ANALYSIS OF RISK FACTORS INFLUENCING THE INCIDENCE OF PNEUMONIA IN TODDLERS IN THE WORK AREA OF BATURRADEN II PUBLIC HEALTH CENTER

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ABSTRACT

Background: Pneumonia is the causes of death in children. Baturaden District is an area with a high incidence of pneumonia, with the prevalence rate of 4%. Pneumonia in under-five children can be caused by a variety of factors. The aim of this study was to identify factors influencing the incidence of pneumonia in under- five children in the work area of the Puskesmas Baturaden II.
Methods: This study is a quantitative analysis observational study with a case- control design using a total of 108 samples consisting of 54 case samples and 54 control samples. Questionnaires, documents and stationery served as research tools. The independent variables used were nutritional status, DPT and measles immunization status, exclusive breastfeeding, vitamin A provision, floor type, wall type, ceiling condition of the house, window opening habits, presence of smokers in the house, and use of mosquito coils. Data analysis was univariate analysis, bivariate analysis with chi-square test, and multivariate analysis with multiple logistic regression test.
Results: Analysis showed that exclusive breastfeeding (p value = 0.003), the presence of smokers in the home (p value = 0.008), and the use of mosquito coils (p value = 0.045) influenced incidence pneumonia in under-five children. Nutritional status, DPT and measles vaccination status, vitamin A administration, floor type, wall type, ceiling condition, and the use of mosquito coils had no effect on the incidence of pneumonia (p value > 0.05). Exclusive breastfeeding is the most influential variable in this study with an OR value of 5.524 (1.755-17.384).
Conclusion: Exclusive breastfeeding is the most influential risk factor for the incidencide of pneumonia in under-five children in the working area of Puskesmas Baturaden II. Therefore, a mother needs to increase understanding and awareness to provide exclusive breastfeeding to under-five children so that under-five children's immunity is in good condition.

Keywords: Under-five children, Risk factor, Physical environment, Pneumonia

INTRODUCTION

Pneumonia is an infection of the respiratory tract of the lungs (Ministry of Health of the Republic of Indonesia, 2022). Pneumonia is mostly caused by microorganisms, such as viruses or bacteria (Sari & Cahyati, 2019). Pneumonia in toddlers is characterized by coughing and/or signs of difficulty breathing (Ministry of Health of the Republic of Indonesia, 2022).

Pneumonia is the leading cause of child death worldwide. In 2019, pneumonia killed 740,180 children under the age of 5. The highest mortality rates from pneumonia occur in low- and middle-income countries (WHO, 2021). The World Health Organization (WHO) states that Indonesia ranks 8th in the world, making it the second-leading cause of infant mortality after diarrhea (Ministry of Health of the Republic of Indonesia, 2022). Central Java Province is the province with the 5th highest coverage of pneumonia in toddlers, which is 37.6% (Ministry of Health of the Republic of Indonesia, 2022). One of the areas in Central Java Province where many cases of pneumonia are found is Banyumas Regency with a prevalence of 3.61%. The 2021 Banyumas Regency Health Profile shows that 1,537 out of 97,885 toddlers suffer from pneumonia (43.5%). The number of pneumonia cases found increased compared to the previous year in 2020, namely 160 toddlers out of 88,764 toddlers suffered from pneumonia (5.0%). Baturraden District is one of the areas with quite high pneumonia cases with a prevalence of 4% (Banyumas Regency Health Office, 2022). According to data recorded in the 2017-2021 case summary of Baturraden II Health Center, pneumonia is ranked 8th out of 10 health problems in the Baturraden II Health Center work area, namely 152 cases in 2021. This figure has increased compared to the previous year, namely 113 cases in 2020 and 47 cases in 2019 (Baturraden II Health Center, 2021). The results of a preliminary study conducted at Baturraden II Health Center showed that the number of pneumonia cases in toddlers found during January-December 2022 was 105 cases.

Pneumonia is a serious problem because it can be transmitted through the air and the immune system of toddlers is still not perfect, causing the transmission of pneumonia infection to

be very easy. Based on the increasing trend of pneumonia incidence in toddlers, a study was conducted to determine the risk factors that influence the incidence of pneumonia in toddlers in the Baturraden II Health Center work area.

RESEARCH METHOD

The type of research used is quantitative analytical observational research with a case control design. The study was conducted in the working area of Baturraden II Health Center during October 2022-March 2023. The case population in this study were outpatients of toddlers at Baturraden II Health Center in January-December 2022, with a minimum sample of 54 toddlers and a consecutive sampling technique. The control population in this study were toddlers who were neighbors of toddlers with pneumonia who had never been clinically diagnosed with pneumonia in January-December 2022, with a minimum sample of toddlers and a purposive sampling technique.

The independent variables used were nutritional status, DPT and measles immunization status, exclusive breastfeeding, vitamin A provision, floor type, wall type, ceiling condition of the house, window opening habits, presence of smokers in the house, and use of mosquito coils.

RESULTS AND DISCUSSION

Table 1. Relationship between exclusive breastfeeding. P value = 0.000 and the presence of smokers in the house (p value = 0.015) with the incidence of pneumonia in toddlers in the Baturraden II Health Center work area.

Variabel		Pneumonia				Total		OR (95% CI)	*p value*
		case		control					
		n	%	n	%	n	%		
Nutritional status	Malnutrition	9	16,7	4	7,4	13	12	2,500 (0,720-8,680)	0,237
	Good nutrition	45	83,3	50	92,6	95	88		
Not getting Vitamin A	Incomplete	1	1,9	0	0,0	1	0,9	-	1,000
Immunization status DPT and measles	complete	53	98,1	54	100	107	99,1		

Variabel		Pneumonia				Total		OR (95% CI)	*p value*
		case		control					
		n	%	n	%	n	%		
Exclusive breastfeeding	Not exclusive breastfeeding	23	42,6	5	9,3	28	25,9	7,271 (2,503-21,126)	0,000
	breastfeeding	31	57,4	49	90,7	80	74,1		
Giving vitamin A	Not getting vitamin A	1	1,9	0	0,0	1	0,9	-	1,000
	Getting vitamin A	53	98,1	54	100	107	99,1		
Floor type	Not eligible	7	13	4	7,4	11	10,2	1,862 (0,512-6,773)	0,525
	eligible	47	87	50	92,6	97	89,8		
Wall type	Not eligible	5	9,3	2	3,7	7	6,5	2,653 (0,492-14,315)	0,434
	eligible	49	90,7	52	96,3	101	93,5		
Condition of the ceiling of the house	Not eligible	33	61,1	22	40,7	55	50,9	2,286 (1,058-4,940)	0,054
	eligible	21	38,9	32	59,3	53	49,1		
The habit of opening windows	No	20	37	10	18,5	30	27,8	2,588 (1,072-1,070)	0,053
	Yes	34	63	44	81,5	78	72,2		
The presence of smokers in the house	Yes	42	77,8	29	53,7	71	65,7	3,017 (1,309-6,956)	0,015
	No	12	22,2	25	46,3	37	34,3		
Use of mosquito coils	Yes	11	20,4	5	9,3	16	14,8	2,507 (0,807-7,789)	0,176
	No	43	79,6	49	90,7	92	85,2		
Total		**54**	**100**	**54**	**100**	**108**	**100**		

(Source: Processed Primary Data, 2023)

Table 2. Results of Multivariate Analysis

Variabel	*p value*	OR	95% Cl
Exclusive breastfeeding	0,003	5,524	1,755-17,384
The habit of opening windows	0,363	1,609	0,577-4,486
The presence of smokers in the house	0,008	3,942	1,419-10,950
Use of mosquito coils	0,045	4,230	1,032-17,341

(Source: Processed Primary Data, 2023)

Table 3 Breastfeeding influenced variables that influence the incidence of pneumonia in toddlers in the Baturraden II Health Center work area are exclusive breastfeeding, the presence of smokers in the house, and the use of mosquito coils. Exclusive breastfeeding is the most influential variable in this study with an OR value of 5.524 (1.755-17.384).

DISCUSSION

The results of the multivariate analysis showed that the variables that influenced the incidence of pneumonia in toddlers in the Baturraden II Health Center work area were exclusive breastfeeding, the presence of smokers in the house, and the use of mosquito coils.

Exclusive breastfeeding for the first 6 months of a baby's life is the best. Exclusive breastfeeding is giving pure breast milk to babies without additional food and drinks from birth until the baby is 6 months old (Pramulya, Wijayanti & Saparwati, 2021). Exclusive breastfeeding is known to provide great protection for babies because it plays a very important role in preventing allergies and inflammation and increasing the immunity of toddlers. Infants under 6 months who do not receive exclusive breastfeeding are at risk of developing infectious diseases, such as pneumonia (Vicasco & Handayani, 2020). The results of the study showed that exclusive breastfeeding had an effect on the incidence of pneumonia in toddlers in the Baturraden II Health Center work area (p value <0.05) with an OR value = 5.524 (1.755-17.384). The results of this study are in line with the study conducted by Mardani, Pradigdo & Mawarni (2018), that a history of exclusive breastfeeding had an effect on the incidence of pneumonia in the Gombong II Health Center work area (p value <0.05) with an OR value = 3.115 (1.247-7.787). However, the results of this study are not in line with the study conducted by Januariana, Khairatunnisa & Sari (2020), that exclusive breastfeeding had no effect on the incidence of pneumonia in toddlers in Tunas

Harapan Village, Gunung Meriah District, Aceh Singkil Regency (p value >0.05).

The habit of smoking indoors is one of the causes of poor air quality, which endangers the health of other family members, especially toddlers (Wulandari et al., 2020). Cigarette smoke inhaled by smokers or inhaled by family members around smokers contains toxic and carcinogenic substances, so the effects on passive smokers are almost the same as active smokers. Cigarette smoke can cause irritation of the respiratory tract by sulfur dioxide, ammonia, and formaldehyde, which can increase lower respiratory tract infections in toddlers (Leonardus & Anggraeni, 2019).

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Pneumonia is the leading cause of child death worldwide. In 2019, pneumonia killed 740,180 children under the age of 5. The highest mortality rates from pneumonia occur in low- and middle-income countries (WHO, 2021). The World Health Organization (WHO) states that Indonesia ranks 8th in the world, making it the second-leading cause of child mortality after diarrhea (Ministry of Health of the Republic of Indonesia, 2022).

The presence of smokers in the house affects the incidence of pneumonia in toddlers in the Baturraden II Community Health Center work area (p value <0.05) with an OR value of 3.942 (1.419-10.950). The results of this study are in line with research conducted by Hasanah & Santik (2021), which stated that family members' smoking habits influence the incidence of pneumonia in toddlers (p value <0.05) with an OR value of 3.619 (1.290-10.150). However, the results of this study are not in line with research conducted by Kasundriya et al. (2020), which stated that the presence of smokers in the home does not affect the incidence of pneumonia in toddlers (p value >0.05). Mosquito coils contain compounds such as carbon monoxide, hydrogen cyanide, heavy

metals, free radicals, and can irritate the respiratory tract in toddlers if the smoke is inhaled (Kusumawati, Suahartono & Dewanti, 2017). The smoke produced by mosquito coils carries a higher risk than the smoke produced by cigarettes (Norkamilawati, Anwary & Ernadi, 2022). The use of mosquito coils affects the incidence of pneumonia in toddlers (p value <0.05) with an OR value of 4.230 (1.032-17.341). The results of this study are in line with research conducted by Sari, Rahardjo & Joko (2018), which found that the use of mosquito coils affects the incidence of pneumonia (p value <0.05) with an OR value of 9.750 (1.158-82.108). This study is inconsistent with research conducted by Suryani, Hadisaputro & Zain (2018), which found that the use of mosquito coils does not affect the incidence of pneumonia (p value >0.05). Variables that do not have a significant relationship and do not affect the incidence of pneumonia in toddlers are nutritional status, DPT and measles immunization status, vitamin A administration, floor type, wall type, ceiling condition, and window opening habits (p value > 0.05). Nutritional status, complete immunization, and vitamin A are one way to improve toddler immunity, physical environmental factors of the house (Minister of Health Decree No. 829 of 1999 concerning Housing Health Requirements).

CONCLUSION AND SUGGESTIONS

The community, especially mothers of toddlers, are expected to be aware of providing exclusive breastfeeding to their children so that the child's immunity is in good condition. In addition, family members are advised to prevent toddlers from exposure to cigarette smoke and mosquito coils. Baturraden II Health Center officers also need to improve monitoring and early detection of risk factors for pneumonia in toddlers so that the incidence of pneumonia in toddlers can decrease. Further researchers can conduct further research on risk factors that influence the incidence of pneumonia in toddlers using a cohort research design, where researchers compare exposed and unexposed groups based on disease status, so that clearer research results are obtained.

REFERENCES

Dinkes Kabupaten Banyumas 2022, *Profil Kesehatan Tahun 2021*, Dinas Kesehatan Kabupaten Banyumas, Banyumas.

Hasanah, U. & Santik, Y.D.P. 2021, 'Faktor Intrinsik dan Ekstrinsik yang Berhubungan dengan Kejadian Pneumonia di Wilayah Puskesmas Rembang', *Jurnal Kesehatan Masyarakat Indonesia (The Indonesian Journal of Public Health)*, vol. 16, no. 2, pp. 84–90.

Hidayani, W.R. 2018, 'Faktor-Faktor Risiko yang Berhubungan dengan Kejadian Pneumonia pada Balita di Wilayah Kerja Puskesmas Sariwangi Kabupaten Tasikmalaya Tahun 2018', *Jurnal Kesehatan Bidkesmas*, vol. 1, no. 9, pp. 39–51.

Januariana, N.E., Khairatunnisa & Sari, E.A. 2020, 'Pneumonia pada Balita di Desa Tunas Harapan Kecamatan Gunung Meriah Kabupaten Aceh Singkil Provinsi Aceh', *Prosiding Seminar Nasional Multidisiplin Ilmu Universitas Asahan ke- 4*, pp. 1166–75.

Kasundriya, S.K., Dhaneria, M., Mathur, A. & Pathak, A. 2020, 'Incidence and Risk Factors for Severe Pneumonia in Children Hospitalized with Pneumonia in', *International Journal of Environmental Research and Public Health*, vol. 17, pp. 1–16.

Kemenkes RI 2022, *Profil Kesehatan Indonesia 2021*, Kementerian Kesehatan Republik Indonesia, Jakarta.

Kusumawati, D., Suahartono, S. & Dewanti, N.A.Y. 2017, 'Hubungan Kondisi Lingkungan Fisik Rumah pada Balita (Studi Kasus di Wilayah Kerja Puskesmas Magelang Selatan Kota Magelang)', *Jurnal Kesehatan Masyarakat (e-Journal)*, vol. 3, no. 3, pp. 675–87.

Leonardus, I. & Anggraeni, L.D. 2019, 'Faktor-Faktor yang Berhubungan dengan Kejadian Pneumonia pada Balita di RSUD Lewoleba', *Jurnal Keperawatan Global*, vol. 4, no. 1, pp. 12–24.

Mardani, R.A., Pradigdo, S.F. & Mawarni, A. 2018, 'Faktor Risiko Kejadian Pneumonia pada Anak Usia 12-48 Bulan (Studi di Wilayah Kerja Puskesmas Gombong II Kabupaten Kebumen Tahun 2017)', *Jurnal Kesehatan Masyarakat (e-Journal)*, vol. 6, no. 1, pp. 581–90.

Norkamilawati, Anwary, A.Z. & Ernadi, E. 2022, 'Hubungan Paparan Asap Rokok, Obat Nyamuk Bakar dan Pembakaran Sampah dengan Penyakit Infeksi Saluran Pernapasan Akut (ISPA) pada Balita di Wilayah Kerja Puskesmas Guntung Payung Tahun 2021'.

Pramulya, I., Wijayanti, F. & Saparwati, M. 2021, 'Hubungan Pemberian ASI Eksklusif dengan Kejadian Stunting pada Balita Usia 24-60 Bulan', *Jurnal Kesehatan Kusuma Husada*, vol. 12, no. 1, pp. 35–41.

Puskesmas Baturraden II 2021, *Profil Kesehatan Puskesmas Baturraden*, Dinas Kesehatan Kabupaten Banyumas, Banyumas.

Sari, D.K., Rahardjo, M. & Joko, T. 2018, 'Hubungan Kondisi Lingkungan Fisik Rumah dengan Kejadian Pneumonia pada Anak Balita di Kecamatan Pacitan Kabupaten Pacitan', *Jurnal Kesehatan Masyarakat (e-Journal)*, vol. 6, no. 6, pp. 61–8.

Sari, M.P. & Cahyati, W.H. 2019, 'Tren Pneumonia Balita di Kota Semarang Tahun 2012-2018', *HIGEIA (Journal of Public Health Research and Development)*, vol. 3, no. 3, pp. 407–16.

Suryani, S., Hadisaputro, S. & Zain, S. 2018, 'Faktor Risiko Lingkungan yang Berhubungan dengan Kejadian Pneumonia pada Balita (Studi di Wilayah Kerja Dinas Kesehatan Kota Bengkulu)', *HIGIENE: Jurnal Kesehatan Lingkungan*, vol. 4, no. 1, pp. 26–31.

Vicasco, M.A.N. & Handayani, D. 2020, 'Literature Review: Analisis Faktor Risiko Pneumonia pada Balita', *National Conference for Ummah*, Universitas Nahdlatul Ulama, Surabaya.

WHO 2021, *Pneumonia*, World Health Organization.

Wulandari, V.O., Susumaningrum, L.A., Susanto, T. & Kholis, A. 2020, 'Hubungan Paparan Asap dengan Kejadian Infeksi Saluran Pernapasan Akut (ISPA) pada Anak Usia 0-5 Tahun di Wilayah Pertanian Kecamatan Panti Kabupaten Jember', *Jurnal Epidemiologi Kesehatan Komunitas*, vol. 5, no. 2, pp. 88–95.