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# Saltwater fish consumption pattern and incidence of hypertension in adults: A study on the population of Gresik coast, Indonesia

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## ARTICLE

# Saltwater fish consumption pattern and incidence of hypertension in adults: A study on the population of Gresik coast, Indonesia

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## Abstract

**Background:** Hypertension is one of the main causes of morbidity and mortality in the Indonesian population, characterized by an increasing number of sufferers each year. Curtailing saltwater fish consumption pattern is an optional effort to prevent hypertension, as most users tend to attribute little or no attention to this possibility.

**Design and Methods:** The purpose of this study, therefore, was to analyze the correlation between saltwater fish consumption pattern and the incidence of hypertension in adults, using analytic research design with cross sectional approach.

**Results:** The analysis showed the dominance of female respondents (63%), aged 36-45 years (60%), graduated from senior high school (33.8%), working as housewives (32.5%), monthly income above the average (63.6%), absence of hypertension history (80.5%), eat sea fish often as a side dish (59.7%), and pre hypertension (59.1%). Furthermore, data analysis showed a P-value of 0.000, indicating the presence of a significant relationship between the consumption pattern of sea fish and the incidence of hypertension.

**Conclusions:** The results of this study show the high consumption of saltwater fish by most people living in Kebungson, Gresik Village. This correlates with the incidence of hypertension in indigenous adults, as the majority was classified with pre-hypertension levels.

## Introduction

Hypertension is a serious health challenge in Indonesia, characterized by an increase in prevalence. This disease features difficulty in regulating blood pressure, as well as other comorbidities and complications, which consequently increases morbidity and mortality.<sup>1</sup> This disease is often referred to as a "silent killer" because most sufferers initially feel no disturbances or symptoms, until complications in vital organs, including the heart, kidneys, and brain is experienced.<sup>2,3</sup> Meanwhile, recent epidemiological data showed positive prognosis for most individuals with high-

normal blood pressure at older ages.<sup>4</sup> Elderly people categorized as pre-hypertensive needs to adopt lifestyle modification, in order to prevent the disease advancement.<sup>5</sup>

The 2018 data obtained from the Public Health Center ranked hypertension among the 10 common diseases, observed in 5.1% of the population.<sup>6</sup> Furthermore, most indigenes living in coastal areas are familiar with the consumption of saltwater fish.

One of the influencing factors of hypertension is the consumption of sodium, which is mostly found in foods sourced from the sea.<sup>7</sup> However, the weekly ingestion of one to four servings (about 100 grams per serving) of fish is recognized as good for health. The human body is capable of producing some fatty acids, while other important form, including Polyunsaturated Fatty Acids (PUFA)  $\omega$ -3 and  $\omega$ -6 are impossible to generate, hence acquired from foods. Currently, only  $\omega$ -6 is present in most processed foods, leading to a low ratio of  $\omega$ -3. Furthermore, the availability of fish oil in saltwater fish is useful for the rapid conversion of  $\omega$ -3 to  $\omega$ -6, in order to reduce the incidence of blood pressure (BP), as well as the various risks of myocardial infarction in dangerous and life-threatening situations. The deficiency of essential fatty acids is possibly prevented using the expert recommendation, which encourages the consumption of at least 2.4% of total  $\omega$ -6, and 0.5% to 1% of total  $\omega$ -3. Based on the unsafe amount of heavy metals (e.g., mercury), and other contaminants present in the sea, it is expected that fish is collected from areas with pollution control. Some studies on fish oil supplementation showed the occurrence of a significant decline in the blood pressure of hypertensive patients.<sup>8,9</sup>

## Design and methods

The research design was analytic with cross sectional approach, conducted in May-June of 2019. The population included all adults of the area in analysis (26-45 years old) with or without a history of hypertension, amounting to 250 people, and subsequently 154 individuals were sampled, individuated with a purposive sampling technique. The research instruments used include questionnaires and blood pressure measurement device,

### Significance for public health

*Hypertension is a serious health challenge in Indonesia, characterized by an increase in prevalence among patients. This disease features difficulty in regulating blood pressure, as well as other comorbidities and complications, which consequently increases morbidity and mortality. This study shows the correlation between saltwater fish consumption pattern and the incidence of hypertension in adults.*

particularly the digital sphygmomanometer (OMRON), while Spearman Rank Correlation Test was used to analyze the results.

## Results and discussion

Table 1 shows that the majority of respondents were female (63%), aged 36-45 years (60%), with SMA / SMK as the last level of education (33.8%), working as housewives (32.5%), with a monthly income above average (63.6%), and no history of hypertension (80.5%). As shown in Table 2, the data demonstrated a high rate of sea fish consumption (59.7%) as a side dish. Moreover, the blood pressure measurement shows the experience of pre hypertension (59.1%) in a majority of the respondents, while 14.3% and 1.3% have hypertension level 1 and 2, respectively.

Table 3 showed the relationship between sea fish consumption patterns and the incidence of hypertension in respondents. Spearman Rank test analysis showed a P-value of 0.000 (<0.05), indicating the presence of a significant relationship between sea fish consumption pattern and the incidence of hypertension in the community of Kebungson, Gresik Village.

Most of the respondents often have been consuming saltwater fish as a side dish for a very long time, which was influenced by the culture. The close proximity of the study location to the sea also supports the ease of acquisition, a repeatedly conducted practice that unconsciously becomes a mainstay. Furthermore, most participants are native residents with a preference for saltwater fish, and the factors influencing the pattern of consumption were consistent with the study conducted by Yunita. This links culture, tradition and preference for foods with the consumption pattern.<sup>10</sup>

It was found that most respondents experienced pre-hypertension, prior to the incidence of hypertension. This describes a low prevalence rate in the village, hence the occurrence was attributed to other unhealthy lifestyles, including the lack of exercise, obesity, smoking, a history of hypertension, and consumption of other risky foods. Black and Hawks individuated the influence of several factors on high blood pressure, including a family history of the disease, age, sex, race, eating pattern, obesity, kidney disease, stress, and drugs abuse.<sup>11</sup>

The results showed the dominance of female respondents, as most women were forecasted to experience high blood pressure after menopause. Furthermore, the non-menopausal group is protected by the hormone, estrogen, which plays a role in increasing the levels of High Density Lipoprotein (HDL), where low concentrations and elevated LDL cholesterol (Low Density Lipoprotein) have been associated with the incidence of atherosclerosis.<sup>12</sup> Moreover, premenopausal women tend to lose blood vessels from damage defense hormone, estrogen with time, through a continuous process characterized by a change in quantity, according to age, between 45-55 years.<sup>13</sup>

The results showed respondents with a history of hypertension,

which is consistent with several studies stating a positive correlation between incidence of hypertension and family history.<sup>14</sup> An individual with hypertensive parents is more likely to be prone to the disease, as seen in 70-80% of cases.<sup>15</sup>

This study showed the significant influence of saltwater fish consumption pattern on the incidence of hypertension, as those with bad eating habit had hypertension level 1, while most regular

**Table 1. Characteristics of respondents by sex, age, last education, occupation, income per month, and history of hypertension.**

Variable	Frequency (f)	Percentage (%)
<b>Sex</b>		
Male	57	37
Female	97	63
<b>Age</b>		
26-35	60	39
36-45	93	60
46-55	1	0.6
<b>Education</b>		
Elementary	39	25.3
Junior high school	32	20.8
Senior high school	52	33.8
Diploma	5	3.2
University	26	16.8
<b>Job</b>		
Housewife	50	32.5
Private	40	26
Private employee	36	23.4
Government staff	10	6.5
Trader	18	11.6
<b>Income</b>		
≤ mean	56	36.4
≥ mean	98	63.6
<b>History of hypertension</b>		
Yes	30	19.5
No	124	80.5

**Table 2. Characteristics of respondents based on sea fish consumption patterns and blood pressure measurements**

Variable	Frequency (f)	Percentage (%)
<b>Sea fish consumption</b>		
Rarely	29	18.8
Often	92	59.7
Always	33	21.4
<b>Hypertension</b>		
Normal	39	25.3
Pre Hypertension	91	59.1
Hypertension 1	22	14.3
Hypertension 2	2	1.3

**Table 3. The relationship between sea fish consumption patterns and the incidence of hypertension**

Fish consumption Pattern	Normal		Pre Hypertension		Hypertension Level 1		Hypertension Level 2		Total N	P-Value	
	n	%	n	%	n	%	n	%			
Rarely	5	17.9	7	25.0	16	57.1	0	0	28	100	0.000
Often	25	26.3	62	65.3	6	6.3	2	2.1	95	100	
Always	9	29.0	22	71.0	0	0	0	0	31	100	
Total	39	25.3	91	59.1	22	14.3	2	1.3	154	100	



users mainly experienced pre-hypertension. This was in line with the study outcome of Stephen, Stella and Linda, which demonstrated the presence of a positive correlation, stating the ability of frequent consumption of seafood to decrease the blood pressure. This was due to the beneficial nutritional content, including Omega 3, an unsaturated fatty acid, low consumption of which is an established risk factor. However, the presence of excessive sodium increases the concentration in extracellular fluid, subsequently elevating the volume of blood in the body. This leads to the development of harder heart pumps, and then a rise in blood pressure. The ability for salt to hold water increases blood volume, resulting in an elevated arterial pressure.<sup>16</sup>

The high Omega 3 fatty acid content in saltwater fish contributes positively to the body immunity, causing a decline in blood pressure, and the risks of coronary heart diseases. Furthermore, the growth of several types of cancer is inhibited, and brain functions are maintained, especially in relation to memory. This fish oil is also useful for the rapid conversion of omega 3 to 6, which is necessary for the reduction in blood pressure as well as the risks of myocardial infarction in dangerous and life-threatening situations.<sup>17-19</sup>

## Conclusions

In conclusion, the results of this study highlight the higher than recommended consumption of saltwater fish by most people living in the Village. This correlates with the incidence of hypertension in indigenous adults, as the majority was classified with pre-hypertension levels.

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**Key words:** Saltwater fish; consumption pattern; hypertension; adult.

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