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Influence of Gender and Age on the Incidence of Dengue Haemorrhagic Fever (DHF) in Bandar Lampung City

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Abstract

Gender and age are one of the factors that can affect dengue disease. Many cases occur in the community with an age range of 15-45 years. Males are often found because they have activities outside the home when the vector that causes DHF is actively biting during the day. The number of DHF patients in Bandar Lampung City in 2022 was 1,440 patients, having an IR of 130.1 per 100,000 population. The number of cases has increased from 2021, which was 623 patients with an IR of 57.2 per 100,000 population. The purpose of this study was to determine the effect of gender and age on the incidence of DHF in Bandar Lampung City. This study used a case control design and used the chi square test. By using a sampling technique that is using Stratified Random Sampling. To calculate the sample in each section using the Proportionate Stratified Random Sampling technique. This research tool uses questionnaire sheets and checklist sheets. The population of this study were DHF patients in 2022 in Bandar Lampung City. The research sample was 154 respondents with 77 cases and 77 controls. There was no influence between gender (p=1.000) on the incidence of DHF in Bandar Lampung City. There was an effect of age (p=0.000, OR=5,211) on the incidence of DHF in Bandar Lampung City.

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INTRODUCTION

DHF or often known as Dengue Fever is a disease caused by the dengue virus transmitted the Aedes Sp mosquito vector, namely Aedes aegypti and the main vector in DHF disease. The low immune status of members as well as the density in the mosquito population is due to the fact that there are still many places that can become mosquito breeding grounds, which is one of the factors that can cause the incidence of DHF (Baitanu et al., 2022).

In the epidemiological triangle theory, namely factors from living things, namely humas as hosts, the environment and the agent which is the dengue infections mosquito, namely Aedes aegypti whre factors that play a major role in the onset of a disease, one of which is dengue disease. The host factors is the sensitivity of a person to an immune response, other than environmental factors which are all elements outside individual factors that can affect the health status of the population (economic factors, biological and physical environmental factors) (Hetti Citra Marbun, Sri Malem Indirawati, 2021).

People with the age group of 15-45 years old are one of the factors that influence the disease because it often occurs in this age group. Males have the biggest factors influencing the incidence of DHF because men have activities during the active time of the Aedes aegypti vector biting humans, namely during the daytime with the first peak at 08 AM-12 PM and the second peak from 03 PM-05 PM (Baitanu et al., 2022).

Macro and micro factors are highly dependent on dengue transmission. As for the micro factors themselves such as temperature, humidity, rainfall, density population, community, movement or known as community mobility, immunity and virus burden, urbanization, environmental factors and sociodemographic and economic factors. These factors influence the spread of dengue through increades populations of Aedes aegypti mosquitoes, and increased spread of the disease (Swain et al., 2020).

The male sex is very often found in the incidence of DHF compared to women. In southeast Asian countries, many get the same result that the male sex is higher than the female sex in cases of DHF incidence (Kharisma et al., 2021).

A total of 13 provinces with the highest DHF cases, namely half of the island of Sumatera, the entire island of Java, half of the island of Sulawesi, Bali and Nusa Tenggara Island, where in 2020 the number of DHF cases reached 103.509 cases with 725 cases of death. In 2020, Lampung Province ranked 4th with the most cases, namely 6.372 cases (Kemenkes RI, 2021). The head of the Lampung Provincial Health Office recorded 3.484 cases of DHF, with Bandar Lampung City occupying the first position or it can be said that the most cases in Lampung Province with 1,440 patients in 2022 (Dinkes Provinsi Lampung, 2022).

Bandar Lampung City has 1,440 dengue cases in 2022 with an IR of 130,1 per 100.000 population. The number of cases in 2022 has increased compared to 2021, which amounted to 523 cases with an IR of 57,2 per 100.000 population, in 2020 the number of DHF cases was 1.048 cases, and in 2019 the number of DHF cases was 1.198 cases, DHF cases in Bandar Lampung city in 2022 has a mortality rate of 3 (three) cases. DHF cases in 2022 increased comprade to cases in the last 3 years in Bandar Lampung City (Dinkes Kota Bandar Lampung, 2022).

Based on the description above, researchers are interested in conducting further research on the effect of gender and age on the incidence of Dengue Haemorrhagic Fever (DHF) in Bandar Lampung City.

METHOD

This study uses quantitative research with a research design using case-control. The design of this research is case-control or case control, carried out by determining in advance the group that suffers from dengue disease (case) and not sick (control). The population in this study who suffered from DHF in Bandar Lampung City in 2022 was 1.440 with the number confirmed in the five highest health centres in Bandar Lampung City in 2022 as many as 491 people (Dinkes Kota Bandar Lampung, 2022). Cases and control are 1:1 so that the overall minimum sample is 154 samples, with 77 cases samples and 77 control

samples. Using the sampling technique, namely Stratified Random Sampling. Calculating the number of samples in each section by Proportionate Stratified Random Sampling technique. In this study, the analysis used the Chi Square Test which was used to determinate the effect between gender and age on the incidence of DHF with a 95% confidence degree (α=0,05) and also used the Odds ratio (OR) calculation. The research tools used in this study were questionnaires and checklist sheets.

RESULTS AND DISCUSSIONS

This study is located in the Working Area of Puskesmas Panjang, Puskesmas Rajabasa Indah, Puskesmas Gedong Air, Puskesmas Kemiling, and Puskesmas Beringin Raya, Bandar Lampung City. This study was conducted on July 31-August 30, 2024 in the Working Area of Puskesmas Panjang, Puskesmas Rajabasa Indah, Puskesmas Gedong Air, Puskesmas Kemiling, and Puskesmas Beringin Raya.

Table 1. Frequency distribution of Research Respondents

Variables	Frequency	%
Gender		
Male	86	55,8
Female	68	44,2
Age		
1-44 years	117	76
>44 years	37	24
Total	154	100

Based on the table 1 Shows that respondents which has a type male gender much as (55,8%) and female (44,2%). Age >44 years (76%), and respondents aged 1-44 years as many as (24%).

Table 2. Influence of Gender and Age on the Incidence of Dengue Haemorrhagic Fever in Bandar Lampung City

Variabel	Dengue Haemorrhagic Fever Disease				Total		p-value	OR
	Case		Control					
	N	%	N	%	N	%		
Gender								
Male	43	55,8	43	55,8	86	55,8		-
Female	34	44,2	34	44,2	68	44,2	1,000	
Total	77	100	77	100	154	100		
Age								
1-44 years	69	89,6	48	62,3	117	76		5,211 (2,194-
>44 years	8	10,4	29	37,7	37	24	0,0001	12,377)
Total	77	100	77	100	154	100		

The statistical of Gender test showed that p-value (1.000 > 0.05) said that there was no influence between gender and the incidence of DHF. The statistical of Agetest shows that the p-value (0.000 < 0.05) indicates that there is an influence between age and the incidence of DHF.

Based on the result of the study, there was no influence between gender and the incidence of DHF with a p-value of 1.000. this finding is in accordance with previous finding by (Fadrina et al., 2021) which states that there is no relationship between gender and the incidence of DHF.

In this study, males were more dominant than females. Based on theory, the suceptibility and severity of infectious diseases are found to be more in men and response to the body so that the morbidity and mortality rates of men are higher than women and children. With increasing age, not only a perfect immune system, but also gender differences that underlie the formation of immunity early in life (Kharisma et al., 2021) Male cytosisin production is very less compared to females so that the male immune response is reduced and more likely to contract dengue disease (Baitanu et al., 2022).

To date, there is no conclusive evidence linking susceptibility to dengue fever with gender differences. The lack of a relationship between gender and DHF incidence can be attributed to the fact that both males and females share similar patterns of daily activity and environmental exposure. The Aedes aegypti mosquito, the primary vector of dengue fever, does not exhibit a preference for biting either gender. Thus, both

men and women have an equal likelihood of being bitten and infected, reinforcing the conclusion that gender does not influence the risk of contracting DHF (Weraman et al., 2025).

Men have higher morbidity and mortality rates because they show a greater tendency towards the spread of infectious diseases caused by the weakening of the humoral and cellular immune response. Men are more susceptible to dengue virus infection because in producing immunoglobin and antibodies as the body's immune response runs better in women than men. The immune systems of men and women show differences when entering the reproductive period. This difference is caused by the estrogen hormone in women which can significantly increase IgG and IgA sites. This increase in the amount of synthesis is what makes women have an immune response which is better against the virus (Taufik et al., 2024).

Because Aedes aegypti is not a vector that prefers to make women and men as targets, it still has the same tendency to bite men and women. Gender is one of the risk factors for a person to suffer from dengue fever, such as genetic factors related to gender and hormonal factors that affect the death rate of dengue fever. Glycoprotein hormone with its receptors Folicle Stimulating Hormone (FSH) and Luteinizing Hormone (LH) will affect the hypothalamus and affect estrogen. Estrogen affects fat in the body, if estrogen in the body is very low then the leptite produced by fat becomes less and is related to reduced body weight so that the immune response is low (Agustina, Norsita, Deny Suryanto, M. Bahrul Ilmi, Achmad Rizal, Agus Jalpi, 2025).

Generally, men will be more susceptible to dengue hemorrhagic fever than women because women produce more imonuglobin and antibodies and women produce estrogen hormone, which is a hormone that plays an important role in the development and growth of women's sexual characteristics in the reproductive process, so they are more immune to infection. According to the Ministry of Health, men are more susceptible to being infected with dengue fever because they cannot produce immunoglobulin and antibodies like women where women are able to manage infections genetically and hormonally (Marpaung et al., 2024).

Sex steroid hormones gradually surge during adolescence from infancy, before finally reaching a peak that can be called “minipuberty”. Sex steroid hormones affect function in lymphocytes, dendritic cells and macrophages by binding to hormone response elements (HRE) in the promoter region, which in addition to steroid hormones play a role in reproduction and reproduction sexual differentation. Testosterone has been shown to have an immunosuppresive effect becaus it can actively reduce cells, namely IFN-y and IL-4 by T lymphocytes and abnormal activity in neutrophils. With this explanation, men have a higher risk of experiencing infection with a disease than the female sex (Kharisma et al., 2021).

Men are still more likely to work outdoors than women, making them more susceptible to mosquito bites during the day, both at work and while traveling. Furthermore, men are more likely to access and utilize health care facilities. However, this does not rule out the possibility of an inherently higher susceptibility in men to dengue virus infection (Prattay et al., 2022). According to Green's theory (Notoatmojo, 2012), gender is a predisposing factor or a possible factor that can influence a person's behavior in carrying out possible actions. Women tend to be more concerned about their own health and that of their home environment. Furthermore, women have traditionally played the primary role in maintaining their homes and their surroundings. Therefore, if women lack sufficient knowledge about dengue fever prevention, they are at risk of contracting dengue fever (Ribek et al., 2023).

There are theoretically more male DHF patients than females because of immunological components in the body. The immunological response of women is superior to that of men. The reason for this is that women produce more cytokines than males do. This hormone, a cytokine, controls the strength and length of an individual's immunological response. Men and women have the same risk of being infected with the dengue virus because genetic factors and hormonal factors such as the type of kelmain can affect an individual to be infected with the dengue virus (Ottay et al., 2025).

Gender is a biological difference between

women and men from birth. It shows that dengue fever sufferers of male patients tend to be more than female patients, this is because in general men will be more susceptible to dengue hemorrhagic fever than women because women produce more imonuglobin and antibodies and women produce estrogen hormone which is a hormone that plays an important role in the development and growth characteristics of women's sexual reproduction process, so it is more immune to infection. The dengue virus is easier to infect men because of the influence of work and activities during the day and night which causes easier exposure time (Thamrin et al., 2021).

Men tend to participate more in outdoor activities, thus increasing the risk of reinfection with different virus serotypes and causing more severe manifestations, which is related to the theory of secondary heterologous infection and the theory of increased dengue infection that depends on antibodies. while women tend to stay at home and become housewives who have more time at home compared to outdoors such as hospitals or public places (Pondaag, Linnie, Finni Fitria Tumiwa, Pingkan Christy Timbuleng, Maria Jeinny Regar, 2025)

With the the lack of producing immunoglubolin as a defense system in the body to fight infection, men are very vulnerable to dengue virus infection. With differences in the immune system of men and women when entering the reproductive period. Women with the hormone esterogen which can increase the synthesis og IgG and Ig will be more functional to carry out the body's defense against virals infections (Ashary et al., 2024). With these findings, it can be concluded that both male and female have the same potential to experience DHF and everone has a very good chance of suffering from DHF depending on what factors are very risky for DHF disease (Fadrina et al., 2021).

One of the predisposing factors or what can be called a factor that makes it easier for someone to behave in a healthy way is gender. This is because it will create behavior, one of which is gender. So that men and women behave according to their gender (Ashary et al., 2024).

Many studies have found that men tend to have a higher incidence of dengue fever than women. This is based on several factors such as biological factors, men and women have differences in the immune system and body physiology that can affect their susceptibility to infection. Men tend to have a slightly weaker immune system in fighting viral infections than women, who have additional protection due to hormonal differences such as estrogen and progesterone. These hormones can affect the immune response to the dengue virus and may explain why women, despite having the same risk of contracting, often show milder or less severe symptoms than men. In addition, the thing that causes men to be more vulnerable to the dengue virus is because men are less efficient in producing immunoglobulins and antibodies as the body's defense system against infections than women (Arifah & Rachman, 2024).

Women are more often in the house than men and the house is a potential place for mosquitoes, where there are objects hanging in the house. This shows that based on gender can affect the occurrence of dengue disease due to certain circumstances or conditions such as a risky home environment where women spend more time at home compared to men who are more often outside the home. Women are more often in the house as well as with behaviour or living habits than the dengue vector is more likely to always be in the house in humid or dark places and around the home environment (Khaulani et al., 2024)

Based on the results of the study there is an influence between age and the incidence of DHF p-value 0,000, OR 5,211(95 CI=2,194-12,377) it can be said that respondents aged 1-44 years old had a 5,211 times risk of experiencing DHF. This finding is in line with previous findings (Rojali & Amalia, 2020) that there is a relationship between age and DHF disease.

Basicalyy, DHF does not affect any age group, either children or adults. Age describes the human age that starts to be calculated from the time of birth untuil the birthday of each year. The older a person is, the more mature they will be in thinking and working. In epidemiological investigations, the variable age or age is very important. In morbidity and mortality rates, almost all show a relationship with age variabels

(Baitanu et al., 2022).

Age is a variable that is always considered in epidemiological studies. Morbidity and mortality rates, in almost all cases, show a correlation with age. Dengue fever cases can affect any age group, possibly due to the large number of respondents who engage in outdoor activities during the day, while dengue-transmitting mosquitoes bite during the day (Susmaneli et al., 2021). This age group is considered to have a high level of vulnerability because, in general, children in this age range are highly mobile, frequently active outside the home, and live in a school environment that is not always monitored for mosquito vector control. Furthermore, they are also starting to become independent but are not yet fully aware of the need to consistently implement clean and healthy living behaviors (PHBS). The combination of unfavorable environmental factors and immature self-control regarding personal and environmental hygiene makes this age group highly vulnerable to dengue fever transmission (Nurhalizah et al., 2025).

Age is one aspect that influences a person's perspective. As they age, their level of development increases based on acquired knowledge and personal experience. Age also influences their behavior in their environment. Those under 24 years of age, considered young, are indeed quicker at absorbing information because they are more active in utilizing information technology and social media where information about dengue fever prevention is widely available. However, at this age, they sometimes lack the application, sensitivity, or concern for their environment (Harahap et al., 2021).

Research has shown that age can influence preventive behaviors regarding dengue fever. Age is often associated with greater experience and knowledge regarding infectious disease prevention, including dengue fever. Older age groups tend to be more aware of the importance of environmental protection and implementing preventive measures than younger age groups. Age is often associated with levels of awareness and concern for preventive measures against diseases, including dengue fever. Research shows that individuals in this older age range are more active in seeking health information and implementing preventive measures, such as maintaining environmental cleanliness and emptying water reservoirs (Chrisye Natalia Bawimbang et al., 2025).

Age is one aspect that influences a person's insight. As they age, their level of development increases based on acquired knowledge and personal experience. Individuals over 30 years of age typically choose activities that are more indoor, such as studying or working, and sometimes spend a lot of time outdoors in the afternoon. Going to work in the morning or interacting around the home in the evening can also expose respondents to Aedes aegypti mosquito bites. One key approach to health is the utilization of information, as it fosters a person's fundamental ability to obtain health information, such as potential health risks and the use of health systems (Muhammad Andariza Avidsyah1, Andi Asrina2, 2024).

Age influences health knowledge and awareness. Age influences a person's comprehension and mindset. As age increases, a person's thinking patterns and comprehension develop, resulting in greater knowledge. Age is a developmental process, and age stratification, and the theoretical perspective of life-span development, suggests that adults' views on social relationships vary with age. Differences in how different age groups perceive information about dengue fever and prevention efforts influence their behaviour (Zaman Chairil, Ali Harokan, 2024).

The disease caused by the transmission of the Aedes aegypti mosquito vector, namely dengue fever, is proven to infect adult human bodies, but it is still found more in the age group of less than 15 years. This can occur because the body’s resistance in children tends to be low so it is very risk to get a disease and children’s activities are fairly large outside the home during the day and meanwhile the Aedes aegypti mosquito actively bites humans during the day (Tarigan et al., 2022).

Younger age is associated with better physical and cognitive abilities, making it easier for them to participate in health activities. Furthermore, this group is more frequently exposed to information through social media and

the internet, making them more aware of the importance of disease prevention. Productive-age individuals have higher motivation and ability to participate in social activities, including health activities. Older adults often face physical and psychological limitations that limit their participation in preventive activities. They may perceive dengue fever prevention as the responsibility of younger generations or health workers, leading to less involvement in prevention programs. This suggests the need for a different approach to engaging older age groups (Lilis Meyrinda et al., 2025).

Every age group (children, adults, and the elderly) can be infected without the significant influence of their age on the possibility of contracting or the severity of the disease. Symptoms of dengue fever (such as high fever, muscle pain, and rash) can occur in anyone, regardless of age. There is no guarantee that certain age groups are more often experiencing severe complications or more often infected with more serious symptoms. All age groups can be infected by one of the four serotypes of the dengue virus (DENV-1, DENV-2, DENV-3, or DENV-4), each of which has the potential to cause different complications. Reinfection with different serotypes is a more influential factor in worsening the severity of the disease, regardless of the age of the infected person (Khaulani et al., 2024).

With increasing age in a person, it will affect and change their mindset and capacity to catch the because a person's mindset is developing. Having accuracy and responsibility in doing everything, older age has that compared to younger age due to experince at an older age being able to make decisions maturely (Hidayah et al., 2021). A person's age influences the risk of dengue fever, ranging from 45 to 60 years. This occurs because a person's level of thinking or maturity in thinking will drive positive or negative actions. From the results of this study, it can be concluded that with age, a person's way of thinking and working becomes more mature and mature. Society tends to trust adults more. In epidemiological research, including case studies of Dengue Hemorrhagic Fever (DHF), age is always a factor that needs to be considered and taken into account. A person's age will influence their activities and actions in carrying out DHF prevention activities (Ranesta & Setiyabudi, 2024).

The majority of respondents were adults, who were employed. Individuals in this age group typically have varied activities and spend a significant amount of time outdoors or outside in the afternoon. Going to work/school in the morning or playing around the house in the afternoon can expose respondents to Aedes aegypti mosquito bites (Dwi Julianti et al., 2023).

CONCLUSION

Based on the result of the research and discussion, it can be concluded that there is no effect of gender on the incidence of DHF in Bandar Lampung City. There is an effect of age on the incidence of DHF in Bandar Lampung City.

Suggestions to future researches to be able to examine othe factors that can cause the incidence of DHF disease such as sociodemographic factors, environmental factors (humidity, temperature, rainfall, mosquito larvae, etc) and behavioral factors.

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