

**IMPACT OF SMOKE EXPOSURE AND PREECLAMPSIA
TO PREMATURE RUPTURE OF MEMBRANES;
CASE STUDY IN ANUTAPURA HOSPITAL**

***(KESAN PENDEDAHAN ASAP DAN PREEKLAMPSIA KE ATAS
PEMBENGGAKAN PRAMATANG MEMBRAN:
KAJIAN KES DI HOSPITAL ANUTAPURA)***

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Abstract

Premature rupture of membranes is a major cause of maternal mortality in developed countries and developing countries. The content of cigarette smoke are nicotine that can endanger the health of pregnant women and fetuses. The purpose of this study was to determine the risk of second hand smoke exposure and preeclampsia on premature rupture of membranes in Anutapura Hospital Palu City. This study was an observational study with case-control approach. Subject maternity cases are experiencing premature rupture of membranes, and the control group was mothers with normal birth. Sample cases and controls respectively 30 and 60 respondents with education as matching. Samples were selected in total sampling; data were analysed using odds ratio at the limit of significance (95%). The results showed that exposure of cigarette smoke is a strong factor against the risk of premature rupture membrane with OR 4.333, 95% CI = 1.341-13. While preeclampsia is not at risk premature rupture of membranes with OR 1.195, 95% CI = 0.430-3.318. Considering the importance of the effect of tobacco exposure on premature rupture of membranes, it is suggested that important to avoid exposure of tobacco. Besides, keeping control of blood pressure during pregnancy is also needed.

Keywords: Premature Rupture Membranes, Mother Maternity, Smoking Behaviour, Preeclampsia

Abstrak

Pembengkakan pramatang membran adalah penyebab utama kematian ibu di negara maju dan negara-negara membangun. Kandungan asap rokok adalah nikotin yang boleh membahayakan kesihatan wanita hamil dan janin. Tujuan kajian ini adalah untuk menentukan risiko pendedahan asap rokok dan preeklamsia pada pembengkakan pramatang membran di Hospital Anutapura, Bandar Palu. Kajian ini adalah kajian observasi dengan pendekatan kawalan kes. Kes subjek bersalin mengalami pecah pramatang membran, dan kumpulan kawalan adalah ibu dengan kelahiran normal. Kes dan kawalan sampel masing-

masing 30 dan 60 responden dengan pendidikan sebagai sepadan. Sampel dipilih dalam jumlah persampelan, data dianalisis dengan menggunakan nisbah odds pada batas kepentingan (95%). Keputusan menunjukkan bahawa pendedahan asap rokok adalah faktor yang kuat terhadap risiko membran pecah pramatang dengan ATAU 4.333, 95% CI = 1.341-13. Walaupun preeklampsia tidak berisiko pecah pramatang membran dengan OR 1.195, 95% CI = 0.430-3.318. Memandangkan kepentingan kesan ketoksikan tembakau pada pecah membran pramatang, disarankan agar penting untuk mengelakkan pendedahan tembakau. Selain itu, menjaga kawalan tekanan darah semasa kehamilan juga diperlukan.

Kata kunci: Pembengkakan Pramatang Membran, Ibu Bersalin, Perilaku Merokok, Preeklampsia.

INTRODUCTION

Premature rupture of membranes (PPROM) is defined as membrane rupture before 37 weeks of pregnancy and has not yet entered the labour period. It is associated with 30% -40% of preterm births and is associated with the incidence of maternal and infant infections. Estimated that 10% of perinatal deaths are directly or indirectly due to premature rupture of membranes (Alam, Saleem, Shaikh, Munir, & Qadir, 2014).

There are several factors that can cause PROM, including exposure to cigarette smoke and preeclampsia. Exposure to cigarette smoke here applies both active and passive smokers. Pregnant women exposed to cigarette smoke will increase the risk of disruption during pregnancy such as abortion, low birthweight, preeclampsia and premature rupture of membranes (Rahele Alijahan, Sadegh Hazrati, 2014). Whereas a preeclampsia can changes in the organs of the pregnant womens, that blood flow decreases to the placenta and cause interference with the placenta, resulting in fetal growth disorders due to lack of oxygen fetal distress.

Premature rupture of membranes in Indonesia is still higher, the data from Cipto Mangungkusumo Hospital in February 2012 as many as 57 cases. Based on a preliminary survey conducted on 7 patients PROM in Dr. H. Soewondo Hospital got 71,4% patient have history of husband smoker (Muntohaet.al., 2013). The incidence of PROM in developed and developing countries ranges from 5% - 25%. Indonesia has an incidence of PROM around 39.1% in 2012 (Nurul Huda, 2013).

Exposure to secondhand smoke during pregnancy and Premature rupture of membranes is closely related to the high Maternal Mortality Rate (MMR) and InfantMortalityRate (IMR).In Central Sulawesi incidence of MMR is still high at 45 per 1,000 live births and IMR at 58 per 1000 live births (Survey of Demografi and Health, 2014). The main causes of maternal and infant mortality inthis area are bleeding, preeclampsia, and infection.

Base on medical records Anutapura Hospital describes the visit of maternity in this hospital in 2015 as much as 1,518. Then the incidence of preeclampsia in 2013 as many as 130 cases, increased to 78 cases in 2014 and the highest 100 cases in 2015. While the incidence of premature rupture of membranes flares, in 2013 by 14 cases, in 2014 increased to 38 cases, and in 2015 up to 25 cases and in 2016 crawling up to 30 cases.

Driven by high number of case, the researchers are interested to examine more about the risk of exposure tobacco and preeclampsia to premature rupture of membranes at Anutapura hospital. This research as one support to succeed of the program "AKINO" (zero of maternal mortality) is proclaimed local government of Palu.

METHODS

The research design was used case control study, the study was conducted for \pm 2 month, from August to October 2016. The population in this study were maternal mothers recorded in the data of maternity visits in Anutapura Hospital, the sampling technique is total sampling with education levels as matching, while the sample of all cases premature rupture of membranes with the number of cases 30 respondents and control 60 respondents. The data in this study are primary data collected using questionnaires, and secondary data derived from medical records patient at Anutapura Hospital. Data analysis used is univariate and bivariate then determined the Odds ratio value.

RESULT

Characteristic of Respondent

Table 1. Characteristic of Respondent

	Frequency	Percentage (%)
Women Pregnancy Ages (Years)		
≤ 20	28	31.1
21-35	40	44.4
> 35	22	24.5
Women Pregnancy Education		
Illiterate	7	7.8
Elementary school	11	12.2
Junior high school	27	30.0
Senior high school	36	40.0
College	9	10.0
Husband's Smokers		
Yes	57	63.3
No	33	36.7
Smoke Behaviour		
Yes	23	25.6
No	67	74.4
Family History of Hipertention		
Yes	57	63.3
No	37	36.7

Table 1 shows that the distribution of respondents according to the highest age is 21-35 years i.e. 40 (44.4%), while the lowest is the age of less than 20 years i.e. 28 (31.1%). While the distribution of respondents according to the level of education, is the highest levels is Senior High School i.e. 36 (40.0%) and the lowest is never touched by formal education (illiterate) i.e. 7 (7.8%). For distribution of respondents according to the husband's smokers (around pregnant women) i.e. 57 (63.3%), while the husband's not a smoker i.e. 33 (36.7%). Meanwhile, smoking behavior in pregnant women shows that 23 (25.6%) as an active smoker and 67 is not an active smoker. The

distribution of respondents according to the family history of hypertension was the most had a history of hypertension i.e. 57 (63.3%), whereas that not has history i.e. 33 (36.7%).

Risk Factor Premature Rupture of Membrane

Table 2. Analysis Risk Factors Premature Rupture of Membrane in Anutapura Hospital 2017

Variables	Premature Rupture of Membrane				Total	OR (CI 95%)
	Case		Control			
	n	%	n	%		
Smoke exposure						4.333
High Risk	26	86.7	36	60.0	62	(1.341-13.998)
Low Risk	4	13.3	24	40.0	28	
Preeclampsia						1.195
High Risk	23	76.7	44	73.3	67	(0.430- 3.318)
Low Risk	7	23.3	16	26.7	23	

Sources: Medical Record of Patient in Anutapura Hospital in 2017

The data in Table 2 describe that respondents who have experience Premature Rupture of Membrane exposure to cigarette smoke is 26 people (86.7%) than those not exposed is 4 people (13.3%). While respondents who did not experience this condition and also more exposed to cigarette smoke that is 36 people (60.0%) than not exposed ie 24 people (40.0%). Even if both of exposed and unexposed groups alike develop the possibility of premature rupture of membranes, but in the exposed group have a greater the chance to experiencing it.

Analysis of Odds Ratio (OR) with Confidence Interval (CI) 95% found OR = 4.333 (1.341-13.998), this means that respondents exposed to smoke have 4.333 times a risk to developed premature rupture of membrane than respondents who are not exposed. The value of OR > 1, that meancigarette smoke exposure is a risk factor for premature rupture of membranes. From the calculation of attribute risk is 0.27. If exposure to cigarette smoke can be controlled, pregnant women can avoid premature rupture of membranes by 27%.

Then Table 2 also describe respondentt who have experience Premature Rupture of Membrane are generally at high risk of preeclampsia ie23 (76.7%) respondent than those who experience low risk of preeclampsia is 7 people (23.3%). While respondents who did not experience Premature Rupture of Membrane and also more high risk of preeclampsia that is 44 people (73.3%) than those who experience low risk of preeclampsia is 16 people (26.7%). Even if both of high-risk and low-risk groups of preeclampsia alike develop the possibility premature rupture of membranes, but in high-risk groups of preeclampsia have a greater chance to experiencing it.

Analysis of Odds Ratio (OR) with Confidence Interval (CI) 95% found OR = 1.195 (0.430 - 3.318), this means that respondents who experienced preeclampsiahave 1.195 times a riskto developed of premature rupture of membranes than respondents who are not preeclampsia. Seen from the value OR = 1, then preeclampsia is not a risk factor for premature rupture of membranes. From the calculation of attribute risk is 0.4. If preeclampsia can be controlled, pregnant women can avoid premature rupture of membranes by 4%.

DISCUSSION

Smoke Exposure and the Incidence Premature Rupture of Membranes

Based on the results of research in Anutapura Hospital against premature rupture of membrane with exposure risk factor of cigarette smoke exposure indicates that the OR 4.333 with lower value (1.341) and upper (13998) does not include 1, this means that of respondents exposed to high-risk

smoke 4.333 times greater than respondents who are not exposed to cigarette smoke. Because of the value of $OR > 1$, exposure to secondhand smoke is a risk factor for premature rupture of membranes.

This study is in line with a Muntoha (2013), that found a relationship between the history of exposure to cigarette smoke with the incidence premature rupture of membranes. Risk Exposure to second hand smoke in pregnant women in this study may occur because her husband's habit to smoke at home or because they are also an active smoker. The data characteristic of respondents in this study (table 1) is also clearly illustrated that there are some pregnant women who are active smokers and many of which are exposed as passive smokers when her husband smokes around.

Women exposed to tobacco smoke tend to be more often disturbed in pregnancy because the chemical content in passive smokers is higher than active smokers. In addition, cigarette smoke can be left for long time in a room. Toxins contained in cigarette smoke are attached to clothing, left in the room, doors and furniture around it for several weeks and months after being used for smoking. At the time the doors and windows are opened or the fan is turned on then the toxin will return to the air. This condition causes a woman with a smoker's husband or living in an environment where there are many smokers will become passive smokers (Dwidan Nurlaela, 2010; mostafa, 2011).

Cigarette smoke contains 4000 chemicals and 200 of them are toxic and one of them is nicotine. As the study conducted by Zisovska (2010) found that pregnant women, both active and passive smokers, have a higher risk of impairment during the perinatal period. Similarly, Athanasakis (2012) pointed out the relationship between smoking behavior and gestational age revealed that mothers who smoked were more at risk of prematurely (53.3%) than non-smokers (43.7%).

Further studies by Melorose (2012) found mothers exposed to tobacco smoke (≥ 3 cigarettes/day) during pregnancy, had a risk of 2,338 times higher for have unsafe pregnancy when compared to mothers exposed to secondhand smoke (< 3 cigarettes/ day).

The results of maternity analysis exposed to tobacco smoke amounted to 62 respondent, and there are 26 respondent gained premature rupture of membranes, this is possible because their husbands spends more 10 cigarettes per day and smoking around them during pregnancy. based on the results of the interview is known there are other family members who also smoked around the respondents during pregnancy and pregnant women who work are also exposed to work place. The standard of socioeconomic of the family is related to the type of work the mother indirectly affects of her pregnancy. Pregnant women who work, have more risk to be exposed to cigarette smoke.

While 28 respondents did not risk to exposure to secondhand smoke, as many as 26 did not experience premature rupture of membranes, according to the interviews were found in this case one family members smoking in the house and mother working as a housewife. but there are 4 respondents who are not at risk of exposure to secondhand smoke but still experience premature rupture of membranes, this can be caused by other factors, such as ages during pregnancy. in table 1 can be seen some pregnant women are too young (< 20 years) and too old (> 35 years) to get pregnant.

Furthermore, mothers exposed to tobacco smoke and did not experience premature rupture of membranes as many as 36 people, this is due to her husband pay attention to the health of pregnant women. Reducing exposure significantly also reduces the risk, if you are in the general area and there is obviously a smoking ban, no need to hesitate to admonish people who are smoking, if necessary use a mask to reduce of cigarette smoke inhaled, increase endurance by consuming food which is nourishing during pregnancy, keep monitored of the fetus growing, such as the weight is in accordance with the age of pregnancy. So that disturbances that occur can be detected and treated early and if necessary with the intake of anti-oxidant vitamins such as vitamins C and E derived a vegetables, fruit or tablets (Osungbade, 2011).

Preeclampsia and the Incidence Premature Rupture of Membranes

Hypertension can be found in pregnant women, the condition still caused of high morbidity and mortality rate for mothers, fetuses, and babies who are born. Pregnant women with hypertension show an increased risk of complications, whereas the fetus conceived is at high risk of developing growth constraints. When early pregnancy blood pressure of pregnant women is high, that means they should be careful to diet. Salt causes excessive water retention in the body. This applies also if at the time of her pregnancy suddenly increased blood pressure. Generally, this condition begins with swelling of the ankles and hands due to increased body fluids (Liaet.al, 2010).

Based on the results of research in Anutapura Hospital against premature rupture of membrane with preeclampsia risk factor indicates that the OR 1.195 with lower value (0.430) and upper (3.318) this include 1, this means that of respondents have a preeclampsia 1.195 times greater risk than respondents who are not get it. Because of the value of OR= 1, preeclampsia is not risk factor for premature rupture of membranes.

This study is not in line with the study of Derakhshi et.al (2014) who found chronic hypertension, preeclampsia and eclampsia, infertility and cervical incompetence have a significant association with the incidence premature rupture of membranes. Diet as one form of lifestyle that has a significant relationship with the incidence of preeclampsia in pregnant women. It is therefore advisable for pregnant women to ensure their diet meets the recommended nutritional needs (Putu, 2013). However, there are also studies with similar findings to support this study; Ensor et. al (2010) also suggested that there is no relationship between history of hypertension disease during pregnancy with the incidence of premature rupture of membranes in Moeslim Hospital YAKSSI Sragen.

Based on the results conducted at Anutapura hospital that of 67 people who are at high risk of hypertension, and did not experience premature rupture of membranes as many as 44 people (73.3%) by reducing fatty foods and salt. While high-risk hypertension and gained premature rupture of membranes as many as 23 people (76.7%) who often consume a fatty meal and age > 35 years. but there are also low risk of hypertension still experience premature rupture of membranes as many as 7 people (23.3%) this is because there are other factors that affect such as too young or too old when get a pregnant.

To prevent of hypertension during pregnancy, they are should avoid foods that can increase blood pressure and improve lifestyle. Although in this study hypertension does not play an important role in premature rupture of membranes, but efforts to prevent against risks that can interfere with the health of pregnant women is needed.

Factors that can lead to hypertensive disease of pregnancy is the immune system is determined by the adequacy of nutrition, activity, and rest. In a busy modern life also makes people less exercise, so the immune system becomes decreased and has a risk of hypertension, family history of hypertension (genetic) is also decisive. The prevalence of hypertension will increase with age, modern lifestyle and wrong diet. Preserved foods and salt and seasonings in high quantities can increase blood pressure because they contain excessive amounts of sodium.

For the hypertensive disease of pregnancy being the agent is a nutritional factor as described previously, sodium plays an important role in the onset of hypertension. Excessive consumption of sodium causes the concentration of sodium in the extracellular fluid to increase. To normalize it, the intra-cellular fluid is pulled out, allowing extra cellular fluid volume to rise. Increased volume of extra cellular fluid causes increased blood volume, thus affecting the onset of hypertension (Dwidan Nurlaela, 2010).

Consumption of kitchen salt (containing iodine) is recommended no more than 6 grams per day, equivalent to one teaspoon. In reality, excessive consumption due to the culture of cooking our

society is generally wasteful of using salt. Our sense of taste since childhood has been accustomed to having a high threshold of saltiness, making it difficult to accept a rather tasty meal.

CONCLUSION

Maternity mothers exposed to tobacco smoke are at risk of premature rupture of membranes compared with pregnant women who are not exposed to second hand smoke at Anutapura Hospital. Hypertension of pregnancy is one of the occurrences of premature rupture of membranes during labor because during pregnancy the mother does not pay attention to the food consumed. However in this study found pregnant women with hypertension during pregnancy (preeclampsia) are not at risk of premature rupture of membranes.

ACKNOWLEDGEMENTS

The author would like to thanks the head of Anutapura Hospital who has accepted and allowed the author to conduct research in this hospital.

REFERENCES

- Alam, M. M., Saleem, A. F., Shaikh, A. S., Munir, O., & Qadir, M. (2014). Neonatal sepsis following prolonged rupture of membranes in a tertiary care hospital in Karachi, Pakistan. *Journal of Infection in Developing Countries*, 8(1), 67–73. <http://doi.org/10.3855/jidc.3136>
- Ahmed, K., Ahmed, S., Handady, S., Alawad, A., & Ali, S. (2015). Advanced maternal age and late pregnancy outcome at Omdurman New Hospital in Sudan. *International Journal of Medicine*, 3(2), 115–117. <http://doi.org/10.14419/ijm.v3i2.5357>
- Alam, M. M., Saleem, A. F., Shaikh, A. S., Munir, O., & Qadir, M. (2014). Neonatal sepsis following prolonged rupture of membranes in a tertiary care hospital in Karachi, Pakistan. *Journal of Infection in Developing Countries*, 8(1), 67–73. <http://doi.org/10.3855/jidc.3136>
- Athanasakis, E. (2012). Ealth science ournal ®. *Health Science Journal*, 6(2), 773–783.
- Derakhshi, B., Esmailnasab, N., Ghaderi, E., & Hem-Matpour, S. (2014). Risk Factor of Preterm Labor in the West of Iran: A Case-Control Study. *Iranian J Publ Health*, 43(4), 499–506. Retrieved from <http://ijph.tums.ac.ir>
- Dwi Sarwani SR dan Sri Nurlaela, 2010, Maternal Risk Factor Risk Analysis (Case Study In Banyumas District), Department of Public Health Faculty of Medicine And Health Sciences University General Soedirma Volume 60 No.1. Page 1-10
- Ensor, T., Cooper, S., Davidson, L., Fitzmaurice, A. and Graham, W.J. 2010. The *Impact of Economic Recession on Maternal, and Infant Mortality: Lessons from History*. *BMC Public Health*, 10(2):pp 727-730
- Lia, X., Zhua, J., Dai, L., Li, M., Miao, L., Liang, J. and Wang, Y. 2010. Trends in Maternal Mortality Due to Obstetric Hemorrhage in Urban, and Rural China. *J. Perinat. Med.* 39: pp 35–41
- Melrose, J., Perroy, R., & Careas, S. (2012). Cervicovaginal Infection during Pregnancy and Its Relation to Preterm Pre-Labour Rupture Of Membranes. *Journal Of American Science*, 8(12), Pp 364–373.
- Muntoha, Suhartono, NurEndah W., 2013. *Relationship Between Historical Exposure of Cigarette Smoke and Early Rupture of Amniotic Inflammation in Pregnant Womens in Dr. H. Soewondo Kendal*, *Journal of Environmental Health Indonesia. Central Java.Vol. 12 No.1 / April. Page 28-34*
- Nurul Huda, 2012, *Factors Influencing Early Rupture of Burial in PKU Hospital Mubamadiyah Surakarta, Faculty of Health Sciences Mubammadiyah University of Surakarta.*
- Osungbade K., O. &Ige O., K. (2011). *Public Health Perspectives of Preeclampsia in Developing Countries: Implication for Health System Strengtbening*. *International Journal of Pregnancy*, 20(10): Page 1-3.
- Putu Kenny, 2013, *Compliance Drug Consumption of Hypertension Patients In Denpasar Judging From Personality Type A And Type B, Vol 1, No. 1. Page 32-42. Psychology Study Program, Faculty of Psychology, Udayana University.*
- Rahele Alijahan, Sadegh Hazrati, 2014, *Prevalence and risk factors associated with preterm birth in Ardabil, Iran. Iranian Journal of Reproductive Medicine.* Vol. 12. No. 1. pp: 47-56.
- RISKESDAS, 2013, *Basic Health Research Report of Central Sulawesi Prevalence of Hypertension.*

Zisovska, 2010., Tobacco influence on the neonatal outcome. *Italian Journal of Public Health*. Year 8. Volume 7. Number 3. Page 249 – 255.

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Submitted: July, 16, 2018

Accepted: August, 21, 2018

