transision theory, increasing wealth is often associated with shifts in dietary and physical activity patterns, which may lead to the predominance of nutrition-related to hypertension and NCDs (Williams et al., 2018). The prevalence of hypertension in this study 42.26 % was lower than the study conducted by Hussain 47.8% (Hussain et al., 2016), but higher than the investigation by Peltzer 33.4% (Peltzer & Pengpid, 2018).

Our finding of prevalence of hypertension was consistent with those of other studies in Indonesia (Herningtyas & Ng, 2019). Increases in risk factors such as tobacco consumption, sedentary lifestyles, and unhealthy diets, including salt intake, may be associated with the rise of hypertension (Mashuri et al., 2022).

The factors associated with hypertension were vary. The risk of hypertension increase in male, BMI more than 25 kg/m$^2$, poor psychological condition, and unhealthy food (Sembiring & Utari, 2019). The results of this study illustrated in Table 2.

Table 2. Association between age, gender, BMI, and education level with hypertension

<table>
<thead>
<tr>
<th>Variable</th>
<th>Hypertension</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Frequency</td>
<td>Percent</td>
</tr>
<tr>
<td>Ages</td>
<td></td>
<td></td>
</tr>
<tr>
<td>40- &lt;45</td>
<td>767</td>
<td>14.14</td>
</tr>
<tr>
<td>45-59</td>
<td>2553</td>
<td>47.05</td>
</tr>
<tr>
<td>&gt;=60</td>
<td>2106</td>
<td>38.81</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Man</td>
<td>2348</td>
<td>43.27</td>
</tr>
<tr>
<td>woman</td>
<td>3078</td>
<td>56.73</td>
</tr>
<tr>
<td>BMI</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Underweight</td>
<td>481</td>
<td>8.86</td>
</tr>
<tr>
<td>Normal</td>
<td>1686</td>
<td>31.07</td>
</tr>
<tr>
<td>Overweight</td>
<td>2630</td>
<td>48.47</td>
</tr>
<tr>
<td>Obese</td>
<td>629</td>
<td>11.59</td>
</tr>
<tr>
<td>Education level</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No school</td>
<td>787</td>
<td>14.50</td>
</tr>
<tr>
<td>Primary school</td>
<td>2719</td>
<td>50.11</td>
</tr>
<tr>
<td>High school</td>
<td>1495</td>
<td>27.55</td>
</tr>
<tr>
<td>Diploma/Bachelor/Postgraduate</td>
<td>425</td>
<td>7.83</td>
</tr>
</tbody>
</table>

The results showed that middle-aged was highly risk for the increasing of hypertension. It was in line with the explanation of the study that age was a predictor of having hypertension (Lamptey et al., 2017). The socio-demographic factors among 24-74-year-old citizens in Yangon Myanmar showed the higher prevalence of hypertension in 2004 was in 49.9 years old, while in 2014 was lowering in 47.6 years old (Htet et al., 2017). The changing of prevalence in age could be caused by the chancing of lifestyle. Sedentary life style, central obesity and metabolic disease are also increasing in middle-age group (Peng Zhang et al., 2016).
The prevalence of women was higher than men. It was in line in Uganda, higher in women 37% (Musinguzi et al., 2018). However, our finding was not in line with many studies in other countries. In Korea men were higher (Lim et al., 2017), also in China (Forouzanfar et al., 2017), in Ghana (Sanuade, Boatemaa, & Kushitor, 2018) and in Africa (Mittal & Singh, 2010). It showed that the prevalence of women were higher than men in Indonesia (Peltzer & Pengpid, 2018), correlated with the obesity that higher in women in Indonesia (Hussain et al., 2016; Peltzer & Pengpid, 2018; Sembiring & Utari, 2019) which increased the risk of hypertension (Chen et al., 2015; Vinjerui et al., 2020).

Overweight was the highest prevalence of hypertension in our finding. In many studies, obese was the highest prevalence of hypertension (Shen et al., 2019; Zhao et al., 2013). Overweight and obese were the risk factor of increased prevalence of hypertension. Moreover, the central or abdominal obesity was also essential to increase the risk of hypertension (Jovic, Marinkovic, & Vukovic, 2016).

Additionally, the education level was also associated with hypertension. The higher of the level of education, the risk of hypertension was decreased. The results was in aligned to the many studies (Jovic et al., 2016; Shen et al., 2019; Hao Wang et al., 2013; Zhao et al., 2013) revealed that low of education level was found to be predictor of hypertension.

Our findings of factors associated with hypertension were statistically significant with P<0,001.

Several limitations exist in our study. First, as a limitation of the data, we cannot provide more data. Second, the study was from 2014, but Indonesia’s socio-demographic are still very much changing, and an update study should continue to pay attention and to implement the evidence-based policy.

CONCLUSION

This study has shown the prevalence of hypertension is still high (42.26%). In addition, the middle-aged group, women, overweight and lower level of education could be the risk factors to rise the prevalence of hypertension. Future intervention should emphasize to improve the promotion of healthy lifestyle, education and inspire the population to maintain the ideal body weight.

REFERENCES


