

ORIGINAL ARTICLE:**Passive smoker during pregnancy is a risk factor of low birth weight****Kanda Izzatul Aini Ardelia¹, Gatut Hardianto^{2*}, Djohar Nuswantoro³**¹Midwifery Study Program, Faculty of Medicine, Universitas Airlangga, Surabaya, Indonesia, ²Department of Obstetric and Gynecology, Faculty of Medicine, Universitas Airlangga, Surabaya, Indonesia, ³Department of Public Health and Preventive Medicine, Faculty of Medicine, Universitas Airlangga, Surabaya, Indonesia**ABSTRACT****Objectives:** to analyze the relationship between passive smoker of pregnant women with low birth weight (LBW).**Materials and Methods:** This study was an observational analytic study using with case control design, in which infants with LBW served as case group and those with normal birth weight as control group. The site of study was Wonokusumo Health Centre, Surabaya, from January 2016 to December 2017. Study sample was 68, consisting of 34 cases and 34 controls. The dependent variable was LBW, while the independent variable was passive smoking of pregnant women. The samples were excluded if they had multiple births and congenital defects. To determine a significant level, data collected were tested with Chi-square statistical test at significance level of $\alpha=0.05$.**Results:** The results showed that a majority (61.5%) of passive smoker of pregnant women were from the case group. Chi-square revealed $p=0.027$ ($p\leq 0,05$) and OR analysis revealed 3.04 (CI 95% 1.117 – 8.274), indicating relationship between passive smoker of pregnant women with LBW.**Conclusion:** Passive smoker of pregnant women has relationship with decreased birth weight.**Keywords:** low birth weight; passive smoking; pregnancy**ABSTRAK****Tujuan:** Menganalisis hubungan ibu hamil perokok pasif dengan kejadian bayi berat lahir rendah (BBLR).**Bahan dan Metode:** Penelitian ini merupakan penelitian analitik observasional dengan desain kasus kontrol, dengan BBLR sebagai kasus dan bayi berat lahir normal sebagai kontrol. Lokasi penelitian di Puskesmas Wonokusumo, Surabaya, periode Januari 2016 – Desember 2017. Sampel penelitian sebesar 68, meliputi 34 kasus dan 34 kontrol. Variabel terikat adalah BBLR, sedangkan variabel bebas adalah ibu hamil perokok pasif. Sampel tidak termasuk kelahiran kembar dan kelainan kongenital. Untuk menentukan tingkat signifikansi, data yang terkumpul akan dilakukan uji statistika dengan Chi-square pada tingkat kemaknaan $\alpha=0.05$.**Hasil:** Sebagian besar (61,5%) ibu hamil perokok pasif merupakan kelompok kasus. Analisis Chi-square didapatkan p value =0.027 ($p\leq 0,05$) dan analisis OR diperoleh 3.04 (CI 95% 1.117–8.274), berarti terdapat hubungan antara ibu hamil perokok pasif dengan kejadian BBLR.**Simpulan:** Ibu hamil perokok pasif berhubungan dengan penurunan berat badan lahir.**Kata kunci:** bayi berat lahir rendah; perokok pasif; hamil***Correspondence:** Gatut Hardianto, Department of Obstetrics and Gynecology, Faculty of Medicine, Universitas Airlangga, Dr Soetomo Hospital, Jalan Prof dr Moestopo 6-8, Surabaya 60286, Indonesia. E-mail: uroginsurabaya@yahoo.co.idpISSN:0854-0381 • eISSN: 2598-1013 • doi: <http://dx.doi.org/10.20473/mog.V27I12019.12-16>

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INTRODUCTION

Neonatal mortality rate is defined as the number of infants under 28 days of age who die, divided by the number of live births in the year. In 2012, neonatal mortality rate in Indonesia was 19 of 1000 live births.¹ The highest causes of neonatal death in East Java is low birth weight (LBW) about 38.03%.² Surabaya City Health Office 2014 reported that LBW in Surabaya was 2.55% and increased in 2015 to 2.58%.³ LBW is defined as a birth weight of less than 2500 grams (up to and including 2499 grams), regardless of the gestational age.^{4,5} LBW associates with increased morbidities and mortalities in neonates. This situation leads to several complications, such as hypothermia, respiratory distress, feeding intolerance, hypoglycemia, or below-normal neurodevelopment, compared with term infants.^{6,7,8} Many risk factors contribute to LBW, and one of the important factors is environment, such as passive smoke exposure.

The prevalence of smoking among Indonesians is high as in many other developing countries. Indonesia is the third place of smokers of the world, after China and India.⁹ Basic Health Research in 2013 had reported that 36% of Indonesian people were active smokers.¹⁰ Passive smoking has been described as second-hand tobacco smoking (SHTS), defined as the involuntary inhaling smoke from other people who are active smoker.¹¹

Based on the data, East Java has high prevalence of LBW and smoker, especially in the city Surabaya. Some health center working areas in Surabaya already had data on the prevalence of LBW, where Wonokromo Health Center had the highest LBW prevalence. In other health centers, such as in Wonokusumo, no previous published studies were done that related the impact of intrauterine fetal exposure to environmental tobacco smoke on maternal delivery of low birth weight at population level.

MATERIALS AND METHODS

This study was an observational analytic study using case control design. Population in this study was all pregnant women who delivered in Wonokusumo Health Center region in January 2016 – December 2017. Samples were divided into case group and control group, in women with LBW infants served as case group with purposive sampling and those with normal birth weight served as control group with quota sampling. Samples were calculated with non-paired analytic categorical research formula 12 and we

obtained 68 samples, consisting of 34 cases and 34 controls. The dependent variable was LBW, while the independent variable was passive smoking of pregnant women. Passive smoking of pregnant woman has defined as the pregnant woman exposed to a smoking person for at least 15 minutes a day, be it a husband and other housemates who smoked inside the house.^{11,13}

We only included women who gave birth to singleton babies without congenital defects, women without chronic medical conditions before and during pregnancy such as hypertension, diabetes mellitus, heart disease and renal disease. To control the confounding effect of maternal age on birth weight, only women who 20 – 35 years old were included in the study. We excluded women who lived not in Wonokusumo Health Center region, and exposed to smoke during transportation minimally an hour every day.

Data on infant birth weight were collected from the medical records of Wonokusumo Health Center. Data on mothers' socio-demographics and exposure to smoke were collected by questionnaire. The questionnaire items were about the number of smokers living together, the number of cigarettes smoked, and duration of exposure.

RESULTS AND DISCUSSION

The study involved 68 samples, 34 as case group and 34 as control group. Table 1 describes the characteristic of the case and control groups. Education level of control group was higher than case group. Most of the women in control group (64.3%) were workers. Habits of drinking herbals in case group (87.5) was higher than in control group. There was no significant difference in the parity status, interval of pregnancy, and abstinence from food during pregnancy between the two groups.

A comparison of birth weight between case and control group is described in Table 2. Most (61.5%) pregnant women in the case group were passive smokers. The higher the number of active smokers inside the house, the higher the number of cigarettes smoked. Statistical tests in this study were chi-square test, the p value was 0.027 ($<\alpha 0.05$), which means that passive smoking of pregnant women had relationship with LBW and had an odds ratio (OR) of 3.04 (95% CI:1.117, 8.274). The results underscored that environmental factor is one of the risk factors to LBW.¹⁴ This observation was supported by other studies, which suggested that smoke exposure during pregnancy reduced birth weight.^{13,15,16}

Table 1. Research subject characteristics

Subject Characteristics	Frequency					
	Control		Case		Total	
	n	%	n	%	n	%
Age						
20 – 25	17	44.7	21	55.3	38	100
26 – 30	12	63.2	7	36.8	19	100
31 – 35	5	45.5	6	54.5	11	100
Education						
Primary School	12	50	12	50	24	100
Junior High School	6	85.7	1	14.3	7	100
Senior High School	15	41.7	21	58.3	36	100
College	1	100	0	0	1	100
Occupation						
Employed	5	35.7	9	64.3	14	100
Housewife	29	53.7	25	46.3	54	100
Parity status						
0 – 1	13	41.9	18	58.1	31	100
2 – 4	21	56.8	16	43.2	37	100
> 4	0	0	0	0	0	0
Interval of pregnancy						
Primipara	13	41.9	18	58.1	31	100
≤ 2 years	0	0	1	100	1	100
> 2 years	21	58.3	15	41.7	36	100
History of LBW						
Primipara	13	41.9	18	58.1	31	100
Yes	0	0	4	100	4	100
No	21	63.6	12	36.4	33	100
Drinking habits						
Tea	0	0	3	100	3	100
Coffee	0	0	0	0	0	0
Alcohol	0	0	0	0	0	0
Herbal	1	12.5	7	87.5	8	100
Nothing	33	57.9	24	42.1	57	100
Abstinence from food during pregnancy						
No	30	54.5	25	45.5	55	100
Yes	4	30.8	9	69.2	13	100

Tobacco smoke that contains more than 7000 chemicals is a human carcinogen and toxic agent that is suspected to contribute to adverse human health.¹⁷ Those chemicals are free radicals, carbon monoxide, nicotine, and tar. They contribute to disrupt hemoglobin function to distribute oxygen and nutrition for fetus. They also lead to Fe deficiency and hypertension of pregnancy. Such condition causes intrauterine growth restriction and preterm delivery, and infant will have LBW.

Number of active smokers inside the same house with pregnant woman had relationship with LBW. However, the strength of correlation was low. This study had OR of 2.98. Active smoker of a husband or other housemate who smokes inside the house when the subject is present increased the intensity of exposure. Tobacco smoke has more toxic substance, because it does not undergo filtering process.¹⁸

Number of cigarettes smoked inside the same house with the pregnant woman had relationship with LBW. The strength of correlation and OR was 3.32. This also demonstrated that an increasing level of exposure to cigarette smoke of women exposed to partners' smoking had reduced greatly the infants' birth weight.¹⁹ Duration of cigarettes smoke exposure to pregnant woman had relationship with LBW. This study showed low strength of correlation and OR of 3.15. The effect of indoor pollution on health depended of type, quantity, and duration.²⁰ Duration of cigarettes smoke exposure disturbed blood circulation which carries oxygen for infant. We were aware of the limitations of this study including that the research location was only in Wonokusumo Health Center region, Surabaya, Indonesia, so the results of this study could not be generalized.

Table 2. Analysis of relationship between passive smoker during pregnancy and LBW

	Frequency						Risk	ρ value	CC	OR
	Control		Case		Total					
	n	%	n	%	n	%				
Passive smoker status										
Non-passive smoker	19	65.5	10	34.5	29	100	0.34	0.027	0.259	3.04
Passive smoker	15	38.5	24	65.5	39	100	0.62			
Number of active smokers										
0	19	65.5	10	34.5	29	100	0.34	0.015	0.331	2.98
1	14	46.7	16	53.3	30	100	0.53			
2	1	11.1	8	88.9	9	100	0.89			
Number of cigarettes/day										
0	19	65.5	10	34.5	29	100	0.34	0.001	0.422	3.32
1 – 4	14	58.3	10	41.7	24	100	0.42			
5 – 12	1	6.7	14	93.3	15	100	0.93			
Duration of exposure/day										
< 15 minutes	19	65.5	10	34.5	29	100	0.34	0.004	0.376	3.15
15 – 60 minutes	14	51.9	13	48.1	27	100	0.48			
> 60 minutes	1	8.3	11	91.7	12	100	0.92			

ρ value: result of chi-square test; CC: Contingency Coefficient; OR: Odd Ratio

CONCLUSION

There was a relationship between passive smoker of pregnant women with decreased birth weight. We also found that the number of active smokers living together with pregnant women, the number of cigarettes smoked inside the same house with pregnant women, and duration of tobacco smoke exposure of pregnant women had relationship with LBW.

REFERENCES

1. Profil Kesehatan Indonesia 2014. Jakarta: Ministry of Health, Republic of Indonesia. 2015.
2. Profil Kesehatan Provinsi Jawa Timur 2012. Surabaya: Health Office, The Province of East Java. 2013.
3. Profil Kesehatan Kota Surabaya 2015. Surabaya: Health Office, The Province of East Java. 2016.
4. Proverawati A, Ismawati. BBLR: Berat Badan Lahir Rendah. Yogyakarta: Nuha Medika; 2008.
5. Kosim MS, Ari Y, Rizalya D et al. Buku ajar neonatologi. Jakarta: Ikatan Dokter Anak Indonesia. 2014.
6. Cunningham FG, Leveno KJ, Bloom SL, et al. Williams Obstetric. 24th edition. New York: McGraw-Hill Education. 2014.
7. Saifuddin AB. Buku panduan praktis pelayanan kesehatan maternal dan neonatal. 1st edition. Jakarta: Bina Pustaka Sarwono Prawirohardjo; 2010.
8. Raynor M, Myles CC. Survival guide to midwifery. 3rd edition. Elsevier. 2017.
9. WHO.int [Internet]. World Health Statistic 2012. [cited 5 September 2017]. Available from: http://www.who.int/gho/publications/world_health_statistics/2012/en/.
10. Riset Kesehatan Dasar 2013. Jakarta: Ministry of Health, Republic of Indonesia. 2013.
11. Bustan MN. Epidemiologi penyakit tidak menular. 2nd edition. Jakarta: Rineka Cipta. 2007.
12. Dahlan MS. Besar sampel dan cara pengambilan sampel dalam penelitian kedokteran dan kesehatan. 3rd edition. Jakarta: Salemba Medika. 2011.
13. Norsa'adah B, Omar S. The effect of second-hand smoke exposure during pregnancy on the newborn weight in Malaysia. Malaysia Journal Medical Sciences. 2014;21(2): 44-53.
14. Sulistyawati A. Deteksi tumbuh kembang anak. Jakarta Selatan: Salemba Medika. 2014.
15. Hayes C, Morgan K, Helen O, et al.. Patterns of smoking behaviour in low-income pregnant women: A cohort study of differential effects on infant birth weight. International Journal of Environmental Research and Public Health. 2016;13.
16. Wahabi HA, Rasmieh AA, Amel AF, et al. Effects of secondhand smoke on the birth weight of term infants and the demographic profile of Saudi exposed women. BMC Public Health. 2013;13(341).
17. Surgeon's General Report on Smoking and Health. U.S. Department of Health and Human Services. 2012.
18. Carlson D. Working safely in health care: A practical guide. New York: Thomson Delmar Learning. 2008.

19. Abusalah A, Magda G, Anna H. Low birth weight and prenatal exposure to indoor pollution from tobacco smoke and wood fuel smoke: A matched case-control study in gaza strip. *Maternal Child Health Journal*. 2012;16:1718-27.
20. Soedarto S. *Lingkungan dan kesehatan*. Jakarta: Sagung Seto; 2013.