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## Relationship between Age and Nutritional Status and Length of Stay of Typhoid Fever Patients at Dr. Soehadi Prijonegoro General Hospital, Sragen, Indonesia

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### ABSTRACT

Typhoid fever is one of the cases of infection that still tends to be high in Indonesia. There is a role for IgG antibodies in the clinical condition of typhoid fever patients. The immune status of an individual is largely determined by nutritional status and age. This study aimed to determine the relationship between age and nutritional status and length of stay of typhoid fever patients at Dr. Soehadi Prijonegoro General Hospital, Sragen, Indonesia. This study was an analytic observational study with a cross-sectional approach. A total of 106 subjects participated in this study. Univariate and bivariate analyses were performed on this study data using SPSS. There is a relationship between age and length of stay, where age over and/or equal to 30 years is at risk of getting longer care than patients who are less than 30 years old. This study also shows that there is no relationship between nutritional status and length of stay of typhoid fever patients.

### 1. Introduction

Infectious diseases are still a major health problem in many countries, especially in developing countries. Currently, in Indonesia, there has been a change in health problems that were originally related to infection and have shifted to degenerative cases. However, problems related to infection have not completely gone down and are still likely to be high. Typhoid fever is one of the cases of infection that still tends to be high in Indonesia. Various studies show that typhoid fever is still a major health problem in various countries in the world. Typhoid fever is caused by the bacteria *Salmonella typhi*, which infects the small intestine. Typhoid fever has a varied clinical picture. Namely, there are conditions of acute,

chronic, and carrier typhoid fever. Acute conditions are infectious conditions that occur within a span of less than 7 days, and are characterized by high fever, nausea, vomiting, and decreased appetite. In contrast, chronic conditions are conditions of infection that occur in a span of more than 14 days. In addition to these two clinical conditions, there are clinical conditions in the form of carriers, namely conditions where the patient is healthy and does not show symptoms of infection, but this patient carries the bacteria *Salmonella typhi*. This patient has the potential to become a source of transmission of typhoid fever infection to others.<sup>1-4</sup>

Various clinical conditions may occur in typhoid fever because this infection is greatly influenced by the patient's immune status and bacterial load. Various studies show the role of IgG antibodies in the clinical condition of typhoid fever patients. The higher the IgG antibody titer in the patient's body, the patient can only be a carrier without experiencing acute or chronic conditions of infection. The immune status of an individual is largely determined by the nutritional and nutritional status of that individual. The better nutritional status is positively correlated with the increase in the immune status of the patient. Age is also believed to contribute to the patient's immune status. Too young, such as toddlers and the elderly, is a risk factor for the severity of typhoid fever infection.<sup>5-8</sup> This study aimed to determine the relationship between age and nutritional status and length of stay of typhoid fever patients at Dr. Soehadi Prijonegoro General Hospital, Sragen, Indonesia.

## 2. Methods

This study is an analytic observational study with a cross-sectional approach and used secondary data sourced from medical records at the medical records installation of Dr. Soehadi Prijonegoro General Hospital, Sragen, Indonesia. A total of 106 research subjects were included in this study, where the

research subjects met the inclusion criteria in the form of patients who had been diagnosed with typhoid fever and were hospitalized at Dr. Soehadi Prijonegoro General Hospital, Sragen, Indonesia, for the 2018-2019 period and had complete medical record data. This study was approved by the medical and health research ethics committee at the Faculty of Medicine, Universitas Muhammadiyah Surakarta, Surakarta, Indonesia.

This study observed data in the form of gender, age, weight, height, nutritional status, and length of stay of patients. Next, the data were analyzed using SPSS software version 25. Univariate analysis was performed to present the data frequency distribution for each observation variable. Bivariate analysis was performed to determine the relationship between age and nutritional status, and the length of stay of typhoid fever patients using the chi-square test,  $p < 0.05$ .

## 3. Results and Discussion

Table 1 shows the baseline characteristics of the research subjects. The majority of research subjects were female and aged less than 30 years. The majority of research subjects had good nutritional status and a length of stay of less than 6 days.

Table 1. Baseline characteristics of research subjects.

Gender	Total (n)	Percentage (%)
Male	49	46,2%
Female	57	53,8%
Age		
< 30 years	55	51,9%
≥ 30 years	51	48,1%
Nutritional status		
Poor	39	36,8%
Good	67	63,2%
Length of stay		
< 6 days	74	69,8%
> 6 days	32	30,2%

Table 2 shows the relationship between age and nutritional status and the length of stay of typhoid fever patients. This study shows that the majority of patients aged less than 30 years get hospitalized for

less than 6 days. Meanwhile, the majority of patients aged over 30 years received hospitalization of more than 6 days. There is a relationship between age and length of stay, where age over and/or equal to 30 years

is at risk of getting longer care than patients who are less than 30 years old. This study also shows that

there is no relationship between nutritional status and length of stay of typhoid fever patients.

Table 2. Relationship between age and nutritional status and length of stay of typhoid fever patients.

Age	Length of stay				P-value
	< 6 days (N)	%	> 6 days (N)	%	
< 30 years	47	44,3%	8	7,5%	0,000
≥ 30 years	27	25,5%	24	22,6%	
Total	74	69,8%	32	30,2%	
Nutritional status	Length of stay				P
	< 6 days (N)	%	> 6 days (N)	%	
Poor nutritional status	29	27,4%	10	9,4%	0,436
Good nutritional status	45	42,5%	22	20,8%	
Total	74	69,8%	32	30,2%	

The highest incidence of typhoid fever is found at the age of 12-30 years because, at that age, they often carry out activities outside the home, so there is a high risk of being infected with *Salmonella typhi* without paying attention to food hygiene. The relationship between age and length of stay in patients affects the body's immune system. The human body has antibodies that have many functions, such as helping to repair deoxyribonucleic acid (DNA) and stopping and blocking infections that enter the body due to fungi, viruses, bacteria, and other organisms. Increasing age will affect the decrease in the body's potency, such as antibodies in fighting antigens that enter. The main change that occurs with age is thymic involution. The thymus is the organ where T cells mature. T cells are vital for their function as lymphocytes to kill incoming antigens and help maintain the body's immunity. With increasing age, many T and B lymphocytes experience a decrease in their ability to fight disease, and the volume of thymus tissue begins to decrease. So the elderly are more susceptible to experiencing a longer recovery than the young.<sup>9-12</sup>

Several studies have shown that nutritional status is an important factor in the performance of the immune system. However, in this study, there were results that were not in accordance with some of these studies. Several other studies show a theory that nutritional status is sometimes not always linear with the performance of the immune system. A person with good nutritional status does not necessarily have good

performance or physical fitness. Body fitness is not only influenced by nutritional status but is also influenced by physical activity habits and balanced nutritional intake. Sometimes a person has a good nutritional status but never exercises. Of course, this condition shows that a good nutritional status is not necessarily in line with one's body fitness.<sup>13-15</sup> This is the reason for the difference in study results in this study related to the role of nutritional status in the length of stay of typhoid fever patients.

#### 4. Conclusion

The age factor is related to the length of stay of typhoid fever patients at Dr. Soehadi Prijonegoro General Hospital, Sragen, Indonesia.

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