

The Effect of Secondhand Smoke and Thirdhand Smoke Exposure at Home on Acute Respiratory Infections

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Abstract—The tendency of smokers who smoke at home continues to increase, therefore many children can be exposed to secondhand smoke and many cases due to exposure to cigarette smoke. The objectives of this study was to determine the associations between children's secondhand smoke and thirdhand smoke exposure at home with acute respiratory infections (ARIs). The study design was case control. The respondents were 145 parents who had children under five who studied in several kindergartens in Semarang and family members or guests smoke at their home. Information on the variables under study was obtained using repeated questionnaires that were completed by the parents. Data analysis using chi square. The result show that children's secondhand smoke and thirdhand smoke exposure at home were associated with Acute Respiratory Infection's (ARIs) significantly. To conclude, the parents have contribution for creating a smoke-free environment to their children. They may help keep their children from being exposed to secondhand smoke and thirdhand smoke by make good role model and home smoke free.

Keywords-secondhand smoke, thirdhand smoke exposure, acute respiratory infection's

I. INTRODUCTION

Secondhand smoke (SHS) and thirdhand smoke (THS) has the same harmful chemicals that smokers inhale. Study was found that smoking in the whole house was a significant factor of positive urinary cotinine in pregnant nonsmokers [1]. Pollution from secondhand smoke (SHS) smoke from burning cigarettes inhaled by nonsmokers especially in the form of gases can be disposed of if there is air ventilation, but can settle on the surface for a certain time on floors, walls, chairs, fabrics, clothing, carpets, furniture that this has the potential as thirdhand smoke[2][3][4][5][6].

Every year, the mortality rate in Indonesia is more than 225,700 due to diseases caused by exposure to cigarette smoke. Exposure to cigarette smoke from 469,000 children (10-14 years) and 53,248,000 adults (15 years and over) who consume cigarettes every day has caused an unhealthy environment and has an impact on smokers and the surrounding community (passive smoking)[7].

Children are most at risk of being effected by exposure to cigarette smoke because children are in their infancy and they breathe faster than adults[4] and immature immune systems[8]. Overall, 40% of children are exposed to cigarette smoke which results in mortality and disability due to the risk of specific diseases, namely acute respiratory infections (ARI), otitis media (inflammation of the middle ear), asthma, lung cancer and ischemic heart disease. The number of childhood diseases due to exposure to cigarette smoke, respiratory infections are most commonly experienced by children under five. Cases of this disease have caused 28% mortality and 40% disability[8][9][10]. In Indonesia, ARI disease in infants is ranked highest with as many as 86,150 cases and ARIs sufferers in infants with the highest level of morbidity and mortality occurring in the province of Central Java [11]. In the city of Semarang, 42% of the number of under-five deaths in 2016 was caused by disturbances in breathing and damage to brain function[12]. ARIs is an acute infection involving the upper and lower respiratory tract organs. This is caused by viruses, fungi and bacteria. ARIs will attack if the body's resistance decreases. Symptoms of ARIs include fever, cough, recurrent runny nose and anorexia[13][14].

The risk of respiratory problems can appear quickly especially in children under five who are often close to smokers. This situation generally occurs in homes where toddlers spend a lot of time with the closest people. Exposure to cigarette smoke from family members or guests who come to the house is contamination in the residence that endangers the health of children[15].

The objective of the study was to determine the associations between children’s secondhand smoke exposure at home and acute respiratory infection’s (ARIs). The study can be supporting evidence to solve the children healthy problem.

II. METHOD

The population characteristics in this study were parents with children aged 3-5 years in Semarang. The sample technique is judgmental or purposive sampling technique that is taken based on the need to achieve the objectives of this study. The sample in this study were

145 parents who had children under five who studied in several kindergartens in Semarang and family members or guests smoke at their home. This study used a cross sectional study design or design. The study used questionnaire as instrument to determine exposure to cigarette smoke in children under five at home due to smoking activities carried out by family members and guests at home with ARI and identify location to smoke. Data analysis in this study uses quantitative methods. Data analysis used the chi square test to test the comparative nonparametric hypothesis in nominal data.

III. RESULT AND DISCUSSION

This research was conducted in Semarang. The subject of research is parents with children aged 3-5 years who were taking kindergarten in some of these areas. With a purposive sampling approach, 145 samples were eligible from 182 initial samples. The subject characteristics are presented in the following table 1:

TABLE 1. SMOKING AREA

Smoking area Guest/Family member	Total of respondents	Percentage
Parents’ bed room	1	1%
Bath room	5	3%
Family room	17	12%
Terrace	69	48%
Outdoors	53	37%
Total Respondents	145	100%

Source : Primary data

Based on the location of smoking, it was found that 69 (48%) of respondents stated that guests / family members smoked on the terrace, 53 (37%) respondents said that guests / family members smoked outdoors,

while other locations smoked were 17 (12 %) respondents were in the family room, 5 respondents (3%) stated in the bathroom and 1 respondent (1%) stated in the parents' bedroom.

TABLE 2 . TOTAL SMOKERS BASED ON FAMILY MEMBERS AND GUESTS

Category of smokers	The number of smokers (person)					Total
	0	1	2	3	> 3	
Family members	26 (18%)	100 (69%)	15 (10%)	3 (2%)	1 (1%)	145 (100%)
Guests	9 (6%)	69 (48%)	22 (15%)	11 (8%)	34 (23%)	145 (100%)

Source : Primary data

The number of smokers show 26 respondents (18%) stated that there is no family member smoked, 100 respondents (69%) stated that 1 family member

smoked, 15 respondents (10%) stated 2 family members who smoked, 3 respondents stated 3 family

members who smoked and 1 respondent stated more than 3 family members who smoked.

In addition, there were 9 respondents (6%) who stated that there is no guest smoked, 69 respondents (48%)

stated that 1 guest smoked, 22 respondents (15%) stated that 2 guests smoked, 11 respondents (8%) stated 3 guests who smoked, and 34 respondents (23%) stated that more than 3 guests smoked.

TABLE 3. STATISTICAL TEST RESULTS

Variable	Total numbers of ARIs' cases		p
	Yes	No	
Contact risk with the smokers (n=145)			0.046
Yes (n =92)	51(55%)	41 (45%)	
No (n=53)	39 (74%)	14 (26%)	

Source : Primary data

With a total of 145 families whose family members and guests smoke at home, it was found that there was association between the risk of contact with smokers at home to the incidence of ARIs in children under five significantly with a value of $p < 0.05$.

The results of this study show that there is an association between exposure to cigarette smoke and ARIs. From the results of this study, it can be interpreted that exposure to cigarette smoke significantly effects the health status of children. This is reinforced by the results of further analysis of basic health research in 2013 which said that there was a correlation between exposure to cigarette smoke at home with the incidence of ARIs in Java and Bali [16]. Research carried out in Manado also reported that there is a difference between exposure to cigarette smoke at home to the incidence of ARI in children under five[17]. Cigarette smoke smoked by passive smoking causes the ciliary to be disrupted, lenter volume increases. There are some changes in the mechanism of the body that does not return to normal before being free from exposure to cigarette smoke. If people with ARI are still exposed to cigarette smoke, the body's defense against infection remains disturbed and prolongs the time needed for healing. Cigarette smoke which is sucked in by the child, will effect the airway ciliary activity (ciliary nasal cavity) and inhibit other local defense mechanisms. If there are germs that enter through the airways, the child's immune system does not work optimally. Exposure to cigarette smoke can interfere with air circulation which is constantly inhaled by children under five and becomes a potential lung disorder as adults[15].

Exposure to cigarette smoke in toddlers is common when family members or guests smoke at home. The results of the study prove that the majority of respondents said that the environment provided for family members and smoking guests was at home and a minority of respondents reported that smoking was

carried out outdoors. This condition is said to be the environment for tobacco smoke in children. At least between 40% and 60% of children in the UK are exposed to cigarette smoke at home[18]. The results of subsequent studies showed ETS exposure in home children varied, from 27.6% in Africa, 34.3% in Southeast Asia, 50.6% in the Western Pacific and up to 77.8% in Europe[19]. Apart from houses, there are other environments that have the potential to expose cigarette smoke, namely apartments and houses that were previously occupied by smokers, the number of houses where smoking activities are allowed, cars that have been used for smoking activities, hotel rooms that are permitted for smoking activities, and rooms where smoking done[3].

The number of smokers at home potentially have an impact on health problems in children. The results showed that in the family, there were even more than three people, both family members and guests who used to smoke at home. This is similar to the results of a study which stated that 74% of three-year-old children in one city in East Java experienced ARIs because of exposure to cigarette smoke by smoking activities carried out by more than one family member at home[20]. Thus it can be said that the more members or guests smoke, the more often they smoke and the more cigarettes smoked, the greater the risk and intensity of ARIs cases in children under five.

With this condition, the family plays an important role in providing health protection to the health development of children under the age of five at home. This is reinforced by Theory A Bioecological Model of Human Development by Bronfenbrenner. The theory states that children's social interactions and experiences gained in the family determine their growth and development. In this case, the role of the family in providing love, care and opportunity to learn and understand has a major impact on the success of child development[21]. Agreeing with the theory

above, Young [22] said that care, care, stimulation of health and education is important to grow children who grow healthy, productive and quality in the future. Therefore, family health policies that include decisions, programs and behavior what will be done to achieve health goals in the home environment is something that needs to be considered [23][24]. The policy of reducing exposure to secondhand smoke starts with enforcing the rules of a house that is smoke free, because children are active and spend time with family members or guests at home. With health protection efforts for children through healthy environmental stimulation, the development of children's health is good.

Indonesia's efforts to protect the public from the effects of cigarette smoke are still limited to creating non-smoking areas in health facilities, educational environments, public transportation; fines for smokers who violate the rules; fees charged for trials for smokers who violate the rules [25]. This has not been effective in overcoming the problem of reducing the impact of exposure to cigarette smoke on children under five. The reason for this policy is that it is still within the general environmental boundaries and that the child is not constantly in the environment and conditions so that the potential for children to experience illness due to cigarette smoke originating from the environment tends to be low. Based on the description above, creating a smoke-free home environment is the main thing to reduce the impact of exposure to cigarette smoke, especially in children under five. In addition, an approach aimed at increasing knowledge and changing attitudes of parents with education and counseling on the dangers of cigarette smoke exposure to children under five is also important to strengthen the policy of a smoke-free home environment so that efforts to reduce exposure to cigarette smoke can continue.

IV. CONCLUSIONS

The parents have contribution for creating a smoke-free environment to their children. Further studies are also required across a range of quantitative research domains, including different disciplines (sociology, anthropology, psychology) and areas of research including the behavior of family members to protect the children.

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