p-ISSN 2407-0831
e-ISSN 2621-8372

JURNAL RESPIRASI

JR

Volume 7, Number 1 January 2021

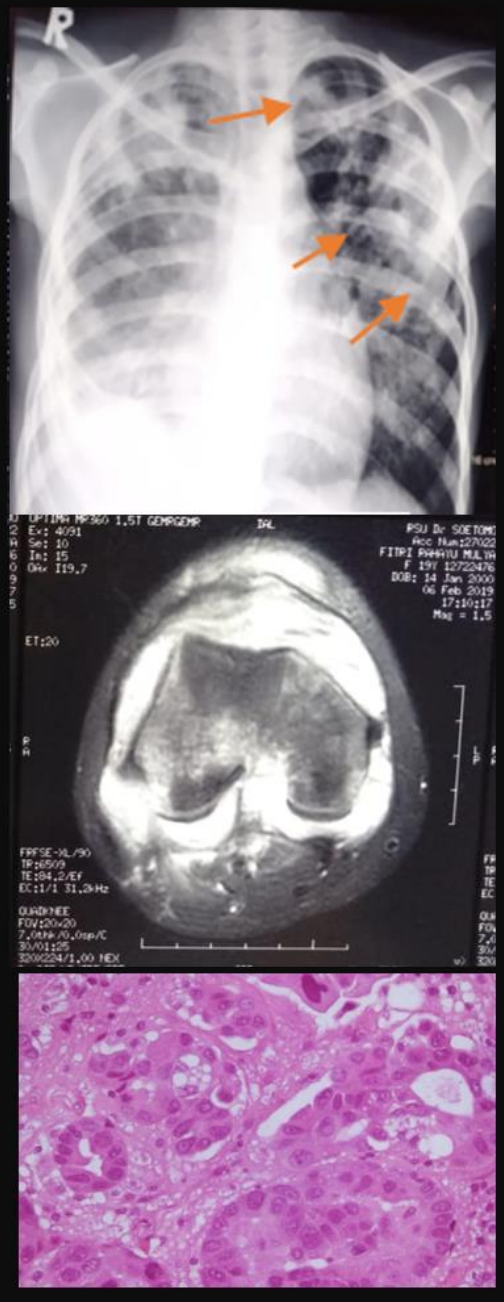

TABLE OF CONTENTS

JURNAL RESPIRASI

Vol 7 (1) 2021

Kini, Jurnal Respirasi ada di genggamanmu, tinggal ketik:

s.id/jurnalrespirasi

INTRODUCTION

Jurnal Respirasi (JR) (p-ISSN: 2407-0831, e-ISSN: 2621-8372) was previously named Majalah Kedokteran Respirasi (MKR) which was established in 2010. The chief editor of MKR was Yusuf Wibisono, dr., Sp.P(K), FCCP. In 2015, MKR changed its name to **JR** with Winariani Koesoemoprodjo, dr., Sp.P(K), MARS, FCCP as its chief editor.

JR is a national journal published by Department of Pulmonology & Respiratory Medicine, Faculty of Medicine Universitas Airlangga/Dr. Soetomo General Hospital, Surabaya. **JR** is published three times a year, every January, May, & September, and contains 6 (six) complete texts in English. **JR** provides a forum for original article, case reports, and literature reviews.

ACCREDITATION

Jurnal Respirasi has been accredited as a **SINTA 2** journal based on the Decree of the Director General of Research and Development Strengthening RISTEK-BRIN No.B/1796/E5.2/KI.02.00/2020 on December 30th, 2020.

INDEXED BY:

ASSISTANT EDITOR

1. Laila Maulida Hidayah, S.KM., Universitas Airlangga, Indonesia
2. Cindy Belinda Ramadhanty, S.Hum., M.Hum., Universitas Airlangga, Indonesia

FOCUS AND SCOPE

This journal publishes various scientific works on the medical world, especially in the field of Pulmonology and Respiratory Medicine, such as:

- Tuberculosis
- Pneumonia
- Lung Cancer
- Asthma
- Chronic Obstructive Pulmonary Disease (COPD)
- Asthma-COPD Overlap Syndrome (ACOS)
- Mediastinal Tumor
- Pleural Effusion
- Pneumothorax
- Fluidopneumothorax
- Chemotherapy
- Radiotherapy
- Superior Vena Cava Syndrome (SVCS)
- Cor Pulmonale
- Atelectasis
- Hemoptysis
- Respiratory Distress
- Occupational Respiratory
- Pneumoconiosis
- Obstructive Sleep Apnea (OSA)
- Lung Mycosis
- Pneumocystis carinii
- Middle East Respiratory Syndrome Coronavirus (MERS CoV)
- Severe Acute Respiratory Syndrome (SARS)
- Immunology
- Endobronchial Ultrasound Bronchoscopy Procedure (EBUS)
- Pleurodesis
- Thoracoscopy
- Thoracocentesis
- Ventilator
- Non-Invasive Ventilation (NIV)
- Pulmonary Disease and Other Actions

METADATA

Metadata associated with this Archival Unit includes:

Journal URL	https://e-journal.unair.ac.id/JR
Title	Jurnal Respirasi
Publisher	Faculty of Medicine Universitas Airlangga
Description	Jurnal Respirasi (JR)
Keywords	Tuberculosis; Pneumonia; Lung Cancer; Asthma; Chronic Obstructive Pulmonary Disease (COPD); Asthma-COPD Overlap Syndrome (ACOS); Mediastinal Tumor; Pleural Effusion; Pneumothorax; Fluidopneumothorax; Chemotherapy; Radiotherapy; Superior Vena Cava Syndrome (SVCS); Cor Pulmonale; Atelectasis; Hemoptysis; Respiratory Distress; Lung Work; Pneumoconiosis; Obstructive Sleep Apnea (OSA); Lung Mycosis; Pneumocystis carinii; Middle East Respiratory Syndrome Coronavirus (MERS CoV); Severe Acute Respiratory Syndrome (SARS); Endobronchial Ultrasound Bronchoscopy Procedure (EBUS); Pleurodesis; Thoracoscopy; Thoracocentesis; Ventilator; Non-Invasive Ventilation (NIV); Public Health; Respiratory Medicine
Language(s)	English (en_US)
Publisher Email	respirasi@journal.unair.ac.id
Copyright	1. The journal allows the author to hold the copyright of the article without restrictions. 2. The journal allows the author(s) to retain publishing rights without restrictions 3. The legal formal aspect of journal publication accessibility refers to Creative Commons Attribution Share-Alike (CC BY-SA). 4. The Creative Commons Attribution Share-Alike (CC BY-SA) license allows re-distribution and re-use of a licensed work on the conditions that the creator is appropriately credited and that any derivative work is made available under “the same, similar or a

VOLUME 7 NO. 1 2021

p-ISSN 2407-0831

e-ISSN 2621-8372

TABLE OF CONTENTS

ORIGINAL ARTICLE

Risk Factors of Recurrent Upper Respiratory Tract Infection in Children Aged 3-60 Months at Primary Healthcare Centers (Puskemas) in Gresik

Hubah Asyiroh[1], Retno Asih Setyoningrum[2*], Widati Fatmaningrum[3], Budi Utomo[3]
[1]Faculty of Medicine, Universitas Airlangga, Surabaya, Indonesia.
[2]Department of Pediatrics, Faculty of Medicine, Universitas Airlangga/Dr. Soetomo General Hospital, Surabaya, Indonesia.
[3]Department of Public Health and Preventive Medicine, Faculty of Medicine, Universitas Airlangga, Surabaya, Indonesia.

ARTICLE INFO

Article history:
Received 04 December 2020
Received in revised form 30 December 2020
Accepted 21 January 2021

Keywords:
Recurrent respiratory infection,
Upper respiratory tract infection,
Children,
Risk factors.

ABSTRACT

Background: Acute respiratory tract infection (ARTI) is one of the causes of morbidity and mortality in children. This infection may happen in either the upper or lower respiratory tracts. It may also happen recurrently in some children according to the risk factors they have. This study aimed to understand the correlation between risk factors and recurrent upper respiratory tract infection in children aged 3-60 months at primary healthcare centers (Puskesmas) in Gresik.
Methods: This study used an analytic observational study with cross-sectional design. The amount of sample used was 110 patients with upper respiratory infection from October 2019-April 2020 at Puskesmas Industri and Puskesmas Alun-Alun, Gresik. Data analysis was performed using chi-square test and logistic regression. The data were taken from medical records as well as questionnaires.
Results: The result of bivariate analysis showed that asthma (p = 0.000), exposure to cigarette smoke (p = 0.045), healthy home status (p = 0.002), and the occupancy of the house (p = 0.019) had correlations with the occurrence of recurrent upper respiratory infection. Meanwhile, the multivariate analysis presented some variables which had significant correlation with recurrent upper respiratory tract infection such as asthma (p= 0.000), exposure to cigarette smoke (p = 0.012), and healthy home status (p = 0.001).
Conclusion: There was a strong relationship between asthma, exposure to cigarette smoke, and healthy home status with the occurrence of recurrent upper respiratory tract infection (URTI) in children.

INTRODUCTION

Acute respiratory tract infection (ARTI) is one of the causes of morbidity and mortality in children living in developing countries.[1] This infection may happen recurrently and become the most frequent disease in the hospital. Recurrent respiratory tract infections are mostly limited only at the upper respiratory tract with cough, fever, and rhinitis as symptoms.[2] According to World Health Organization (WHO), during the first 5 years of life, a child may experience four to eight episodes of respiratory tract infection which spreads to the lower tract.[3] In the first year of life, as much as 25% of children experienced recurrent respiratory infection and lowered to 18% in children aged 1–4 years old in Western countries.[4] This infection is often linked to the absence of children at school, lower function of the lungs, the increased risk of chronic infection in adulthood, and the excessive use of antibiotics which causes resistance.[5,6] The high number of recurrent upper respiratory tract infection (URTI) morbidity in children is influenced by some risk factors. According to

*Corresponding author: Retno Asih Setyoningrum, Department of Pediatrics, Faculty of Medicine, Universitas Airlangga/Dr. Soetomo General Hospital. Jl. Mayjen Prof. Dr. Moestopo No.6-8, Surabaya, Indonesia. e-mail: retno-a-s@fk.unair.ac.id

Jurnal Respirasi, p-ISSN: 2407-0831; e-ISSN: 2621-8372. Accredited No. 200/M/KPT/2020
 Available at https://e-journal.unair.ac.id/JR. DOI: 10.20473/jr.v7-I.1.2021.8-13

the previous studies, the factors which related to the recurrent URTI are social economy status, exposure to cigarette smoke, rickets, immunization status, family history, older siblings in the family, nutritional status, breastfeeding, cardiovascular disease, and congenital disease in respiratory tract.[7–12] These risk factors may be used for recurrent infection control program in children. Therefore, this study aimed to understand the risk factors which influence the occurrence of recurrent upper respiratory infection in children aged 3–60 months at primary healthcare centers (Puskesmas) in Gresik.

METHODS

This study used analytic observational study with cross-sectional design. The population in this study were children aged 3–60 months who lived in the working area of Puskesmas Industri and Puskesmas Alun-alun Gresik, East Java, Indonesia. Sampling was done through medical records at the healthcare centers. The inclusion criteria in this study were patients aged 3–60 months who were treated and lived around the working area of Puskesmas Industri and Puskesmas Alun-alun, lived with their mothers, and the patients' mother were willing to be respondents. The exclusion criteria in this study were patients with laryngomalacia, cleft palate, and HIV. Data collection was done by looking at growth chart books and conducting interviews with the patient's mother based on patient data from medical records. The sampling was done using purposive sampling. The risk factor variables studied were nutritional status, birth weight, asthma, maternal education, socioeconomic conditions, exposure to cigarette smoke, healthy home status, and the occupancy of the house. The operational definition used was as follows, diagnosis of URTI through the patient's medical record and then anamnesis to distinguish recurrent or non-recurring URTI. The diagnosis from the same doctor if the patient had one or more URTI including rhinitis, sinusitis, pharyngitis with one or more of the symptoms that include URTI criteria (cough, sore throat, rhinorrhea, nasal congestion, hyposmia or anosmia). The patient was diagnosed with recurrent respiratory tract infections if they had URTI equal to or more than 3 times during the past 3 months.

Nutritional status was assessed according to anthropometric standards set by Ministry of Health for assessing children's nutritional status. Assessment of nutritional status was based on weight index according to height. The nutritional status is normal if the Z-score is -2.0 SD to +1 SD, while the nutritional status is not normal if the measurement results are outside of the normal Z-score value. Birth weight is measured through medical records or growth chart books. Birth weight is considered normal if the birth weight is between 2,500 and 4,000 grams. If the birth weight is outside of the normal threshold value, it is said that the birth weight is abnormal. Respondents are said to have comorbidities if they are experiencing asthma or congenital heart disease. The mother's education history is considered to be high if the history of the mother's last education is high school or college and low education if the mother does not have formal education, only finishes elementary or junior high school. The socio-economic level is considered high if the total monthly family income is above the regional minimum wage (RMW) and low if it is below the RMW. Respondents are said to be exposed to cigarette smoke if there is at least one active smoker who lives with the patient. Healthy home status was measured by a healthy home assessment questionnaire. If the total value of the questionnaire is >1,068, it is said that the house status is healthy and <1,068 is said to be not healthy. The occupancy of the house is measured based on the ratio of the area of the house to the occupants. A crowded house is defined if the area of the house is $<8m^2$ per person and it is not overcrowded if the area is $\geq 8m^2$ per person. Data from comorbidities, maternal education, socioeconomic variables, exposure to cigarette smoke, healthy housing, and the occupancy of the house were obtained through interviews with the patient's mother. Data analysis was performed using chi-square test for bivariate analysis and logistic regression for multivariate analysis. This study had received approval from the ethics committee of Faculty of Medicine, Universitas Airlangga.

RESULTS

From October 2019 until April 2020, the number of samples obtained and classified into the inclusive criteria was 110 respondents; all of them were 3-60 months old. From the total of 110 children, there were 40 (36.4%) children which had recurrent upper respiratory infection during the course of this research.

While 70 children (63.6%) only suffered from URTI but did not have a recurrent infection in the next three months. The distribution of the subjects based on the demographic is presented in Table 1. The association between nutritional status, birth weight, asthma, educational status of the mother, socioeconomic, exposure to cigarette smoke, healthy home status, and the occupancy of the house with recurrent URTI using bivariate analysis is shown in Table 2. Based on the bivariate analysis using chi-square test, it showed strong correlations of asthma (p = 0.000; RR = 3.282; CI 95% = 2.250 – 4.788), exposure to cigarette smoke (p = 0.045; RR = 1.818; CI 95% = 0.969 – 3.412), healthy home status (p = 0.002; RR = 2.182; CI 95% = 1.377 – 3.458), and occupancy of the house (p = 0.019; RR=1.802; CI 95% = 1.123 – 2.891). The multivariate analysis was done using logistic regression analysis on independent variables which had p-value <0.25 on bivariate analysis. Thus, there were three variables which had p-value <0.25: asthma, exposure to cigarette smoke, healthy home status, socioeconomic, and occupancy of the house. The result of multivariate analysis is presented in Table 3. Based on multivariate analysis, there was a significant correlation between asthma, exposure to cigarette smoke, and healthy home status. The result of asthma showed p = 0.000; CI 95% = 6.170 – 212.261; RR = 36.188 and exposure to cigarette smoke showed p = 0.012; CI 95% = 2.013 –17.329l RR = 4.458 while the result of healthy home status showed p = 0.001; CI 95% = 1.385 –14.34; RR = 5.907.

Table 1. Characteristics of the respondents

Characteristics	Recurrent Upper Respiratory Tract Infection			
	Yes		No	
	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)
Age				
3 –31 months	23	39.0	36	61.0
32–60 months	17	32.7	35	67.3
Gender				
Male	24	37.5	39	62.5
Female	16	34.8	31	65.2
Nutritional Status				
Abnormal	13	44.8	16	55.2
Normal	27	33.3	54	66.7
Birth Weight				
Abnormal	4	40.0	6	60.0
Normal	36	36.0	64	64.0
Asthma				
Yes	15	88.2	2	11.8
No	25	26.9	68	73.1
Maternal Education				
Low	11	42.3	15	57.7
High	29	34.5	55	65.5
Socioeconomic Status				
Low	20	42.6	27	57.4
High	20	31.7	43	68.3
Exposure to Cigarette Smoke				
Yes	31	43.1	41	56.9
No	9	23.7	29	76.3
Health Home Status				
Not healthy	18	60.0	12	40.0
Healthy	22	27.5	58	72.5
Occupancy of the House				
Yes	17	53.1	15	46.9
No	23	29.5	55	70.5

Table 2. Bivariate analysis of risk factors for recurrent upper respiratory infection in children

Independent Variable	Recurrent Upper Respiratory Tract Infection		RR	95% CI		P
	Yes	No		Upper limit	Lower limit	
Nutritional Status			1.345	2.235	0.809	0.270
Abnormal	13	16				
Normal	27	54				
Birth Weight			1.111	2.480	0.498	0.802
Abnormal	4	6				
Normal	36	64				
Asthma			3.282	4.788	2.250	0.000
Yes	15	2				
No	25	68				
Maternal Education			1.225	2.096	0.716	0.471
Low	11	15				
High	29	55				
Socioeconomic Status			1.340	2.191	0.820	0.244
Low	20	27				
High	20	43				
Exposure to Cigarette Smoke			1.818	3.412	0.969	0.045
Yes	31	41				
No	9	29				
Health Home Status			2.182	3.458	1.377	0.002
Not healthy	18	12				
Healthy	22	58				
Occupancy of the House			1.802	2.891	1.123	0.019
Yes	17	15				
No	23	55				

Table 3. Multivariate analysis of risk factors for recurrent upper respiratory tract infection in children

Variable	*p-value*	RR	95% CI
Asthma	0.000	36.188	6.170– 212.261
Health home status	0.001	4.458	1.385– 14.345
Exposure to cigarette smoke	0.012	5.907	2.013–17.329

DISCUSSION

Most of the respondents in this study had a good nutritional status as much as 73.6%. The results showed no relationship between nutritional status and the incidence of recurrent URTI. The immunity of the children was not only influenced by nutritional status, but there were still many defense mechanisms that were not measured in this study. Thus, even though the children had a good nutritional status, they might still experience repeated infections. However, this study is inconsistent with the study conducted by Sienviolincia, *et al*. (2017) which showed a significant relationship between nutritional status and the frequency of recurrent ARDs.[13] The different results were probably due to differences in nutritional status assessments. This study assessed nutritional status by measuring height and weight, while the other study used two methods, namely body weight for age and height for age.

This study showed no association between birth weight and recurrent upper respiratory infection. The result is different with the previous study conducted by Imelda (2017) which showed that there was strong correlation between low birth weight (LBW) and URTI.[14] The different result of these studies were probably because in the other study, they only analyzed the relationship between LBW and URTI and did not categorize specifically to recurrent respiratory tract infection.

This study found an association between asthma as comorbidity and the incidence of recurrent URTI. This result is in accordance with the theory of Wark, *et al*. (2005) which stated that uncontrolled asthma causes epithelial damage, thus the virus easily enters.[15] These results are consistent with the research of Hai-Feng, *et al*. (2014) which stated that there is a relationship between asthma and the incidence of recurrent respiratory infections.[8] Based on a study by Fleming, *et*

al. (2005) asthma episodes will increase substantially when infected with respiratory syncytial virus (RSV).[16]

In the maternal education variable, most respondents' mothers have high education as much as 76.4% and low education as much as 23.6%. Chi-square test results showed no relationship between maternal education and the incidence of recurrent URTI. The absence of the relationship could be caused because this study only examined the history of formal education. This study is not in line with the study conducted by Febrianti (2020), which stated that there is a significant relationship between maternal education and the incidence of ARTI.[17] The different results may be due to differences in sample size with this study.

There were more respondents with a high socioeconomic status as much as 57.3% and a low socioeconomic status as much as 42.7% who were assessed based on the total income of their parents. The results of the analysis showed that there was no association between socioeconomic level and the incidence of recurrent URTI. This is probably due to the selection of respondents who were not homogeneous. Study by Syahidi, *et al*. (2016) stated that there is a relationship between family income and the incidence of ARTI in children.[18] The different results may be due to differences in income grouping. In this study, the grouping was based on the RMW, while the previous study was determined by the researcher.

In this study, most of the children were exposed to cigarette smoke. The results of the bivariate and multivariate analysis showed that there was a significant relationship between cigarette smoke exposure and the incidence of recurrent URTI. This result is in line with the theory of Vanker (2017) which stated that cigarette smoke affects the respiratory system through an imbalance of Th1 and Th2 responses which makes children more susceptible to respiratory infections and allergies.[19] These results are consistent with the study of Manese, *et al*. (2017) who found a relationship between smoking status of the family members and the incidence of ARTI.[20]

In the variable of healthy home status, most respondents were inside the criteria of a healthy home. The results of bivariate analysis showed a significant relationship between healthy home status and the incidence of recurrent URTI. A house with insufficient ventilation increases the risk of transmission viral to the surrounding people.[20] The results of this study are in accordance with the study conducted by Mayasari (2017) which found a relationship between a healthy home and the incidence of ARTI.[21]

Regarding the occupancy of the house, most of the respondents have a less crowded house. The results of the bivariate analysis of the study found a significant relationship between house density and the incidence of recurrent URTI. A house with a density of inhabitants can increase humidity and increase the risk of transmission between occupants of the house quickly.[22] These results are consistent with the study of Husna, *et al*. (2015) which showed a relationship between occupancy density and the incidence of ARTI under 5 years old.[23]

Limitations in this study were the presence of the respondents who were not willing to be interviewed and the telephone numbers of the patient's parents were not available in the medical records that made the research less effective and took a long time to complete.

CONCLUSION

There was a correlation between asthma, exposure to cigarette smoke, healthy home status, and the occupancy of the house with the occurrence of recurrent URTI in children aged 3-60 months at Puskemas in Gresik. Asthma, exposure to cigarette smoke, and healthy home status are the most influential risk factors in this study.

REFERENCES

1. Hassen S, Getachew M, Eneyew B, et al. Determinants of Acute Respiratory Infection (ARI) among Under-Five Children in Rural Areas of Legambo District, South Wollo Zone, Ethiopia: A Matched Case-Control Study. *Int J Infect Dis IJID Off Publ Int Soc Infect Dis* 2020; 96: 688–695.
2. Raniszewska A, Górska E, Kotuła I, et al. Recurrent Respiratory Tract Infections in Children - Analysis of Immunological Examinations. *Cent J Immunol* 2015; 40: 167–173.
3. El-Azami-El-Idrissi M, Lakhdar-Idrissi M, Chaouki S, et al. Pediatric Recurrent Respiratory Tract Infections: When and How to Explore the Immune System? (About 53 cases). *Pan Afr Med J* 2016; 24: 53.
4. Cuppari C, Colavita L, Miraglia Del Giudice M, et al. Recurrent Respiratory Infections between Immunity and Atopy. *Pediatr Allergy Immunol* 2020; 31: 19–21.
5. Schaad UB, Esposito S, Razi CH. Diagnosis and Management of Recurrent Respiratory Tract Infections in Children: A Practical Guide. *Arch*

Pediatr Infect Dis; 4.
6. Li K-L, Wang B-Z, Li Z-P, et al. Alterations of Intestinal Flora and the Effects of Probiotics in Children with Recurrent Respiratory Tract Infection. *World J Pediatr* 2019; 15: 255–261.
7. Acharya D, Prasanna KS, Nair S, et al. Acute Respiratory Infections in Children: A Community Based Longitudinal Study in South India. *Indian J Public Health* 2003; 47: 7–13.
8. Hai-Feng LI, Yan Z, Pei-Gang J, et al. Risk Factors for Recurrent Respiratory Infections in Preschool Children in China. *Iran J Pediatr* 2014; 24: 14–22.
9. Pujokusuma N, Pamungkasari ETIP, Rahardjo SS. Faktor Risiko Kejadian Recurrent Respiratory Infection pada Anak Usia 2-5 Tahun. *Smart Med Journal; Vol 1, No 2 Smart Med JournalDO - 1013057/smj.v1i228702* , https://jurnal.uns.ac.id/SMedJour/article/view/28702 (2019).
10. Pruikkonen H, Dunder T, Renko M, et al. Risk Factors for Croup in Children with Recurrent Respiratory Infections: A Case-Control Study. *Paediatr Perinat Epidemiol* 2009; 23: 153–159.
11. Trandafir LM, Boiculese L V, Dimitriu G, et al. Recurrent Respiratory Tract Infections in Children. In: *2017 E-Health and Bioengineering Conference (EHB)*. 2017, pp. 741–744.
12. de Oliveira TB, Klering EA, da Veiga ABG. Is Recurrent Respiratory Infection Associated with Allergic Respiratory Disease? *J Asthma* 2019; 56: 160–166.
13. Sienviolincia D, Suhanantyo, Suyatmi. Frekuensi Infeksi Saluran Pernapasan Akut (ISPA) Berulang Mempengaruhi Status Gizi Balita di Kelurahan Jebres Surakarta. *Nexus Kedokt Komunitas* 2017; 6: 11–17.
14. Imelda. Hubungan Berat Badan Lahir Rendah dan Status Imunisasi dengan Kejadian Infeksi Saluran Pernafasan Akut pada Balita di Aceh Besar. *J Ilmu Keperawatan* 2017; 5: 90–96.
15. Wark PAB, Johnston SL, Bucchieri F, et al. Asthmatic Bronchial Epithelial Cells Have a Deficient Innate Immune Response to Infection with Rhinovirus. *J Exp Med* 2005; 201: 937–947.
16. Fleming DM, Pannell RS, Elliot AJ, et al. Respiratory Illness Associated with Influenza and Respiratory Syncytial Virus Infection. *Arch Dis Child* 2005; 90: 741–746.
17. Febrianti A. Pengetahuan, Sikap dan Pendidikan Ibu dengan Kejadian ISPA pada Balita di Puskesmas 7 Ulu Kota Palembang. *J Kesehat Saelmakers PERDANA* 2020; 133–139.
18. Syahidi MH, Gayatri D, Bantas K. Faktor-faktor yang Mempengaruhi Kejadian Infeksi Saluran Pernapasan Akut (ISPA) pada Anak Berumur 12-59 Bulan di Puskesmas Kelurahan Tebet Barat, Kecamatan Tebet, Jakarta Selatan, Tahun 2013. *J Epidemiol Kesehat Indones*; 1.
19. Vanker A, Barnett W, Workman L, et al. Early-Life Exposure to Indoor Air Pollution or Tobacco Smoke and Lower Respiratory Tract Illness and Wheezing in African Infants: A Longitudinal Birth Cohort Study. *Lancet Planet Heal* 2017; 1: e328–e336.
20. Manese MM, Ratag BT, Rattu AJM. Faktor-Faktor Risiko Kejadian ISPA pada Balita di Wilayah Kerja Puskesmas Amurang Timur Kabupaten Minahasa Selatan. *KESMAS*; 6.
21. Mayasari E. Analisis Faktor Risiko Kejadian ISPA Ditinjau dari Status Rumah di Wilayah Kerja Puskesmas Kota Wilayah Utara Kota Kediri. *IKESMA; Vol 13 No 1 (2017)DO - 1019184/ikesma.v13i17020* , https://jurnal.unej.ac.id/index.php/IKESMA/article/view/7020 (2017).
22. Ningrum EK. Hubungan Kondisi Fisik Rumah dan Kepadatan Hunian dengan Kejadian ISPA Non Pneumonia pada Balita di Wilayah Kerja Puskesmas Sungai Pinang. *J Publ Kesehat Masy Indones*; 2.
23. Husna J, Mahfuz AS, Hayati R. Hubungan antara Rumah Sehat dan Pengetahuan Orang Tua dengan Kejadian ISPA pada Balita di Wilayah Puskesmas Pasar Panas Kab. Barito Timur. *An-Nadaa J Kesehat Masy* 2015; 2: 6–13.