ORIGINAL ARTICLE

Parental Knowledge and Preventive Behaviors Towards Vehicular Emission-associated With Acute Respiratory Tract Infections: A Cross-sectional Study in Indonesia

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ABSTRACT

Introduction: : Acute respiratory tract infections (ARIs) are a significant part of the disease burden in Indo-nesia. The increase in the number of vehicles has been one of the significant contributing factors of air pollution in Indonesia. **Methods:** A cross sectional study was conducted in eight public health centers in Jakarta and used a self-reported instrument on parental knowledge on the effects of vehicle emission and The Motorcycle Rider Behavior Questionnaire. **Results:** Mothers who received had higher education, employed, higher income, had history of previous ARIs, and higher knowledge showed better preventive behaviors (p-value <0.05). Most parents had adequate knowledge on the health consequences of vehicular emissions (91.9%). Item in which 90% or more answered corrected was: "smoke and dust are harmful", while the lowest percentage of corrected answer was "cough, runny nose, fever, and short of breath are ARIs symptoms. Over half showed poor preventive behaviors (51.8%). Item in which 20% or more answered as 'often practice' was "used a child safety jacket on motorcycle". While the lowest percentage (<5%) of often and always practices were: "use gloves when riding a motorcycle with children". In the multivariable analysis, age, educational level, employment status, family income, history of previous ARIs, and knowledge (β=0.62, p=0.001) were the factors associated with preventive behaviors towards vehicle emission associated with ARIs. **Conclusion:** Parental adequate knowledge and poor preventive behaviors towards vehicular emission as-sociated with ARIs. Interventions targeting children from parents with lower educational is of importance to reduce the burden of ARIs.

Keywords: Acute respiratory tract infections, Parental education, Public health centers, Under- five children, Vehicle emissions

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INTRODUCTION

Acute Respiratory Infections (ARIs), refer to infections affecting respiratory systems, mainly categorized into upper respiratory tract infections (URIs) and lower respiratory tract infections (LRIs). These infections may include rhinitis, (common cold), sinusitis, ear infections, acute pharyngitis or tonsillopharyngitis, epiglottitis, and laryngitis. Whilst, LRIs involve the airways from trachea to the alveoli. The infections may include pneumonia and bronchiolitis (1). ARIs have been the leading causes of the morbidity and mortality in under-five children worldwide. Moreover, respiratory tract infections caused by pneumonia kill more children than any other infectious disease. They are responsible for the mortality of 800,000 under five chil-dren annually, or about 2,200 every day, accounting for 15% of all under five children's mor-talities. The United Nations Children's Fund (UNICEF) reported that there were more than 1,400 cases of pneumonia per 100,000 children globally. The greatest incidence was mainly found in South Asia (2,500 cases per 100,000 children) then followed by Central Africa (1,620 cases per 100,000 children) (2)(3)(4).

Indonesia is among the top three countries with the highest ARI cases. Indonesia, along with India, Nigeria, Pakistan and China contributed to over half of the global pneumonia cases (5). The prevalence according to medical diagnosis and medical diagnosis/ clinical symptoms was 7.8 percent and 12.8 percent for ARIs, and 2.1 percent and 4.8 percent for pneumonia. Meanwhile the prevalence in DKI Jakarta Province according to medical diagnosis and medical diagnosis/ clinical symptoms was 5.4 percent and 13.2 percent for ARIs and 2.0 percent and 4.2 percent for pneumonia respectively (6). The increase in the number of vehicles has been one of the significant contributing factors of air pollution in Indonesia, particularly in Jakarta as an urban area and the capital of the country. Statistics Indonesia reported that the number of motor vehicles in Indonesia increases at a rate of 5.35% every year, with the total number reached 18,006,404 in 2016 (7). Accordingly, people living and commuting in Jakarta is at higher risk of ARIs and other air pollution- related diseases due to greater exposure on vehicular emissions. According to The World Air Quality Index Project Team, Jakarta Air Quality Index (PM 2.5 AQI) reached 177, and was categorized into unhealthy, indicating that every individual may begin to experience health effects, and members of sensitive groups may experience more se-rious health effects (8). This number was much higher than that of the Sustainable Development Goals (SDGs) target (11.6) and the overall concentration of fine particle matter (PM 2.5) in Indonesia, with the average value of 15.58 (13.54 – 20.16) [12].

Various studies identified key factors that may predispose under five children to ARIs. Parental factors, such as younger age, unemployment, lower income and lower educational attainment could increase the likelihood of ARIs in children (9) (10). However, high ARI mortality rates in under-5 children are due to a lack of health facilities, poverty, and education in poor countries (5). Parents with good knowledge regarding ARIs, on contrary, have signifi-cantly better abilities to prevent ARIs on their children [9]. A previous study in Pakistan found that most mothers knew what an ARI was and could identify the warning signals. Mothers who were illiterate received insufficient vaccines for their youngest child (11). Despite its relevance on public health issue in Indonesia, few studies have been conducted to assess parental knowledge on the effects of vehicular emission to ARIs in their children. Furthermore, there was a paucity of studies pertaining to parental behaviors to protect their children from vehicular emission exposure and its association with ARIs occurrence. The current study, therefore, is aimed at assessing parental knowledge and preventive behaviors towards vehicular emis-sion-associated with ARIs and to identify its associated factors with parental preventive be-haviors.

MATERIALS AND METHODS

Study Design and Setting

This was a cross- sectional design. The study was carried out from May to June 2019 in the eight public health centers in DKI Jakarta Province, Indonesia. DKI Jakarta Province was selected because it has the highest level of air pollution (PM 2.5 AQI = 177) and is classified as unhealthy (12).

Sample

Population of this study was mothers who has children aged under five children visited one of the eight selected public health centers in DKI Jakarta. Inclusion criteria were parent aged above 18 years old, having a child aged under 5 years old, provide consent to join in this study. Children with severe health problems and whose parents did not give consent were excluded from the study.

We used power analysis to calculate the sample size, assuming =.05, effect size=0.15 (medium effect size), and power level=.80. The initial sample size was estimated to be 109. In this study, a total of 250 questionnaires were distributed, with 112 being collected. Using their queue number, study participants were chosen using an internet-generated simple random sampling technique (random.org).

Instrument

Data were collected using a questionnaire consisting of four parts. The first part comprised questions on the demographic information of the child (i.e., age, sex, and nutritional status) and the parent (i.e., age, educational attainment, and family income). The second part contained questions with a 2- point scale response concerning parental knowledge on the effects of vehicle emission on the respiratory health, which were adapted and translated from a questionnaire developed for the Mongolia – Healthy Environments for Children Alliance (HECA) Seed Funds for Country Implementation Study (13)(14). The third part consisted of questions with 5- point scale response regarding the preventive behaviors towards ARIs while driving/ riding motor vehicles. This part was adapted and translated from The Motorcycle Rider Behavior Questionnaire developed by Sakachita, Senserrick, Lo, Boufous, de Rome, and Ivers (15). The last part comprised questions on the severity and functional impacts of ARIs which were adapted and translated from The Acute Respiratory Tract Infection Questionnaire (ARTIQ) developed by Aabenhus, Thorsen, Siersma, and Brodersen (16).

The questionnaire was pre- tested in 50 respondents who met the inclusion criteria. After completing the questionnaire, the respondents were asked about their

thoughts on the meaning of each questionnaire item to ensure the clarity of the questionnaire. We analyzed the validity of the questionnaire by performing Pearson Product- Moment Correlations with the result of higher r count value on each questionnaire item compared to the r table (r = 0.167 – 0.529). We, fur-thermore, analyzed its reliability using Cronbach's @ coefficient, with the result of 0.705.

Procedure

The Health Research Ethics Committee at an affiliated university granted ethical permis-sion. Data collection was approved by the directors of each of the hospitals included in this investigation. The study's eligible subjects were contacted. Following receiving written consent, the researchers collected the data during the parent visited eight public health institutions in Indonesia's DKI Jakarta Province. Participants had the right to cancel or discontinue their par-ticipation in the study at any time. Subjects were provided information regarding demographic data, knowledge, and preventive behavior towards vehicular emission as a cause of ARIs. It took about 10-15 minutes for each participant to complete the questions.

Data analysis

Continuous data were reported as means with standard deviation (SD) and categorical data as percentages. We did bivariate analysis using the independent t-test for continuous data and chi square test for categorical data. A linear regression model was employed to identify preventive behavior factors. The data were analyzed using SPSS 22.0.

RESULTS

Of 122 children, over half were aged 3-4 years old (67.86%) and only 22.32 percent of the children had normal nutritional status. The majority of children were from families in which the parent aged under 30 years old (51.8%), completed basic (elementary and high school) educa-tion (57.1%), unemployed (74.1%) and earned less than the minimum wages (36.6%) (Table I). Mothers who received had higher education, employed, higher income, had history of previous ARIs, and higher knowledge showed better preventive behaviors (p-value <0.05).

Our study found that most parents had adequate knowledge on the health consequences of vehicular emissions (91.9%). Items in which 80% or more answered corrected were: "smoke and dust are harmful", "smoke and dust pose health problems", "air pollution is caused by vehicle emission, cigarette smoke, and dust", exposure to dust and polluted air might lead to health problems", respiratory diseases not related to temperature humidity, and air quality", and "children breathing problems not caused by weather, transmitted by others, air or dust pollu-tion". While the lowest percentage of corrected answer was "cough, runny nose, fever, and short of breath are ARIs symptoms (Figure 1).

Nonetheless, over half showed poor preventive behaviors (51.8%). Item in which 20% or more answered as 'often practice' was "used a child safety jacket on motorcycle," "When being transported by motorcycle, children wear shoes". While the lowest percentage (<5%) of often and always practices were: "use gloves when riding a motorcycle with children" (Figure 2).

In the multivariable analysis, we found that after adjusting for all confounders, age (β=-0.57, p=0.012), educational level (β=0.58, p=0.023), employment status (β=0.49, p=0.018), family income (β=0.51, p=0.013), history of previous ARIs (β=0.43, p=0.001), and knowledge (β=0.62, p=0.001) were the factors associated with preventive behaviors towards vehicle emission-associated with ARIs (Table II).

DISCUSSION

Our study demonstrated that 91.9% parents had adequate knowledge on the effects of vehicular emissions on ARIs. The proportion was higher than that in Ghana; the proportion of adequate knowledge on the effects of air pollution on health was around 50% (17). The great majority of parents have confidence in the impact of vehicle emission or air pollution on health and only a few parents aware about ARIs symptoms. Toxic pollutants from combustion of fuels may injure children's respiratory tract, leading to ARIs (18). While early identification and awareness of ARIs symptoms is important to provide early treatment and prevent from other complications. In this study, 22.3% children were malnourished, and children belonging to low socioeconomic status were more malnourished than higher socioeconomic status. Therefore, parents' education and socioeconomic status play a very important role toward consulting a registered healthcare practitioner.

This study, however, found that more than half of the parents had poor preventive be-haviors. This result was in line with the finding on a previous study (19), showing that parental behaviors was inadequate. Apparently, adequate knowledge is not always followed by adequate behaviors. The study furthermore indicated that adequate behavior was found among those with the highest wealth index. This might be due to their financial abilities to access healthcare ser-vices. These preventive behaviors include the selection of transportation mode while travelling with children. Different transportation modes could strongly influence the exposure. People from low- resource areas who relied more heavily on public vehicles would be more likely to receive higher exposure during commute (20). Moreover, parents with higher education level would be more likely to have

Table I : Differences in preventive behaviors towards vehicular emission-associated with ARIs to general characteristics of study participants (n=112)

Variables	n (%)	Preventive behaviors		
	Mean ±SD	t	p-value	
Children				
Age				
1-2 years old	36 (32.14)			
3-4 years old	76 (67.86)			
Nutritional Status				
Malnourished	25 (22.32)			
Normal	87 (77.68)			
Parents				
Age				
<30 years old	58 (51.79)	42.32±14.88	3.789	0.014
≥30 years old	54 (48.21)	39.15±13.75		
Educational Attainment				
Basic Education	64 (57.14)	38.53±12.61	2.176	0.027
Higher Education	48 (42.86)	41.74±15.21		
Employment Status				
Unemployed	83 (74.11)	37.21±13.46	5.421	0.004
Employed	29 (25.89)	43.35±12.73		
Family Income				
< minimum wage	41 (36.61)	38.88±10.05	1.213	0.036
≥ minimum wage	71 (63.39)	40.87±15.86		
History of ARIs previous last month				
Yes	79 (70.54)	43.11±17.23	6.764	0.001
No	33 (29.46)	37.33±15.50		
Knowledge				
Adequate		46.91±14.72	7.224	0.001
Inadequate		38.26±15.45		

Table II : Factors associated with preventive behaviors towards vehicular emission-associated with ARIs (n=112)

Variables	β	95% CI	*p-value*
Age in years	-0.57	-1.45 – (-0.145)	0.012
Educational Attainment	0.58	0.10 – 2.14	0.023
Employment Status	0.49	0.13 – 2.76	0.018
Family Income in USD	0.51	0.13 – 2.76	0.013
History of ARIs previous last month	0.43	0.13 – 2.76	0.001
Knowledge score	0.62	0.13 – 2.76	0.001
R^2=0.53, Adjusted R^2=0.34, F=4.61, p-value=0.002			

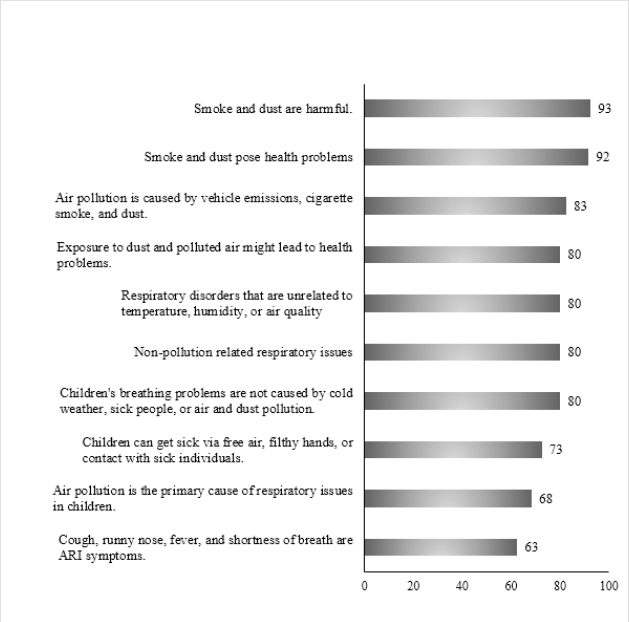

Figure 1 : Percentage of parents' corrected responses to the questions related to knowledge of ARIs (n=112).

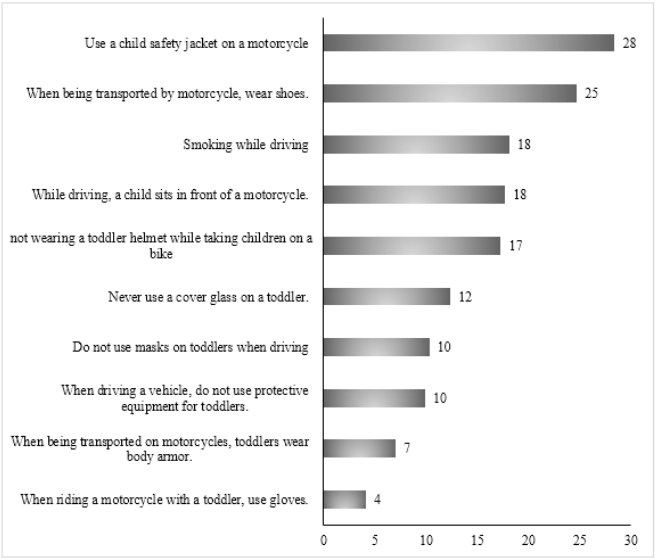

Figure 2. Percentage of parents' responses (always and most of time) to the questions related to preventive behaviors of ARIs (n=112)

Figure 2 : Percentage of parents' responses (always and most of the time) to the questions related to preventive behaviors of ARIs (n=112).

better analytical skills and abilities to comprehend health- related information (21). Better knowledge is of importance to minimize activities and practices that may increase the exposure of air pollution to children. Knowledge acquired from either formal or informal education could help parents in adopting healthy behaviors that may prevent ARIs (22) (23).

Study Limitations

The current study was not without limitations. The information pertaining to knowledge, preventive behaviors, and ARIs was obtained from the parents and therefore was subjective in nature. While Indonesia has 34 provinces in total, all participants in this study hail from DKI Jakarta, which is a drawback to the design of the study. Another disadvantage of convenience sampling is that it has population bi-as-related restrictions that may impede the interpretation and generalization of the target sample findings. The study used a convenient sampling strategy because of time constraints, and hence the sample may not be representative of all parents. However, we conclude that the data provided here may be regarded as adequate representations of parental knowledge and preventive behaviors towards vehicular emission associated with ARIs considering that the study involved parents from DKI Jakarta as a capital city of Indo-nesia. In addition, this study utilizes self-reported information that could lead to bias.

CONCLUSION

Our study highlights parental adequate knowledge and poor preventive behaviors towards ve-hicular emission associated with ARIs. Better awareness is needed for preventive behavior, and parents shall be encouraged to minimize bring child using a motorcycle without protection from the air pollution. Tailored training programs regarding vehicular emission associated with ARIs aimed at thorough. In addition, the government and all other stakeholders must take the re-quired efforts to strengthen the healthcare delivery strategy to prevent the impact of vehicle emission of ARIs and therefore improve parent knowledge and sustained preventive practices.

ACKNOWLEDGEMENT

Thanks to participants to join in this study.

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