

## Analysis of Risk Factors for Dengue Virus Infection with Warning Signs in Child Care at Haji Hospital Makassar City for the 2022-2023 Period

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### ABSTRACT

Dengue Hemorrhagic Fever ranked among the top 10 diseases with 193 cases in the Inpatient Hospital of Haji Hospital, Makassar City in 2018. The WHO's Dengue Virus Infection (IVD) classification with 7 Warning Signs helps identify severe IVD risks in both pediatric and adult patients. A retrospective cohort study analyzed 132 medical records of pediatric patients aged 4 months to 18 years using Purposive Sampling. Most IVD patients were aged 5-18 years (72.8%), male (56.1%), had good nutritional status (69.7%), and experienced fever for <4 days before treatment (58.3%). Significant risk factors for IVD with Warning Signs included gender (p-value 0.029) and nutritional status (p-value 0.025), while age (p-value 0.914) and duration of fever (p-value 0.323) were not significant. Gender and nutritional status are significant risk factors for IVD with Warning Signs.

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## INTRODUCTION

*Dengue* has become a major health problem in several tropical and subtropical countries, which is a disease transmitted by mosquitoes (mosquito-borne viral disease) with a very rapid spread, namely 30 times in the last 50 years.(Kharisma et al., 2021). Dengue virus (DENV) is a single-stranded RNA virus from the Flaviviridae family with 4 serotypes (DENV1, DENV2, DENV3, & DENV4) which is transmitted through the bite of mosquitoes of the *Aedes* genus, namely *Aedes aegypti* (*Stegomyia aegypti*) and *Aedes albopictus* (*Stegomyia albopictus*)(Khairunnisa et al., 2020).

Based on data from the World Health Organization (WHO), it is estimated that there are around 100 million symptomatic cases and 300 million asymptomatic cases every year. In the Asian region, the dengue fever outbreak amounted to 5,091 cases with 98 active clusters which has been ongoing since April 9 2020. Indonesia itself has reported 68,000 cases of dengue infection as of June 21 2020 which caused 446 deaths.(Hope et al., 2021). Based on data from the Ministry of Health of the Republic of Indonesia (Kemenkes RI) in 2017, there were 1,724 cases of Dengue Hemorrhagic Fever (DBD) in South Sulawesi Province, with an Incidence Rate (IR) per 100,000 population of 19.84% and a Case Fatality Rate (CFR) of 0.58%. Makassar City is one of the dengue endemic areas with an IR of 0.4% in 2018 and an IR of 18 per 100,000 population with a CFR of 0.0 in 2019 based on data from the Makassar City Health Service in 2020(Lakasang et al., 2022). Based on the distribution of diseases in the Inpatient Hospital Haji Makassar City in 2018 visit data, Dengue Hemorrhagic Fever is included in the top 10 diseases with 193 cases(Haeruddin et al., 2021).

WHO has revised the classification of Dengue Virus Infection (IVD) and proposed 7 Warning Signs that can be used to identify whether a person is at risk of developing severe Dengue Infection in adult and pediatric age group patients(Ranawaka et al., 2021). In research conducted by Putri et al. in 2021 shows that there are several risk factors associated with the severity of IVD in children, including age, gender and nutritional status. This research shows that there is a significant relationship between gender and the severity of IVD in children, where males have a greater ratio of suffering from dengue fever and there is no significant relationship between age and nutritional status and the severity of IVD in children.(Kharisma et al., 2021).

Preventive measures have focused on vector control, education, and behavioral changes to reduce interactions between humans and mosquitoes as vectors. Improvements in management and public awareness have contributed to reducing the death rate to below one percent, but the overall incidence of dengue continues to increase(Sachdev et al., 2021). This study aims to determine the risk factors for Warning Signs in pediatric patients with Dengue Virus Infection and to analyze the most dominant risk factors for the incidence of IVD

with Warning Signs in pediatric patients at RSUD Haji Makassar City.

## RESEARCH METHODS

### *Design*

This research is a descriptive analytical study with a retrospective cohort design using secondary data in the form of medical records of pediatric patients at the Haji Regional Hospital, Makassar City. The sampling method using Purposive Sampling based on certain criteria in the 2022-2023 period was obtained 145 samples and based on the inclusion criteria there were 132 samples, including 90 in the IVD without Warning Signs group and 42 in the IVD with Warning Signs group.

### *Data Analysis*

Sample characteristics were tested using the distribution method obtained through descriptive tests on the Statistical Program for Society Signs (SPSS) and then entered into a frequency table. The correlation statistical test used is the Chi-Square test which is used to assess the different proportions of the relationship between each variable. The interpretation that arises is if  $p < 0.05$  there is a significant correlation between the two research variables.

## RESULTS

Based on the secondary data collection that has been carried out, the results of data analysis include;

### *Characteristics of Dengue Virus Infection Patients*

*Table 1. Distribution of Characteristics of Dengue Virus Infection Patients*

<b>Age (Years)</b>	<b>n</b>	<b>%</b>
4-59 months	28	21.2
5-18 years old	104	72.8
Total	132	100
<b>Gender</b>		
Man	74	56.1
Woman	58	43.9
Total	132	100
<b>Nutritional status</b>		
Malnutrition	40	30.3
Good Nutrition	92	69.2

Total	132	100
<b>Long Fever Before Treatment</b>		
<4 days	77	58.3
>4 days	55	41.7
Total	132	100.0

Table 1 shows the distribution of samples based on age groups, where the majority of samples are in the 5-18 year age group, namely 104 people (72.8%), the male gender group is 74 people (56.1%), the majority of them have good nutritional status. 72 people (54.5%), and the duration of the fever was <4 days before seeking treatment as many as 77 people (58.3%).

*Analysis of the Relationship between Age and the Incidence of Dengue Virus Infection with Warning Signs.*

*Table 2 Analysis of the Relationship between Age and the Incident of Dengue Virus Infection with Warning Signs.*

Variable		Age		Total	p
		4-59 months	5-18 years old		
<b>Dengue Virus Infection</b>	<i>Warning Sign</i>	11	31	42	0.914
	<i>Without Warning Sign</i>	17	73	90	
	<b>Total</b>	28	104	132	

On table 2 shows the results of the Chi-Square test, where a p-value of 0.914 is obtained, which means there is no significant relationship between the age of children 5-18 years and the incidence of Dengue Virus Infection with Warning Signs.

*Analysis of the Relationship between Gender and the Incident of Dengue Virus Infection with Warning Signs.*

*Table 3 Analysis of the Relationship between Gender and the Incident of Dengue Virus Infection with Warning Signs*

Variable	Gender		Total	p
	Man	Woman		
<b>Dengue Virus Infection</b>	<i>Warning Sign</i>	24	18	0.029
	<i>Without Warning Sign</i>	50	40	
<b>Total</b>	74	58	132	

On table 3 shows the results of the Chi-Square test, where a p-value of 0.029 is obtained, which in the male gender group has a significant relationship with the incidence of Dengue Virus Infection with Warning Signs.

*Analysis of the Relationship between Nutritional Status and the Incident of Dengue Virus Infection with Warning Signs.*

*Table 4. Analysis of the relationship between nutritional status and the incidence of dengue virus infection with warning signs.*

Variable	Nutritional status		Total	p
	Malnutrition	Good Nutrition		
<b>Dengue Virus Infection</b>	<i>Warning Sign</i>	14	28	0.025
	<i>Without Warning Sign</i>	26	64	
<b>Total</b>	40	92	132	

On table 4 shows the results of the Chi-Square test, where a p-value of 0.025 is obtained, which means that good nutritional status has a significant relationship with the incidence of Dengue Virus Infection with Warning Signs.

***Analysis of the Relationship between Delay in Treatment and the Incident of Dengue Virus Infection with Warning Signs.***

**Table 5. Analysis of the relationship between delays in treatment and the incidence of dengue virus infection with warning signs**

Variable		Long Fever Before Treatment		Total	p
		<4 days	>4 days		
<b>Dengue Virus Infection</b>	<i>Warning Sign</i>	23	19	42	0.323
	<i>Without</i>	54	36	90	
	<i>Warning Sign</i>				
<b>Total</b>		77	55	132	

In table 5 showed the results of the Chi-Square test, where the p-value was 0.323, which means that the duration of fever <4 days before treatment did not have a significant relationship with the incidence of Dengue Virus Infection with Warning Signs.

**DISCUSSION**

Based on the research that has been carried out, it was found that the largest samples based on age were in the 5-18 year age group with 104 samples (72.8%), the male gender group with 74 samples (56.1%), good nutritional status with 72 samples ( 54.5%), and the duration of the fever was <4 days before seeking treatment in 77 samples (58.3%). The results of this research are in line with research conducted by (Jessyca Azzahra et al., 2023) regarding "Analysis of Characteristics and Treatment Profiles of Pediatric Dengue Fever Patients in the Inpatient Installation of Samarinda Medika Citra Hospital in 2020-2021" shows the results of the most patient characteristics, namely male patients 62.4%, school age children (6-18 years ) as much as 80%, with normal body weight (20kg-<40kg) as much as 56.8%.

In the results of the Chi-Square test, it was found that there was no significant relationship between the child's age and the incidence of Dengue Virus Infection with Warning Signs (p-value 0.914). This is in line with research conducted by (Adam et al., 2018) regarding "Clinical Profile and Warning Sign Finding in Children with Severe Dengue and Non-Severe Dengue" was obtained from a total sample of 140 people, 42 people (30.0%) were aged 6-10 years. Nearly 95% of dengue fever cases occur in people under 15 years of age due to an immature hemodynamic system which tends to cause severe dengue infections. In addition, children with dengue fever show varying clinical symptoms and signs because it is a systemic disease. Severe dengue infections are preceded by

'warning' signs. Many clinical and laboratory factors are associated with the severity of dengue infection, therefore the child's age does not affect the severity of dengue infection(Khan et al., 2021).

In the Chi-Square test results, it was found that there was a significant relationship between gender and the incidence of Dengue Virus Infection with Warning Signs (p-value 0.029). This is in line with research conducted by(Kharisma et al., 2021)regarding "The Relationship between Nutritional Status, Age, Gender and the Degree of Dengue Infection in Children at Abdul Wahab Sjahranie Hospital, Samarinda," obtained significant results between the relationship between gender and the degree of Dengue Infection in children (p-value 0.041). In this study, 88 cases of Dengue Virus Infection with Warning Signs were found and 50 of them (56.8%) were male.(Sachdev et al., 2021). During infancy and childhood, susceptibility to severe infections tends to be higher in males due to humoral and cellular immune responses. Before reaching the peak of sex steroid hormones in adolescence, there is a surge in infancy called "minipuberty". Sex hormones such as testosterone have immunosuppressive effects by suppressing the secretion of interferon-gamma (IFN- $\gamma$ ) and interleukin-4 (IL-4) by T lymphocytes, as well as causing abnormal activation of neutrophils. This phenomenon explains why the male gender group is at higher risk of infection(Khairunnisa et al., 2020).

In the analysis of the relationship between nutritional status and the incidence of Dengue Virus Infection using the Chi-Square test, significant results were obtained (p-value 0.025). This is not in line with research conducted by(Naiem et al., 2022)regarding "The relationship between nutritional status and the severity of dengue infection in pediatric patients at RSUP Prof. Dr. RD Kandou, Manado, Indonesia" with the Chi-Square test showed that there was no significant relationship between nutritional status and the severity of Dengue Virus Infection in children. The effects of malnutrition will result in dysfunction of the innate and adaptive immune system; for example, decreased muscle mass deposition has been associated with persistent low-grade inflammation in childhood through adolescence. In particular, nutritional deficiencies can affect the immune system by dendritic cells and monocytes and disrupt the function of effector memory T cells(Maneerattanasak & Suwanbamrung, 2020).

The results of the Chi-Square test on the relationship between the duration of fever before coming for treatment and the incidence of Dengue Virus Infection with Warning Signs did not show a significant relationship (p-value 0.323). This is not in line with the research conducted(Yatra et al., 2015)regarding "History of Dengue Fever and Delay in Diagnosis as a Risk Factor for Dengue Shock Syndrome (DSS) at Wangaya Hospital Denpasar" where the duration of fever $\geq$ 4 daysbefore admission to hospital as a factor that was independently proven to be

associated with the severity of dengue infection OR=5.5 (95%CI: 2.03-14.96). Warning Signs in children's Dengue Virus Infection usually occur on the 3rd to 7th day after the initial symptoms appear. This phase is called the critical phase which shows certain clinical signs which give an indication that the infection may become more severe. The critical phase begins around the time the fever subsides and is characterized by plasma leakage, hemoconcentration, and organ dysfunction(Singh et al., 2022).

## CONCLUSION

Based on the research results, it was found that the characteristics of the incidence of Dengue Virus Infection with Warning Signs in child care at the Haji Hospital, Makassar City showed that the largest sample was aged >5-18 years, male, had good nutritional status, and delayed treatment <4 day. Apart from that, gender was also identified as the dominant risk factor for the incidence of Dengue Virus Infection with Warning Signs in the hospital. These results highlight the importance of patient management and improving health policies related to risk factors for this disease at RSUD Haji Makassar City. The researchers' suggestions include the need for further research that can expand understanding of the risk factors for Dengue Virus Infection with Warning Signs.

## FURTHER STUDY

Enhancing screening and early detection of Dengue Virus Infection with Warning Signs is recommended, especially targeting male patients aged 5-18 years with good nutritional status, to improve outcomes and reduce complications. Further research is needed to validate and expand understanding of the relationships between risk factors, such as age, nutritional status, and fever duration, and the severity of dengue infections to refine management strategies.

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