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The Risk Factors of Measles for the Infants in Oesapa Community Health Center Target area of Kupang

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Abstract
Measles is a highly contagious viral disease which affects mostly children. In the City of Kupang, measles is still an acute health problem for the society. The outbreak or upsurge emerged in 2011 showed measles reached the peak of 169 cases. Of 169 cases, 52 measles cases happened in Oesapa Community Health Center with 22 cases of affected infants. The coverage of immunization or vaccination in Oesapa community health center in 2011 has reached UCI (Universal Child Immunization) (100%). This condition has correlation with a number of risk factors such as the level of knowledge of the mother, measles immunization status, pattern of giving exclusive breastfeeding and density of occupancy. The objective of this research is to verify the risk factors that contribute to the emergence of measles which affected children in Oesapa Community Health Center covered area. The type of research is analytic observational with case control study design, using 22 cases samples and 44 control samples. Cases samples include all measles affected children in Oesapa Community Health Center target area in 2011. Control samples include children who were not affected by measles during the period of research. The method of analysis used for the research result is Odds Ratio (OR). The research result shows that the risk factors that caused the measles are level of knowledge of mother is OR = 5,714 (95% CI: 1, 872 – 17, 440); measles immunization status 46,467 (95% CI: 9,972 – 216,526); the pattern of giving exclusive breastfeeding 4,080 (95% CI: 1,279 – 13,019); and dwelling density3,509 (95% CI : 1,154 – 10, 666). It is recommended that the parents need to isolate the measles affected children, carry out additional immunization, increase the volume of giving exclusive breastfeeding, use house ventilation to reduce the risk of density, keep the report and record cases accurately, and disseminate information on measles to the community.

Key Words: *Risk Factors, Measles.*

I. INTRODUCTION

Morbili or *measles* is a disease that infects primarily the children, caused by measles virus from the paramyxoviridae family, genus of morbilivirus. *Measles* is easily transmitted through air or droplet of sufferer or victim, which can be inhaled through nose or mouth. This disease is potentially causing epidemic[1]. According to *Regional and Global Summaries of Measles Incidence by* WHO year 2008, incident rate in the region of South East Asia (SEAPRO) was 75.770. The death rate caused by measles, as reported in 2002, was as many as 777.000; and 202.000 out of 777.000 came from ASEAN Countries. Indonesia is one of the 47 countries as the biggest contributor of measles in the world[1]. In Indonesia, 30.000 children died every year from measles; which means a child died every twenty minutes[2]. The highest case of measles in Indonesia infected the children of 1 – 4 year of age. In 2005 the measles case in Indonesia decreased to 48.612 cases. In the same year, there were also 3.622 cases emerged. The cases decreased by 7.353 in 2010. Until August 2010, the outbreak of measles was 1.525 cases[3].

East Nusa Tenggara Province faced the outbreak of measles in 2008. The outbreak was considered as the biggest case followed by hepatitis B, Polio and Tetanus Neonatorum which reached to 77 cases. It was lower than the previous year which was 118 cases. The city of Kupang was the second place for the highest measles cases after East Sumba District with 22 cases. In 2009, the measles cases dropped to 36 cases and there were 21 cases occurred in Kupang Municipality. However in 2010, the measles cases increased to 169 cases, with 13 cases emerged in Kupang municipality[4]. According to Measles surveillance report by the Health Agency of Kupang Muncipality, that since the week 51 2010 to week 25 in 2011 there was an increase of measles cases to 148 cases. It was doubled than 2009 which was only 13 cases. It then decreased to 13 cases in 2010. Based on aforementioned cases the Municipal of Kupang City declared as the measles Outbreak as stipulated in the municipal decree no. Dinkes. 443.32/025/2011 dated 14 February 2011. After the Outbreak, there was an increase of 21 cases. Therefore the total of measles cases in 2011 was 169 cases and spread in 9 Community Health Center in the City of Kupang. Of 9 Community Health Centers, Oesapa Health Center was in the first place with 52 measles cases and 22 of it suffered by the under-five infants[5].

Measles cases have correlation with the success of measles immunization program. The indicator used to measure the level of community health standard in developing countries is measles immunization. If the measles immunization covered up to 90%, then it contributes to the decrease of ill rate and mortality rate of 80 - 90%. In Indonesia, the measles immunization program started in 1982, and it achieved complete basic measles immunization or Universal Child Immunization (UCI) nationally in 1991. However, the outbreak of measles still happened in some areas, primarily in area with lowest measles immunization coverage[1]. The result of measles immunization coverage in Oesapa Community Health Center showed an increase during the period of 2008 – 2010 which was 50%, 70% and 100%. In 2008 measles immunization coverage were 795 of 869 targeted infants or around 91.45%. In 2009 measles immunization coverage at Oesapa Community Health Center were 898 infants of 869 targeted infants, or around 103.3%[6].

There are some risk factors that caused the emergence of measles disease at Oesapa Community Health Center such as the measles immunization coverage from 2008 to 2010 was 91.4%, 103.3% and 119.9%; which mean that there are still unimmunized infants around 8.6 %. Furthermore, in 2010 exclusive breastfeeding coverage was still low, or around 23.4%, which meant that there were still 56.6% of infants who did not get exclusive breastfeeding, Then the health quality of house and environment was still low, the percentage of standardized houses was around 85.4% (504 houses), of 590 houses which were inspected their sanitation quality. Research by Casaeri in Kendal District (2002) showed that the emergence of measles disease in Kendal related to the vulnerable age, malnutrition status, lack of understanding on measles, contact history and density of population. It can be summarized that there was an increase in Universal Child Immunization at Oesapa Community Health Center. Furthermore, there are still measles cases within the community, and even potentially cause epidemic. Based on this condition, the writer carried out a research on "THE RISK FACTORS OF MEASLES FOR THE INFANTS IN OESAPA COMMUNITY HEALTH CENTER TARGET AREA OF KUPANG".

II. RESEARCH METHOD

Type of research conducted was analytical observational with case control. Research location was at Oesapa Community Health Center targeted areas. It was carried out from October to November 2012. The research population was all infants in Oesapa Community Health Center targeted areas in 2011. The total case samples measles infected infants in Oesapa Community Health Center targeted areas in 2011 are 22 infants. The inclusive criteria of case sample were:

1. The measles cases which infected the infants
2. The decision of the cases based on the diagnosis by the doctor, which stated that the infants suffered from measles based on clinical symptoms or lab confirmation.
3. Medical recorded measles cases at Oesapa Community Health Center in 2011.

The total of control samples was a number of uninfected infants resided at Oesapa Community Health Center targeted areas and lived around or nearby the 44 infected infants. The inclusive criteria of control samples are as follows:

1. Having the same age characteristics with case samples
2. Approval to become the research respondents

The comparison between case respondents and control respondents was 1:2, and then the total respondents were 66. The data was collected from informants using interview, documentation, observation methods, and the room size measurement, and analyzed through computerized data editing, data coding, data entry and data cleaning. The data was then gradually analyzed to identify risk factors, through counting Odds Ratio and trust level with 95% CI. The relation was considered valuable if the lower limit and upper limit (95% CI) did not reach point 1.

III. RESEARCH RESULT AND DISCUSSION

A. Risk factors analysis between research variables and measles infected infants.

The risk factors analysis on the emergence of measles disease included the knowledge of mothers, measles immunization status, exclusive breastfeeding method, and the density of occupancy, as stated on table one in the following page. For knowledge variable, the result of the research conducted on 66 respondents in Oesapa Community Health Center targeted areas showed that 15 infants' mothers (68.2%) and 12 control infants' mothers (27.3%) lacked of knowledge on measles disease, while 7 case infants (31.8%) and 32 control infants' mothers (72.7%) have good knowledge on measles. The result of statistical analysis using Chi Square test, the valued gained between the knowledge of mother and measles disease was p= 0,001 (p < 0,05). It means that there was a correlation between the level of mother's knowledge and infant's measles disease. The OR result calculation was OR = 5,714 (95% CI: 1,872 < OR < 17,440). In CI 95% OR > 1 did not reach number 1, then the level of mother's knowledge become the risk factor for the emergence of measles disease on infants. The infant whose mother has

lack of knowledge on measles diseases has risk 5.714 higher to be infected by measles, compared to infant whose mother has good understanding on measles disease.

For measles immunization status variables, of 66 respondents, 17 case infant mothers (77.3%) and 3 control infant mothers (6.8%) did not give measles immunization to their infants. While 5 case infant mothers (22.7) and 41 control infant mothers (69.7%) gave measles immunization to their infants. The result of statistical analysis using Chi Square stated that between giving measles immunization and measles cases infected the infants, the value was $p = 0,000$ ($p < 0,05$), means there is correlation between measles immunization and measles cases in infants. OR result calculation showed the biggest value of OR = 46,467 (95% CI: 9,972 < OR < 216,526). In CI 95% OR > 1 and it did not reach number 1. Therefore, measles immunization status was the risk factor that caused the emergence of measles cases, that unimmunized infants have risk of 46,467 higher to be infected by measles, compared to those immunized infants.

For exclusive breastfeeding variable, of 66 respondents in Oesapa Community Health Unit targeted areas, 17 mothers (77.3%) and 22 control infant mothers (45.5%) did not give exclusive breastfeeding to infants. While 5 case infant mothers (22.7%) and 24 control infant mothers (54.5%) gave exclusive breastfeeding to their infants.

Table 1. Risk Analysis on mother's knowledge, measles immunization status, the method of exclusive breastfeeding, and the dwelling density toward measles cases infected infants in Oesapa Community Health Center targeted areas – period January 2011 – October 2012.

No	Risk Factors	Cases		Control		Total		OR	CI 95%	p
		n	%	n	%	N	%			
1	Mother's knowledge									
	Less good	15	68,2	12	27,3	27	40,9	5,714	1,872-17,440	0,001
	Good	7	31,8	32	72,7	39	59,1			
2	Measles immunization status									
	Unimmunized	17	77,3	3	6,8	20	30,3	46,467	9,972-216,526	0,000
	Immunized	5	22,7	41	93,2	46	69,7			
3	Exclusive breastfeeding									
	No	17	77,3	20	45,5	37	56,1	4,080	1,279-13,019	0,014
	Yes	5	22,7	24	54,5	29	43,9			
4	Dwelling density									
	Not in compliance with standard	16	72,7	19	43,2	35	53,0	3,509	1,154-10,666	0,023
	In compliance with standard	6	27,3	25	56,8	31	47,0			

Base on the result of statistical analysis using *Chi Square*, the correlation between Exclusive breastfeeding by mother and infants measles cases, shows the value of $p= 0,014$ ($p < 0,05$) which means that there is correlation between exclusive breastfeeding and infant measles cases. The OR result shows the OR value = 4,080 (95% CI: 1,279 < OR < 13,019). It shows CI 95% OR > 1 and it did not reach point 1, then the exclusive breastfeeding by mother was a risk factor for measles. It means that the infants who did not get exclusive breastfeeding would have risk of 4,080, higher to be infected by measles, compared to the infants who have been given exclusive breastfeeding.

For the dwelling density, based on the research conducted on 66 respondents in Oesapa Community Health Center target area, it showed that 16 mothers of infected infants cases (72.7%), and 19 mothers of control cases (43.2%), have non standardized dwelling density. The 6 infants mothers cases (27.3%) and 25 mothers of infants control (56,8%) have standardized dwelling density. From the result of statistical analysis using *Chi Square* test between the dwelling density and the incidence of measles on infants, it was obtained the values of $p = 0,023$($p < 0,05$), which means that there is a correlation between the dwelling density and measles incidence on infants. Form the OR result calculation it was obtained the values of OR = 3,509 (95% CI: 1,154 < OR < 10,666). In CI 95% OR > 1 and it could not reach point 1, then the dwelling density was the risk factor for the measles incident; which

means that the infants living with the mother in the same room the size of 4 m^2 has greater risk of 3,509 to be infected by measles, compared to those infants living with the mother in the same room with the size of more than 4 m^2.

IV. ANALYSIS

1. The relation between the risk factor of knowledge and the measles incident

The research result showed that the value of OR=5,714. It means that the infant whose mother lack of knowledge on measles disease had the risk of 5,714 greater to be infected by measles, compared to the infants whose mothers have good knowledge on the measles disease. Statistically, there was a significant correlation between the mothers knowledge and the measles incident (*p value* =0,001). Lack of knowledge on measles caused the mother would not gain knowledge whether the disease that infected the child was measles andkind of medical treatment that should be undertaken so that the measles would not be getting worse. This was proved by the research result that there were still 4 case respondents (18, 18%) who did not finish basic education. Furthermore, this research showed that there were some mothers who argued that measles symptoms. It was therefore, normal for infants to have it, it would be cured naturally. The measles, if it is not cured, it will affect other infants. The measles can be prevented, if it is not cured, it will cause death. According to Notoatmodjo (2011) knowledge can influence ones health, if it is based on awareness and positive attitude in compliance with the level of knowledge. Other research conducted by Rukanah (2007) in the city of Kupang, stated that there was a correlation between the level of knowledge and the emergence of measles. It means that the infants whose mothers have lack of knowledge on measles have risks of 8,667 greater to be infected than infants whose mothers have good knowledge on measles.

2. Relation between risk factor statuses with the measles cases.

Research result showed that the value of OR =46,467. It means that the infants who were not given immunization would have risk of 46,467 greater to be infected by measles, then the infants who had immunization. Statistically there was a significant correlation between immunization status and the measles occurrence (*p value* =0,000). There was a government program to provide immunization to 9 month infants. This program also provided services to the community without charges. Measles immunization could be obtained in integrated health service Post and community health center. There were 77.3% of mothers who did not provide immunization to their infants (77,3%). The reason was the mother lacked of knowledge on infants' health, and they did not live permanently in one place, but moved very often from one place to another. Measles vaccine was a weakened virus preparet, and originated from various isolated measles strain. Vaccine can protect body from infection and has an important effect in disease epidemiology, which is to change the distribution of relative case age and prevent form getting older than its age. Immunization given during infants' period will decrease the level of distribution of infection agent, and reduced the opportunity of vulnerable infants to be infected by infection agent. World Health Organization (WHO) suggested to the developing countries to give measles immunization to 9 month babies. Based on findings in Haiti stated that around 84% of 11 month infants infected by measles. Therefore the WHO suggestion is considered accurate. The research result conducted in Turkey showed that around 84% of 9 months babies were infected by measles. The research also stated that maternal antibody has vanished at 9 months old babies, also from the babies who were born from infected mothers. This fact also supported the WHO suggestions[8]. Sixty six respondents interview results showed that 46 % respondent (69,7%) brought their infants to the health service center to obtain measles immunization, and 93,5% of infants were given measles vaccine at the age of 9 months. The above research result similar to the of Suardiyasa (2008) that stated that there was a correlation between immunization status and the measles occurrence, that risk of measles for infants without measles immunization was 28,897 times greater than the infants who had been given measles immunization.

3. The relation between risk factor of giving exclusive breastfeeding and measles occurrence

Exclusive breastfeeding has great benefit for the health of infants and babies[9]. However the research result showed that 56,1% of mothers did not give exclusive breastfeeding to their infants. The mothers just gave colostrums and the yellow liquid which came out soon after the delivery process. In fact, 84,8% respondents were the mothers who should have enough time in caring the infants, but due to the lack of knowledge on the necessity of exclusive breastfeeding, then exclusive breastfeeding was not given to their infants. Breastfeeding is a substance with biology complexity which enable to give protection, whether directly or through immunology management. The breastfeeding not only providing protection from infection and allergy, but also stimulating the growth of infants' immunology system. Breastfeeding provides immunity which could not be produced by the infants. Furthermore, breastfeeding contains several anti-inflammation components with the function to protect the cell, slow the neutrofil degranulation, and prevent the radial oxygen. As the result, the infants who were given exclusive breastfeeding would not get sick, primarily at the beginning of their lives. The immunity and anti-infection substance contained in breastfeeding, will protect the infants from infection by bacteria, virus and parasite and other antigen[9].

Based on theoretical concept, breastfeeding is useful for the growth of infants/babies. This research was relevant with above theory. After the OR examination, it was obtained the OR values of 4,080, which means that the infant without breastfeeding would have risk of 4,080 greater to be infected by measles compared to those who were given breastfeeding. The research result was quite different with the research conducted by Tatik Bahar (2011) in Konawe District which showed that exclusive breastfeeding pattern was one of the aspects that reduce the effect of measles. In other words, exclusive breastfeeding is protective factors toward measles infected infants; this can be seen in its values span of 95% CI which did not pass number one. The different between these two researches was the size of samples used. There are 32 case samples and 32 control samples used in Konawe research, based on gender and age matching. While this research used 22 case samples and 44 control samples based on the age matching. Moreover, the target of Konawe research was 12 – 59 months babies, while the target of my research was 0 – 59 months babies.

4. The relation between risk factor of dwelling density and the measles occurrence

The environmental factor that could contribute as risk factor for the occurrence of measles was housing environment. House is one of the human needs, used as place to live, which protect the family from extreme climate and other disturbance. One of the prerequirements as stated in the decree of Indonesian Health Ministry, no.829/MENKES/VII/1999 is the dwelling density. Dwelling density is measured and calculated based on the size of rooms compared to the total number of occupants. In this research, the density occupancy is measured using non dense occupied size if every 4 m² of floor size occupied by 1 person, and it is dense, if every 4 m² room occupied more than 1 person.

Research result shows that the infants who live in a house with dwelling density of 53,0% greater compared to less dense occupancy of 47,0% and statistically there was a correlation between dwelling density and measles occurrence ($p < 0,05$). Risk of measles occurrence for infants living in dense occupied house of 3,509 greater to be infected by measles compared to infants living in house without dwelling density (95% CI: 1,154 – 10,666). The infants who live in dense occupied house will more likely to be infected with disease if there was a sick or infected person in the house. It would be harder to manage and clean the dense occupied house. This will lead to the development of microorganism in the long run. Based on the research, small number of respondents lived in a small rent with very small bedrooms.

This research result is matched with the research by Casaeri (2002) which stated that there is a correlation between the dwelling density and the occurrence of measles, with cross table calculation, the relation between the dwelling density and the measles occurrence, with OR = 2,7 (95% CI: 1,3 -5,8) with p value of 0,01. Therefore statistically the dwelling density is valuable.

V. CONCLUSION

Based on the research result, it can be concluded as follows:

1. Mother's knowledge is the risk factor for the occurrence of measles on infants. Mothers who have lack of knowledge will risks 5,714 greater for the infants to be infected by measles compared to those mothers who have good knowledge on measles.

2. Measles immunization status is the risk factor for the occurrence of measles on infants. The infants without measles immunization will risk 46,467 greater to be infected by measles compared to infants with measles immunization.

3. Exclusive breastfeeding is the risk factor toward the occurrence of measles on infants. The infants without exclusive breastfeeding will have risk of 4,080 greater to be infected by measles, compared to those infants with exclusive breastfeeding.

4. The dwelling density is a risk factor for the measles occurrence on infants. Infants living in the same room with the mothers with the room size of 4 m² will risk 3,509 greater to be infected by measles compared to infants living with the mothers in the room with size of more than 4 m².

VI. RECOMMENDATION

1. For the Family /infected babies

a. The parents who know that their babies are infected by measles with the symptoms of fever, cough, influenza, conjunctivitis, and red spots on the skin, should separate the infected from other infants/babies to avoid the transmission of the disease.
b. Preventive action such as immunization and exclusive breastfeeding should be regularly carried out.

c. To reduce the risk of measles on infants who live in dense occupied house, healthy house facilities such as ventilation and windows should be provided. They are open in the morning for the fresh air and sunlight to come into the house.

2. For Health Institutions

a. To increase knowledge, and improve community's habit and behavior toward measles, then the community mindset should be changed, through distribution of measles information, and the infection caused by measles, through community health program, or leaflet at hospitals or community health center or through health cadres at integrated health service post regularly and sustainably.
b. To reduce the transmission of measles from the infected infants/babies to other infants/babies, it is important to report and record the measles cases as part of measles Early Warning System.
c. To reduce the risk of vulnerable age, it is necessary to increase special prevention programs such as through additional immunization (*Catch up campaign*, *Crash program*) and supplement vitamin A for the family with children of 2 – 14 years of age.

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