

ORIGINAL ARTICLE

THE SECOND-HAND SMOKE IN PREGNANCY AND ITS IMPACT TOWARD LOW BIRTH WEIGHT IN DISTRICT OF ACEH BESAR, ACEH PROVINCE, INDONESIA

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ABSTRACT

Smoking does not only endangers the smokers themselves but will also harm the people around them. These are the non-smokers also called the passive smokers or second-hand smoke. In particular pregnant women who are the second-hand smoke can lead low birth weight (LBW) babies. This study aims to determine the impact of second-hand smoke in pregnancy toward LBW in the district of Aceh Besar in 2016. A case control study was done in district of Aceh Besar, Aceh province, Indonesia. The total sample was 120 neonates (1:1), 60 neonates were LBW (cases) and 60 neonates were normal weight (controls). Data collection was done using a questionnaire filled in by the parents. The univariate analysis was described with percentages and the Wald-Wolfowitz run test was used for the bivariate analysis. The results showed that the majority of mothers had a good knowledge about the dangers of smoking, ie 91 or 75.8%. Most of the mothers had positive attitudes for male smokers. The smoking men are considered normal and acceptable, consisting of 73 mothers or 60.8%. All the mothers in this study were non-smokers (100.0%). The majority of the fathers were smokers, 88 or 73.3%, and most of them smoked around their pregnant wife, 55 fathers or 62.5%. The results of the bivariate analysis indicated there was a significant impact of the second-hand smoke toward the LBW (P value <0.05). It means, mothers as a second-hand smoke during pregnancy have a risk to born the LBW baby

Keywords: second-hand smoke, pregnancy, low birth weight (LBW)

INTRODUCTION

Nowadays, smoking is one of the biggest threats to health worldwide, especially in Indonesia¹. Nevertheless, cigarettes have become a primary need for many people, not only for adults, especially for men, but also even for children. People have smoked cigarettes for centuries.¹ Most of the raw materials of cigarettes come from tobacco leaves which contain highly addictive psychoactive substances, namely nicotine.² Nicotine (C₁₀H₁₄N₂) is an alkaloidal organic compound, consisting of carbon, hydrogen, nitrogen and even sometimes oxygen is in. This alkaloid chemical compound has a strong stimulant effect on the human body. A cigarette usually contains 8-20 mg of nicotine (depending on the type of cigarette), and the body will absorb 1 mg of nicotine from a smoked cigarette.³

Cigarettes are smoked by more than 1 billion people worldwide or close to 20.0% of the world population in 2014. About 80.0% of them or 800 million smokers are male.⁴ World Health Organization (WHO) stated that the country with the largest prevalence of smokers in the world is Indonesia. Approximately 76.2% of men in Indonesia, aged over 15, are smokers.⁵ Ten other countries with the highest prevalence of smokers in the world are: Jordan, Kiribati, Sierra Leone, Russia, Georgia, Laos, Lesotho, Cuba, Greece, and Armenia.⁵

Besides having a socioeconomic impact⁶, smoking also endangers health. The health impacts of smoking include: increases in the risk of heart attacks and strokes (2-4 times more risk than that of people who do not smoke)⁷, increases in the risk of lung cancer (smokers are 25 times more at risk of developing lung cancer than those who do not smoke).⁷ Increases the risk of cancer, including bladder cancer, cervical cancer, colon cancer, oesophageal cancer, kidney cancer, ureteral cancer, larynx cancer, liver cancer, oropharynx cancer, pancreatic cancer and stomach cancer,⁸ also increases the risk of cardiovascular disease.⁹ Recent data from the WHO shows that tobacco has killed more than half of its users. Tobacco kills around 6 million people annually (more than 5 million active smokers and 600,000 others who are passive smokers). Furthermore, other data shows that 1 billion smokers in the world live in low to middle-income countries.¹

Smoking, not only endangers the smokers but also harms the people around them who are non-smokers, these are the people who are called passive smokers or second-hand smoke. A second-hand smoke is someone who does not smoke directly but inhaling cigarette smoke from the people who smoke around them.¹⁰ Although not directly smoking, the second-hand smoke is often affected by the smoke from the cigarettes. Cigarette smoke coming out from the tip of the burning cigarette contains more than 7,000 chemicals. Hundreds of these chemicals are toxic

and more than 70 types of these toxins can cause various kinds of cancer.¹¹

The more often a person is exposed to cigarette smoke, the higher the level of risk of health problems that will be experienced. Meanwhile, the effects of second-hand smoke for children include ear infections, increased risk of asthma attacks, respiratory symptoms and increased risk of sudden infant death syndrome (SIDS). For adults, the effects of passive smoking definitely increase the risk of heart disease, stroke and lung cancer.^{12,13}

Tobacco effects become more serious for women in pregnancy. Smoking during pregnancy can lead to preterm births, low birth weights (LBW), birth defects and ectopic pregnancy. Smoking during pregnancy can also cause placenta complications such as placenta previa and abruption placenta.¹⁴ The dangers of smoking cigarettes not only occur for pregnant women who smoke but also occur for pregnant women who are forced to become second-hand smoke. For pregnant women who are second-hand smoke, the risks that usually occur include miscarriages, birth defects, premature births, LBW and SIDS.^{15,16} All of these smoking risks increase infant mortality, especially in the neonatal period.¹⁷ The number of deaths of children under five worldwide in 2015 was 5.9 million¹⁷, and 45.0% of those occurred in the neonatal period (0-28 days after birth).¹⁸ Four of the major causes of neonatal death are infections, asphyxia, birth trauma, prematurity and LBW.¹⁸ LBW is weight at birth of less than 2,500 grams (5.5 pounds).¹⁹

Each year it is estimated that more than 20 million LBW babies are born, or 16.0% of all births. The majority of LBW births occur in developing countries (96.0%). The effects of LBW are increased the risk of early growth retardation, infectious diseases, slower growth and development, even leading to death.²⁰ Meanwhile, based on the results of the National Basic Health Research (Riskesdas) in 2013, it was mentioned that the prevalence of LBW in Indonesia in 2013 was 10.2 % of all births,²⁰ and LBW was one of the leading causes of neonatal deaths in Indonesia.²¹

In addition to having one of the highest numbers of smokers in the world, Indonesia also has a very large number of second-hand smoke. It has been estimated that more than 100 million people in Indonesia were second-hand smoke, mainly women and children.⁵ According to Riskesdas 2013, Aceh province was one of the provinces with the highest percentage of smokers in Indonesia.²⁰ It indicated that many women and children who live in Aceh were exposed cigarette smoke and become a second-hand smoke. One of the exposed groups was pregnant women. This situation is feared will increase the risk of LBW in

Aceh, which has implications for a higher infant mortality rate.

This study was done in the district of Aceh Besar, one of 23 districts in Aceh Province, Indonesia. Total area district of Aceh Besar was 2,903 km², with a population in 2015 of 384,618.²² In 2013, it was estimated that around 30% of males (aged over 10) in Aceh Besar were smokers.²⁰ The high number of smokers has been the cause of many health problems, such as an increasing number of strokes,²³ and asthma in toddlers.²⁴ This study aims to determine the impact of second-hand smoke in pregnancy toward LBW in the district of Aceh Besar in 2016.

METHODOLOGY

Study Design and Population

This study was an observational study with a case control method. The population of this study was neonates (infants under 28 days of age) who were born and lived in the district of Aceh Besar in 2016. The sample was divided into two groups, the first group was LBW: neonates who were born with weight 1,001-2,499 grams (case group), the second group were neonates who were born with weight 2,500-4,000 grams (control group). Non-probability sampling was used to determine the sample: They were purposive sampling for choosing the subdistrict as the study site and consecutive sampling for determining the case and control. The distance of sub-district with the capital district and prevalence of LBW were the considered when selecting the study site (sub-district).

Fless JL formula was used to calculate the minimum size sample needed:²⁵ Thus the minimum total sample needed for the study results to be valid was 120 neonates (1:1), 60 neonates LBW (cases) and 60 neonates normal weight (controls). Inclusion criteria were that the babies were singletons, the parents were literate and the parents had lived in the same house since before the mother became pregnant until after the delivery. Exclusion criteria were that the mother had no chronic or infectious diseases including tuberculosis, hepatitis B, malaria, diabetes mellitus and/or chronic energy deficiency during her pregnancy.

Data Collection

Data collection was done from July 5 to October 20, 2016, in 15 of the 25 sub-districts in the district of Aceh Besar. Data was collected based on a questionnaire that was completed by the parent when the study was done. The questionnaire was created by the researcher in 2 sections, viz: (a). The characteristics of the neonates' mother and father, and (b). descriptions of the knowledge, attitude and behaviour of the mother towards smoking and also of the father's behaviour while smoking.

Variables

The dependent variable for this study was birth weight which was divided into two groups; birth weight 1,001-2,499 grams (cases) and birth weight 2,500-4,000 grams (controls). The independent variables were: a) paternal smoking (the father had smoked since before the mother became pregnant until delivery, and that he habitually smoked at least 3 cigarettes per day), b) second-hand smoke viz: The mother did not smoke, but had (been forced to) inhaling cigarette smoke from her husband since before pregnant until her delivery).

Data Analysis

Descriptive statistic was used for univariate analysis. But, since the data distribution was not normal, Wald-Wolfowitz run test was used to bivariate analysis (nonparametric test)

Ethical Considerations

Ethical approval for this study was obtained from the ethical committee of Health Polytechnic of Aceh. Written informed consent was signed by all respondents of this study. All information was kept confidential and did not identify the individual respondents.

RESULTS

Descriptive Analysis

Table 1 shows the socio-demographic characteristics of the neonates mothers, and fathers. The maternal characteristics showed that most of the mothers who responded to this study were between 20 to 35 years old, ie 85 people or 70.8% (42 cases and 43 controls). The majority of mothers were high school graduates, ie 68 or 56.6% (32 cases and 36 controls). Most of the mothers were housewives, 104 mothers or 86.7% (51 cases and 53 controls). The characteristics of parity showed that most of the mothers had given birth to children, 2 to 4 times, ie 80 or 66.7% of the total sample (35 cases and 45 controls). The characteristics of the fathers showed that the majority of fathers were between 20 to 40 years

old (young adults). The number of young adult fathers was 83 or 69.2% of the total sample (43 cases and 40 controls). Generally, the fathers were graduates of a secondary education level (high school) of 79 or 65.8% of the total sample (42 cases and 37 controls).

Characteristics of the fathers' occupations showed that the majority of fathers were self-employed, ie. 73 people or 60.9% (35 cases and 38 controls). The average family income showed that the majority of the families in this study had above average incomes. The average monthly income for the families in the study was USD 160 (average income was the cumulative monthly income of the entire sample, divided by the number of samples). The number of families with monthly income above the average was 86 families or 71.7% of the total families (45 cases and 41 controls). Meanwhile, most of the household heads had between 1-3 dependents viz: 63 families or 52.5% of all households (35 cases and 28 controls).

The characteristics of the neonates showed that most of the neonates were female, ie. 70 babies or 58.3% of the total sample (39 cases and 31 controls). Furthermore, 82 neonates or 68.4% were born when the pregnancy was full-term ie. 37 weeks or more (22 cases and 60 controls ie 100% of the controls).

Table 2 sets out the knowledge, attitude, and behavior of the mothers to smoking cigarettes and the father's smoking behavior. In this study, it was found that the majority of mothers had a good knowledge about the dangers of smoking, ie 91 people or 75.8% (43 cases and 48 controls). Toward male smokers, most mothers showed positive attitude for male smokers, consisting of 73 or 60.8% of all mothers (38 cases and 35 controls). They considered smoking men are normal and acceptable. All mothers in this study were non-smokers (100.0%). The majority of the fathers in this study were smokers, 88 or 73.3%, and most of the fathers who smoked, smoked around their wife when she was pregnant (55 people or 62.5%).

Table 1: Characteristics of mothers, fathers and neonates

Characteristic	Cases (60)		Controls (60)		Total (120)	
	n	%	n	%	N	%
Age of mother's						
- < 20 years old	4	6.7	2	3.3	6	5.0
- 20- 35 years old	42	70.0	43	71.7	85	70.8
- >35 years old	14	23.3	15	25.0	29	24.2
Total	60	100.0	60	100.0	120	100.0
Mother's Education Level						
- Primary	18	30.5	16	26.7	34	28.3
- Secondary	32	54.2	36	60.0	68	56.6
- Tertiary	9	15.3	8	13.3	17	14.1
Total	60	100.0	60	100.0	120	100.0
Mother's Occupation						
- Fulltime	8	13.3	4	6.7	12	10.0
- Part time	1	1.7	3	5.0	4	3.3
- Housewife	51	85.0	53	88.3	104	86.7
Total	60	100.0	60	100.0	120	100.0
Parity						
- 1	21	35.0	8	13.3	29	24.2
- 2-4	35	58.3	45	75.0	80	66.7
- >4	4	6.7	7	11.7	11	9.2
Total	60	100.0	60	100.0	120	100.0
Father's Age						
- < 20 years old	0	0.0	0	0.0	0	0.0
- 20- 40 years old	43	71.7	40	66.7	83	69.2
- > 40 years old	17	28.3	20	33.3	37	30.8
Total	60	100.0	60	100.0	120	100.0
Father's Education Level						
- Primary	14	23.3	18	30.0	32	26.7
- Secondary	42	70.0	37	61.7	79	65.8
- Tertiary	4	6.7	5	8.3	9	7.5
Total	60	100.0	60	100.0	120	100.0
Father's Occupation						
- Fulltime job	6	10.0	7	11.7	13	10.8
- Self-employment	35	58.3	38	63.3	73	60.9
- Farmer/ Fisher	3	5.0	6	10.0	9	7.5
- Temporary work	16	26.7	9	15.0	25	20.8
- unemployment	0	0.0	0	0.0	0	0.0
Total	60	100.0	60	100.0	120	100.0
Monthly Income						
- < USD 160,00	15	25.0	19	31.7	34	28.3
- ≥ USD 160,00	45	75.0	41	68.3	86	71.7
Total	60	100.0	60	100.0	120	100.0
Number of dependents						
- 1-3 persons	35	58.3	28	46.7	63	52.5
- 4-6 persons	25	41.7	25	41.7	50	41.7
- ≥7 persons	0	0.0	7	11.6	7	5.8
Total	60	100.0	60	100.0	120	100.0
Sex of neonate						
- Boy	21	35.0	29	48.3	50	41.7
- Girl	39	65.0	31	51.7	70	58.3
Total	60	100.0	60	100.0	120	100.0
Gestational age when the neonate was born						
- < 37 weeks	38	63.3	0	0.0	38	31.6
- ≥ 37 weeks	22	36.7	60	100.0	82	68.4
Total	60	100.0	60	100.0	120	100.0

Table 2: Description of knowledge, attitude and behavior of mother's related smoking and the father's behavior while smoking

Characteristic	Cases (60)		Controls (60)		Total (120)	
	n	%	n	%	N	%
Mother's knowledge of the dangers of smoking						
- Good	43	71.7	48	80.0	91	75.8
- Poor	17	28.3	12	20.0	29	24.2
Total	60	100.0	100	100.0	120	120.0
Mother's attitude towards husband's smoking						
- Negative	22	36.7	25	41.7	47	39.2
- Positive	38	63.3	35	58.3	73	60.8
Total	60	100.0	60	100.0	120	100.0
Mothers Smoking						
- Non-smoker	60	100.0	60	100.0	120	100.0
- Smoker	0	0.0	0	0.0	0	0.0
Total	60	100.0	60	100.0	120	100.0
Fathers Smoking						
- Non-smoker	12	20.0	20	33.3	32	26.7
- Smoker	48	80.0	40	66.7	88	73.3
Total	60	100.0	60	100.0	120	100.0
The father smoked around mother during pregnancy						
- Did not smoke around mother	19	39.5	14	35.0	33	37.5
- Smoked around mother	29	60.5	26	65.0	55	62.5
Total	48	100.0	40	100.0	88	100.0

Bivariate Analysis

Since the data of this study was not a normal distribution, the Wald-Wolfowitz run test was used for bivariate analysis. The two independent variables which were the smoker (father) and the mother as a second-hand smoker were tested.

Table 3 present the results of the Wald-Wolfowitz run test analysis of the second-hand smoke. The finding revealed a significant impact or relationship between the mothers as a second-hand smoker with the LBW. (P value <0.05).

Table 3: Wald-Wolfowitz runs test; The Impact of second-hand smoke toward LBW

Variable	Number	A symp.sig (1 tailed)
Second-hand smoke	55	0,000*

Significant variable: $p < 0.05^*$

DISCUSSION

The bad effects on the health of cigarettes are not only felt by the smoker, but also by passive smokers nearby. For pregnant women, in addition to damage to personal health, second hand smoke from cigarettes can also adversely affect the foetus, which can cause ectopic pregnancies, birth defects, premature births and LBW.¹⁴ The results of this study showed that there was an impact of second-hand smoke on the mothers resulting in LBW in the district of Aceh Besar in 2016.

The results of this study are similar to some studies that have been done previously by other researchers in other countries and also in Indonesia. The results of one study, based on secondary data from the Indonesian family life survey 1993-2007, showed that fathers who smoked 11 or more cigarettes per day would be at risk of having a child born with LBW.²⁶ The difference with this study was that the smoker ie the father smoked 11 or more cigarettes per day and focused the investigation only to father as a

smoker. Another study conducted in Taiwan concluded that there was a correlation between a smoking father and LBW babies. Fathers who smoked 11 or more cigarettes per day when the mother was in the preconception period, the first and second trimester of pregnancy, were at risk of having a baby born with LBW.²⁷ The difference with this study was in the limit of the number of cigarettes smoked ≥ 3 /day and did not divide the pregnancy period in trimesters.

Some references mention the relationship between a smoking father and the risk of having a baby born with LBW. One of them stated that cigarettes smoked by the father will cause sperm damage, reduce the quality of the semen in the sperm and it will not react to infertility treatment.²⁸ The results of this study further showed that mothers who are passive smokers have a significant impact on the birth of babies with LBW. The second-hand smoke referred to in this study was the mothers exposed to cigarette smoke exploited by their husbands at home during pregnancy.

A study in Iran conducted in 2013 concluded that there was a significant relationship between pregnant women who were passive smokers with LBW births, and also most of their babies were born prematurely.²⁹ The difference with this study was that the study was conducted in hospitals with a cohort study. Samples were recruited since they were pregnant in the 3rd trimester and in follow up to labour. Another study conducted in Jordan in 2011 also concluded the same thing. Mothers who were passive smokers will be twice as likely to give birth to LBW as compared to mothers who were not passive smokers.³⁰ The difference with this study lies in the research methodology. The Jordanian study used secondary data (medical records) from a government hospital in North Jordan, while this study used primary data.

Even though the mother is not a smoker, but the smoke that is often inhaled by the mothers not only harms her own health, but also harms the foetus in the womb. Carbon monoxide contained in cigarette smoke and inhaled by the mother will reach the foetus through the placenta and will interfere the growth of the foetus in the womb. So, the foetus cannot grow and develop properly.³¹

The limitation of this study was that it was too difficult to determine precisely who was the cause of the second-hand smoke if more than 1 smoker lived in the same home and smoked around the mother when she was pregnant. Another similar problem was also found for the mother who was a full-time worker (minimum 6 hours/day), outside the home, because smoking in public areas is still commonplace and the mother could be affected by smoke at work as well as at home.

Strict rules about smoking restrictions in homes or around vulnerable groups should be introduced and enforced. Smoking at home should be equated with domestic violence. This will improve the status of the community and household health and help avoid the problems of LBW births and other similar conditions, as well as supporting the human rights of non-smokers. In addition, more intense health promotions should be done to change the perceptions and attitudes of the community so that they no longer assume that men or women who smoke are the norms and that their smoking is harmless to others.

CONCLUSIONS

The majority of the fathers in this study were smokers, 88 or 73.3%, and most of them smoked around their wife, when she was pregnant, 55 fathers (62.5%). There were impacts between the mother as a second-hand smoke and LBW (P value <0.05). Mothers as a second-hand smoke during pregnancy have a risk to born the LBW baby.

ACKNOWLEDGMENTS

We wish like to thank all the participants who helped participate in this study and we are very grateful to the head of the Aceh Besar district Health Office, the heads of the Puskesmas (Sub-district health centres) and to the heads of the maternal and child health teams in those Puskesmas who helped us with this study.

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