The Relationship Between Instant Noodle Consumption and the Proportion of Hypertension Aged >18 Years According to Provinces in Indonesia (Analysis of Indonesian Health Survey 2023)

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Abstract: One of the triggers for hypertension is unhealthy eating patterns, such as high levels of salt which are generally found in instant foods. In Indonesia, instant food has a fairly high consumption level, one of which is instant noodles. The level of instant noodle consumption in Indonesia reached 60.7% within a period of 1-6x/week based on data from the 2023 Indonesian Health Survey. The aim of the research was to analyze the relationship between percentage instant noodle consumption and percentage of hypertension in the population aged >18 years according to provinces in Indonesia. The research used a cross-sectional design using data from the 2023 Indonesian Health Survey. The population used was data from 38 provinces in Indonesia. The sample size is the population aged over 18 years according to provinces in Indonesia. The analysis used is the Pearson correlation test. Based on data, it shows that the highest frequency of instant noodle consumption is in South Sulawesi Province (72%) and the lowest in Mountainous Papua Province (45%). The incidence of hypertension in people aged >18 years is highest in Central Kalimantan Province (40,7%) and the lowest in Mountainous Papua Province (19,9%). The results of statistical tests with Pearson correlation showed that there was a positive relationship between instant noodle consumption and the incidence of hypertension (p=0.039; R=0.336). In conclusion, there is a relationship between instant noodle consumption and the incidence of hypertension.

Keywords: hypertension, instant noodles, instant food

INTRODUCTION

Hypertension is known as a silent killer because it is difficult to detect and manage (Olin & Pharm, 2018). An increase in blood pressure or hypertension is defined as a condition where systolic blood pressure is greater than or equal to 140 mmHg and diastolic blood pressure is greater than or equal to 90 mmHg after two blood pressure measurements with a minimum interval of 10 minutes (Unger et al., 2020). One of the global targets for non-communicable diseases is to reduce the prevalence of hypertension by 33% between 2010 and 2030. According to the World Health Organization, 1.13 billion people worldwide suffer

from hypertension. It is estimated that 46% of adults with hypertension are unaware that they have the condition (WHO, 2023). Based on data from the 2023 Indonesian Health Survey, the incidence of hypertension in Indonesia remains quite high, with 30.8% of adults aged ≥18 years identified as having hypertension through blood pressure measurements (Kemenkes, 2023). This figure clearly still needs attention to prevent further increases in the coming years, and it would be better if this figure could be reduced in the following years. To achieve this, preventive actions are needed to address modifiable risk factors for hypertension.

One modifiable risk factor for hypertension is diet, particularly a high-salt diet, as many studies have shown that excessive salt intake is one of the risk factors for hypertension (Grillo et al., 2019). In Indonesia, the average daily salt consumption is 3.500 mg (Siswanto et al., 2014). while the WHO recommends a daily salt intake of 2.400 mg. This amount is higher than the WHO's recommended limit for salt consumption (WHO, 2023). Instant foods, particularly instant noodles, are highly consumed in Indonesia. Instant noodles contribute significantly to high salt intake, as their nutritional labels indicate that the sodium content per serving size ranges from 850 to 1,480 mg, or about 50-70% of the daily recommended salt intake. A study on hypertension risk factors found that frequent consumption of instant noodles increases the likelihood of hypertension by 1.25 times compared to those who rarely consume them (Destiani et al., 2021). Another study showed that instant noodle consumption is associated with a 1,273 times higher risk of hypertension in men and a 1,666 times higher risk in women (Choi et al., 2024).

The consumption rate of instant noodles in Indonesia reaches 60.7% within a frequency of 1-6 times per week, according to data from the 2023 Indonesian Health Survey (Kemenkes, 2023). This clearly becomes one of the triggers for hypertension due to the high salt content in instant noodles and frequent consumption. Based on this background, the aim of the study is to analyze the relationship between instant noodle consumption and the proportion of hypertension among people aged >18 years across provinces in Indonesia.

METHOD

This study is an ecological study with a cross-sectional design, using secondary data from the 2023 Indonesian Health Survey. The Indonesian Health Survey combines the Basic Health Research with the Indonesian Toddler Nutritional Status Survey. In this study, the data used includes the percentage of instant noodle consumption 1-6 times per week and the percentage of

hypertension cases in the population aged >18 years. The independent variable in this study is the percentage of instant noodle consumption 1-6 times per week, while the dependent variable is the percentage of hypertension in the population aged >18 years. The data was processed using SPSS version 21. The data analysis method used Pearson correlation test, preceded by the Shapiro-Wilk test to determine data normality ($p>0.05$), indicating that the data was normally distributed. If the Pearson correlation test shows a value of ($p<0.05$), it indicates a correlation between the variables being examined.

RESULTS

Figure 1 and Figure 2. shows the map of instant noodle consumption and incidence of hypertension in each province in Indonesia.

Figure 1. Data map of instant noodle consumption 1-6/week in Indonesia

Figure 2. Data map of Hypertension Indonesia

Figures 1 and 2. the darker the color in a provincial area, the higher the percentage of instant noodle consumption 1-6 times per week and the percentage of hypertension cases in that province. Conversely, lighter colors indicate a lower percentage of instant noodle consumption 1-6 times per week and a lower percentage of hypertension cases in each province in Indonesia.

Figure 3. shows the percentage of instant noodle consumption, and percentage incidence of hypertension in each province in Indonesia.

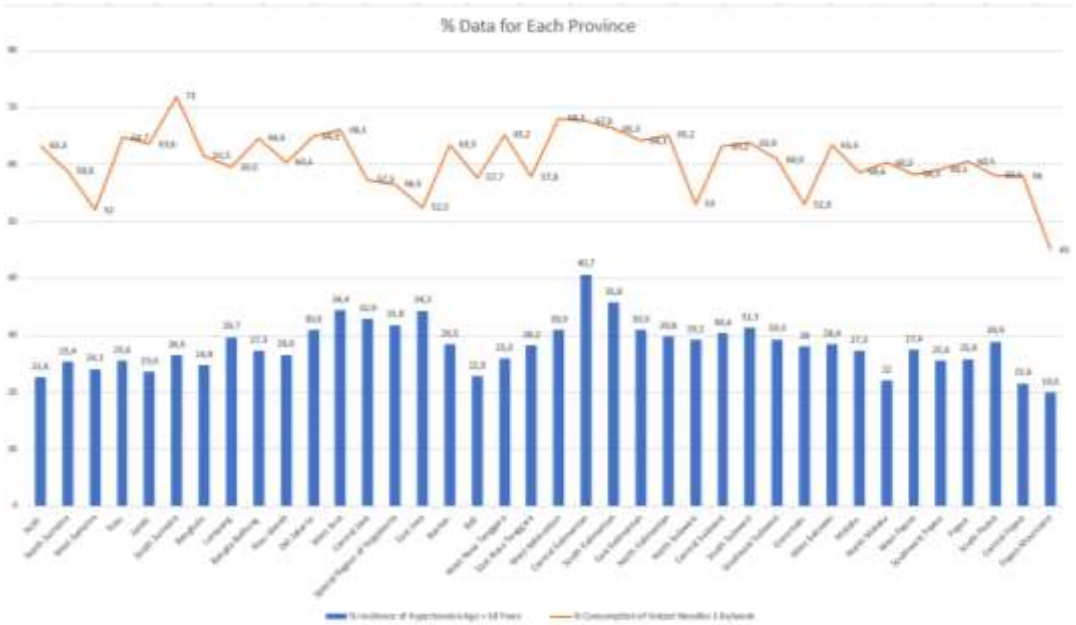

Figure 3. Graph of % consumption of instant noodles 1-6x/week and incidence of hypertension aged >18 years

Based on the graph **figure 3**. the highest percentage of instant noodle consumption is in South Sumatra province (72%), while the lowest percentage is in the mountainous province of Papua (45%). Regarding the percentage of hypertension cases in the population aged >18 years the highest percentage is in Central Kalimantan province (40,7%), and the lowest percentage is in the mountainous province of Papua (19,9%).

Table 1. Statistical test results of the relationship between % instant noodle consumption 1-6x/week and % hypertension in people aged >18 years in Indonesia

%Consume Instant Noodles 1-6x/week	%Hypertension	*p-value*	r
Mean ± SD			
60,744 ± 5,267	28,134 ± 4,254	0,039	0,336*

*Correlation is significant at 5% or 0.05

The results of the statistical test using Pearson correlation in the table show a significant relationship between the percentage of instant noodle consumption 1-6 times per week and the percentage of hypertension cases in the population aged >18 years, with a positive correlation. This means that the more frequently instant noodles are consumed, the higher the incidence of hypertension. The R^2 results indicate that consuming instant noodles 1-6 times per week is a risk factor for hypertension by 11,28%.

DISCUSSION

Instant noodles are consumed by nearly all segments of society in Indonesia due to their easy access, affordable price, and convenience in preparation. Instant noodles are typically produced by the food processing industry using advanced technology and include various additives for preservation and flavor enhancement. As is well known, instant noodles have become increasingly popular as a fast food option due to their convenience in preparation (Fahira et al., 2024). However, frequent consumption of instant noodles is often associated with hypertension due to their high sodium content per serving. Figure 1 shows a map of Indonesia with the percentage of instant noodle consumption, where darker colors indicate higher percentages. It can be seen that the province with the highest percentage of instant noodle consumption (1-6 times per week) is South Sumatra. In Figure 3, the graph indicates that 72% of people in South Sumatra consume instant noodles 1-6 times per week. Conversely, in Figure 1, lighter map colors indicate lower percentages of instant noodle consumption. The lowest consumption is in Mountainous Papua Province, with 45%, as shown in Figure 3. The next set of data is shown in Figure 2, which displays a map of Indonesia indicating the percentage of hypertension among individuals over 18 years old. Darker areas on the map indicate higher hypertension rates, while lighter areas represent lower percentages in each province. The highest hypertension rate is recorded in Central Kalimantan at 40.7%, as shown in Figure 3, while the lowest rate is found in Mountainous Papua Province at 19.9%, also depicted in Figure 3. The trends in hypertension among individuals over 18 years old and instant noodle consumption are also visible. It can be observed that provinces with high instant noodle consumption (1-6 times per week) tend to have higher hypertension rates. However, not all data follow this pattern, as some provinces show low instant noodle consumption but high hypertension rates, while others have high instant noodle consumption but low hypertension rates. To better understand the relationship between instant noodle consumption and hypertension incidence, a Pearson correlation test was conducted.

The results of the study indicate a significant relationship between the percentage of instant noodle consumption 1-6 times per week and the percentage of hypertension cases ($p=0.039$) in Indonesia, where higher frequency of instant noodle consumption corresponds to a higher incidence of hypertension ($r=0.336$). One serving of instant noodles contains 850-1,480 mg of salt, contributing significantly to daily sodium intake. In Indonesia, salt consumption is very high, reaching 3,500 mg per day (Siswanto et al., 2014). High salt intake can trigger hypertension because the sodium absorbed into the bloodstream from excessive salt consumption causes water retention, which increases blood volume, leading to elevated blood pressure. Additionally, high

sodium intake stimulates excessive release of natriuretic hormones, which indirectly contributes to increased blood pressure (Firman, 2024). Excessive salt consumption has a significant impact on the risk of hypertension. Salt is directly related to the onset of hypertension; the more salt that enters the body, the higher the plasma volume, cardiac output, and blood pressure. Additionally, high salt intake can narrow the diameter of the arteries, forcing the heart to work harder to pump the increased blood volume through the increasingly narrow vessels, which can ultimately lead to hypertension (Purwono et al., 2020).

Based on its pathophysiology, the occurrence of hypertension due to high salt consumption is related to instant noodle consumption because of the high salt content in instant noodles. Foods high in salt significantly increase plasma sodium levels and osmolarity compared to a low-salt diet. Salt can contribute to a rapid increase in blood pressure through its effects on plasma osmolarity, where an increase in plasma sodium of 1 mmol/L can raise systolic blood pressure by at least 1.91 mmHg (Covic et al., 2019). The relationship between salt intake and blood pressure shows a positive correlation, meaning that the more salt a person consumes, the higher the likelihood of developing hypertension (Armitha et al., 2024). The incidence of hypertension due to high salt intake from instant noodles alone contributes 11.28% as a risk factor for hypertension, while the remaining percentage consists of other risk factors for hypertension, such as a family history of hypertension (Purnama Ria Sihombing et al., 2023), age, smoking habits (Abineno & Simbolon, 2024), having a BMI > 25 kg/m² and alcohol consumption (Ondimu et al., 2019).

CONCLUSION

This study aimed to investigate the relationship between the percentage of instant noodle consumption (1-6 times per week) and the prevalence of hypertension in Indonesia. The findings indicate a significant correlation between the percentage of instant noodle consumption and the incidence of hypertension. As the frequency of instant noodle consumption increases, the occurrence of hypertension tends to rise as well.

Conflict of Interest

The authors confirm that there are no conflicts of interest.

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