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Original Research Article

Risk factor of pneumonia on toddler at puskesmas (public health center) I South Denpasar

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ABSTRACT

Background: The death of toddler due to pneumonia is still high because its risk factor still exist and has not been managed properly. United Nations International Children's Emergency Fund (UNICEF) states that in 2011 there was 1.3 million deaths of children below five years old (toddler) and 14% of the number was caused by pneumonia.
Methods: The design for this research was case control with 27 cases and 27 controls. The case was toddlers who were diagnosed with pneumonia by doctor of public health center (hereafter Puskesmas), aged 0-59 months and were recorded in the ill toddler register from January 1, 2016 until December 31, 2016, meanwhile control was healthy toddlers who were invited to Puskesmas during the research. Data was collected through interview, observation and measurement using questionnaire. Univariate, bivariate, multivariate analyses were performed using Stata SE 12.1.
Results: Bivariate analysis showed that two years of breastfeeding and ARI frequency, as the risk factors of pneumonia on toddler. From bivariate analysis, it was found that the risk factor which was proven to be significant and increased pneumonia on toddler was OR ARI with the value of 5.67 (95% CI:1.16-27.82).
Conclusions: ARI frequency as the risk factor of pneumonia on toddler at Puskesmas I South Denpasar.

Keywords: Pneumonia, Risk factor, Toddler

INTRODUCTION

Pneumonia is the primary death cause of toddlers in the world including Indonesia. United Nations International Children's Emergency Fund (UNICEF) states that in 2011 there was 1.3 million deaths of children below five years old (toddler), 14% of the number was caused by pneumonia.[1] New case prediction and pneumonia incident on toddlers are the highest in 15 countries, covering 115.3 million (74%) out of 156 million cases worldwide. More than the half are concentrated in six countries, covering 44% toddler population of the world. The six countries are India (43 million), China (21 million), Pakistan (10 million), Bangladesh, Indonesia and Nigeria where each has six million cases annually.[2] Basic health research (here after Riskesdas) which was conducted on 2010 states that in 2007 15.5% pneumonia sufferers passed away or 83 toddlers died every day and became the second death cause of the entire toddler deaths in Indonesia. Demography and Health Survey of Indonesia (hereafter SKDI) states that there had been an increase of pneumonia occurrence on toddler from 2002-2007 from 7.6% into 11.2%.[3]

Bali is the second province with the highest occurrence of pneumonia in Indonesia with the percentage of 11.1% in 20. Denpasar is the city with the fourth highest pneumonia coverage in Bali with the percentage of 18.73%, meanwhile Puskesmas I South Denpasar is the second highest public health center with the highest pneumonia coverage in South Denpasar which was amounted to 15.07% in 2012.[4] The highest coverage of

penumonia in South Denpasar is Puskesmas II South Denpasar, however a research about pneumonia occurence on toddlers has been conducted previously at the Puskesmas.

From the research related to the breastfeeding record as the risk factor of pneumonia on toddlers, it is found that adequate breastfeeding could cut down the morbidity and mortality caused by pneumonia as it could decrease infection of respiratory tract as well as lessening the severity level of infection during infancy and childhood, inadequate breastfeeding as one of the risk factors of pneumonia on toddler.[5-11]

From the study of control case on infant and toddler about exclusive breastfeeding and pneumonia, it is found that the two does not have significant relationship.[12,13] The research on breastfeeding associated with pneumonia on toddlers has been conducted in Indonesia, however there has not been one that deeply digs the role of breastfeeding as the risk factor of pneumonia. On the exclusive breastfeeding, the question should not only whether breast milk is the only food given for six months, but there are other things that must be asked regarding the breastfeeding pattern. The things include the early initiation of breastfeeding (EIB) during childbirth, colostrum administration, policy or regulation about exclusive breastfeeding. Accordingly, some programs or policies have been taken or issued by the government to pursue a successful exclusive breastfeeding. Unfortunately, in reality the exclusive breastfeeding coverage in Indonesia has been below the target for years.

Pneumonia prevention relating to pertussis and measles is DPT and measles vaccination with a pleasant coverage number; DPT is ranged from 89.6-94.6% and measles from 87.8%-93.5%. Vaccine probe which has been conducted declares that it is predicted that pneumococcal conjugate could prevent the disease and mortality of 20-35% pneumococcus pneumonia cases and Hib vaccine could prevent the disease and mortality of 15-30% Hib pneumonia cases. Currently in many developing countries, Hib vaccine is recommended to be integrated into routine vaccination program with pneumococcal conjugate is named as the suggested vaccine.[3]

Thanks to the technology advancement of vaccine production, DPT/Hb vaccine could be combined into one single preparation in liquid form called DPT-Hb-Hib. This is in accordance with Strategic advisory Group of Experts on Immunization (SAGE) recommendation on the combination of Hib vaccine with DPT-HB into DPT-Hb-Hib (pentavalent) vaccine to reduce the number of injections for the infant, cost, time and storage efficiency. Pentavalent immunization is given on the age of 2, 3, 4 months and the advanced pentavalent immunization on the age of 18 months. Immune which is formed after the three doses of pentavalent injection previously will decrease on children at the age of 15-18 months.[14] Based on the data from Public Health Office of Denpasar City in 2014, toddler who had gotten pentavalent immunization at Denpasar City in 2014 was amounted to 40%.

METHODS

The design of this study was observational analytic with case control approach. This research was conducted at Puskesmas I South Denpasar from 16th until 25th of November 2017. The sample of this research, for the case was toddlers who were diagnosed with pneumonia by doctor at Puskesmas, aged 0-59 months and were recorded in the ill toddler register from 1st of January until 31st of December 2016 in the working region of Puskesmas I South Denpasar, meanwhile for control was healthy toddlers who were invited to Puskesmas during the research for vaccination or brought by their parents but did not infect by pneumonia in the working region of Puskesmas I South Denpasar and sampling technique used here was purposive sampling technique. The inclusion criteria for cases are those with pneumonia from January 1 to December 2016, willing to be respondents, for control of inclusion criteria are toddlers who have never experienced pneumonia and are not willing to be respondents. Exclusion criteria for the case is not willing to be a respondent, experiencing pneumonia from January 1 to December 31, 2017, not willing to be a respondent, for control of exclusion criteria is never experienced pneumonia and not willing to be a respondent. The authors used questionnaire to collect data on the toddlers' characteristics, breastfeeding, status of Hib and pneumococcus vaccine, as well as ARI frequency. Data analysis was conducted by utilizing STATA program. Bivariate and multivariate analysis were performed with logistic regression by counting the value of crude Odds Ratio (OR), adjusted odds ratio (OR) and confidence interval (CI). This research has been declared ethical by the Research Ethic Commission of Medical Faculty of Udayana University/General Hospital of Sanglah Denpasar through the letter numbered 2045/UN.14.2/Kep/2017.

RESULTS

The result of bivariate analysis of this research was as follows:

Table 1 shows that the risk of pneumonia ishigher on the toddlers who were breastfed less than two years in comparison with the toddlers who were breastfed more than 2 years with OR of 4.03 (95% CI:1.30-12.58). The risk of pneumonia is higher on the toddlers who had suffered from ARI in the last six months compared to the toddlers who had never gotten ARI in the last six months with OR of 7.99 (95% CI:1.93-33.18). Based on the statistic of the toddlers' age, exclusive breastfeeding status, breastfeeding duration, early initiation of breastfeeding status, colostrum administration, Hib immunization status, and pneumococcus immunization, significant result of pneumonia on toddlers was not found.

Table 1: Bivariate test on risk factor of pneumonia on toddler at Puskesmas I South Denpasar.

Variable	Crude OR	95% CI	p Value
Age of toddler	0.11	0.03-0.40	0.001
Exclusive breastfeeding status	1.36	0.46-4.04	0.580
Breastfeeding duration	1.00	0.34-2.93	1.00
Two years-breastfeeding	4.03	1.30-12.58	0.016
Early Initiation of breastfeeding status	1.16	0.40-3.39	0.785
Colostrum administration	2.08	0.18-24.40	0.560
Hib immunization status	1	0	0
Pneumococcus immunization status	1	0	0
ARI frequency	7.99	1.93-33.18	0.0064

Table 2: The result of multivariate analysis on risk factor of pneumonia on toddler at Puskesmas I South Denpasar.

Variable	OR	95% CI	P Value
Age of toddler	0.14	0.03-0.58	0.007
Two-year breastfeeding	2.18	0.55-8.65	0.266
ARI frequency	5.67	1.16-27.82	0.037

Table 2 shows that from the multivariate analysis that had been conducted, the risk factor of toddler's age and two-year breastfeeding which was proven to be significant in bivariate analysis turned to be not significant after they were inserted to the model. Risk factor which was proven to be significant and increased pneumonia factor on toddler was ARI frequency. The risk of pneumonia is higher on the toddlers who had suffered from ARI in the last six months compared to the toddlers who had never gone through ARI in the last six months with OR of 5.67 (95% CI:1.16-27.82).

DISCUSSION

The result of this research shows that the characteristics of toddler (age and gender) are proven to be significant as the risk factor of pneumonia on toddler. This research result is not in accordance with Tantry's theory (2008) which stipulated that the risk to be infected by pneumonia is higher on the children below two years old. The children below two years old have higher risk of being infected by pneumonia compared to the older children because immune status or the immunity of children below two years old has not been complete and lumen of respiratory tract is still narrow. This research result does not go in line with the research result of Regita in 2013 which stated that children aged <12 months has 4.18 times possibility of being infected by pneumonia in comparison with the toddler >12 months until <60 months, it also implied that children ≤12 monthshave risk to get pneumonia which is 2.27 times larger than children aged >12 months.[15] This research result is against the P2 Guidelines on ARI which mentioned that male as the risk factor of pneumonia. This is because the circumference of respiratory tract of male children is smaller than female children or different immunity which exists between boy and girl.[16] In general, almost all researches stated that consistently male has more risks to be infected by pneumonia, even though there are some who posit no significant relationship between the two. Male has more risk of pneumonia than female.[17,6,10] 56% of pneumonia sufferers who are treated in hospital are male based on the research in Uruguay during 997-1998.[18]

The variable of breastfeeding (exclusive breastfeeding status, breastfeeding duration, two-year breastfeeding, early initiation of breastfeeding, and colostrum, administration) as shown in the result, is not significant as risk factor of pneumonia on toddler. This research result is not in line with the research conducted in Brazil where breastfeeding without formula milk could provide protection for toddlers, particularly in the first month of their life. The same goes with the systematic review performed in the US which declared that toddlers whose risk of pneumonia infection is higher have risk factor of exclusive breastfeeding less than the first five months compared to the toddlers who are not infected by pneumonia. This is also in accordance with the breastfeeding coverage based on age which stated that as a toddler gets older, the breastfeeding coverage is decreased. The breastfeeding coverage on age 0 month is 39.8%, 32.5% on age 1 month, 30.7% on age 2 months, 25/2% on age 3 months, 26.3% on age 4 months and 15.3% on age 5 months. This shows that exclusive breastfeeding for six months is still very difficult to be performed by mothers who have infants. In its relations to pneumonia, this study finds the importance of breastfeeding for at least in the first two months of a child's life but also essential to ensure exclusive breastfeeding for the first six months in accordance with the policy taken by government related to the result of previous researches.

Immunization which could prevent the infection of pneumonia is Pertussisthat is contained in DPT Combo 1-3 vaccination (now changed by Pentabio 1-3), Hib (now it is included into basic vaccination which is Pentabio), measles, and pneumococcus. Immunization status used in this research besides the basic vaccination (DPT and measles) is Hib and pneumococcus immunization based on the Association of Pediatrician Indonesia (IDAI) recommendation. Based on the result of multivariate analysis, it is found that Hib and pneumococcus vaccination based on IDAI suggestion is not proven to be significant to increase the risk of pneumonia on toddlers. This research is not in accordance with the one conducted by Annah et al at RSUD Salewangan, Maros, Makassar, Yafanita at RSUD Soetomo Surabaya and Fanada, at

Puskesmas Kenten Palembang which state children with incomplete immunization status have higher status of being infected by pneumonia compared to the children with complete immunization status. However, other researches stated that there is no difference between the children whose DPT and measles vaccination status are incomplete with those whose vaccination status is complete, but those researches did not use Hib and pneumococcus vaccination, instead they used complete vaccination of DPT and measles or basic vaccination.[19] This is because the two vaccine had not been inserted into basic immunization program in Indonesia, however, as for Hib vaccination has been included into basic vaccination within Pentabio (the combination between DPT-Hb and Hib) since 2013 in four regions in Indonesia namely West Java, Yogyakarta, Bali dan Nusa Tenggara Barat. For all regions of Indonesia, it has been applied since 2014. This research result does not comply with the research conducted in Gambia, Africa, which found that pneumococcus vaccination decreases pneumonia by 37%, declining number of patient who has to be hospitalized by 15%, and the decreasing mortality of children by 16%.

Independent variable which is proven to be significant and increases pneumonia on toddler at Puskesmas I South Denpasar is ARI frequency. This goes in line with the statement of Health Department Republic of Indonesia (Depkes RI) which poses that a toddler catches cough and cold three until six times annually on average. This is supported by the coverage of ARI sufferers on toddler at Denpasar City which was 26.8%, with 7.05% pneumonia sufferers in 2013. The proportion of toddler who experienced ARI in the region of Puskesmas I South Denpasar in 2015 was 63.7% and 13.54 who suffered from pneumonia.

In this research, it was found that 63% toddlers had suffered from ARI in the last six months, this is similar with the research in Central Java that found 42.8% experience ARI once within three months. This research result is against the research at Puskesmas Sidorejo Kota Pagar Alam Semarang in 2012 which found insignificant relationship between respiratory tract infection and pneumonia occurrence (OR:2.13;95% CI:0.78-5.64).[6] Recurring ARI occurrence is still high, causing most of them turn into pneumonia if it is not managed directly.

CONCLUSION

ARI frequency as the risk factor of pneumonia is proven to be significant as the risk factor of pneumonia on toddler.

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