Maternal education, prematurity and the risk of birth asphyxia in selected hospitals in Jakarta

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Abstrak

Latar belakang: *Asfiksia dapat menyebabkan kerusakan organ berat dan berakibat fatal pada bayi baru lahir. Berdasarkan hasil analisis lanjut Riskesdas 2007, asfiksia merupakan penyebab kematian kedua pada bayi setelah infeksi. Tujuan penelitian ini adalah untuk mengidentifikasi faktor risiko yang berkaitan dengan kejadian bayi asfiksia pada bayi baru lahir.*

Metode: *Data diambil dari rekam medik wanita hamil yang melahirkan di dua rumah sakit (RS) di Jakarta, yang dipilih secara purposif di antara yang melahirkan pada periode 1 Januari sampai 31 Desember 2011. Kelahiran asfiksia ialah bayi baru lahir dengan skor Apgar kurang dari tujuh, satu menit setelah lahir. Analisis data dilakukan dengan menggunakan regresi logistik.*

Hasil: *Pada analisis ini diperoleh 2777 sampel dari 4191 yang memiliki data lengkap. Proporsi asfiksia pada bayi baru lahir adalah 6,5%. Jika dibandingkan wanita berpendidikan tinggi, wanita berpendidikan rendah memiliki risiko melahirkan bayi asfiksia 4,3 kali lebih tinggi [rasio odds suaian (ORa) = 4,31; P=0,000], sedangkan wanita berpendidikan menengah dibandingkan dengan yang tinggi berisiko 3,3 kali lebih tinggi melahirkan bayi dengan asfiksia (ORa=3,31; P=0,000).*

Selanjutnya, jika dibandingkan bayi cukup bulan, bayi prematur memiliki risiko 3,1 kali lebih tinggi mengalami asfiksia (ORa=3,07; P=0,000), sedangkan bayi postmatur 63% (namun tidak signifikan) lebih tinggi berisiko mengalami asfiksia (P=0.118).

Kesimpulan: *Wanita yang memiliki tingkat pendidikan rendah dan menengah serta bayi prematur memiliki risiko lebih tinggi mempunyai bayi baru lahir yang asfiksia. **(Health Science Journal of Indonesia 2015;6:111-5)***

Kata kunci: *pendidikan, prematur, asfiksia bayi baru lahir*

Abstract

Background: Birth asphyxia can causes hypoxic ischemic organ damage in neonates. According to advanced Indonesian Basic Health Research 2007, asphyxia was the second highest cause of infant death after infection (13.8%). This study aimed to identify several risk factors associated with birth asphyxia.

Methods: This study was carried out in one government and one private hospitals in Jakarta. All medical records of pregnant women who gave birth between January 1 to December 31 of 2011 were included. Birth asphyxia was defined as an Apgar score less then seven at one minute after birth. Logistic regression was used to analyze the risk factors related to birth asphyxia.

Results: As many as 2777 samples out of 4191 were included for this analysis. The proportion of asphyxia in newborn babies was 6.5%. Compared with those who had high educated mothers, those who had low education level had 4.3-fold higher risk to have an asphyxiated baby [adjusted odds ratio (ORa) = 4.31; P=0.000]. Meanwhile middle educated mothers had 3.3-fold higher risk to have birth asphyxia (ORa=3.31; P=0.000). In terms of gestasional age at birth, compared with those who had full term birth, those who had preterm birth had 3.1-fold higher risk to have birth asphyxia (ORa=3.07; P=0.000). Meanwhile, although not significant, those who had postterm birth had 63% more risk (P=0.118) to have birth asphyxia.

Conclusion: The mother who had lower and middle education levels as well as preterm babies had higher risk for having birth asphyxia baby. **(Health Science Journal of Indonesia 2015;6:111-5)**

Keyword: maternal education, prematurity, birth asphyxia

Asphyxia is one of the major causes of neonatal mortality.[1] Birth asphyxia can cause hypoxic ischemic organ damage in neonates which subsequently leads to severe or fatal outcome.[2] The impact of birth asphyxia in the newborns includes attention deficits, hyperactivity, epilepsies, mental retardation, cerebral palsy, and the most severe damage is hipoxic ischemic encepalopathy (HIE).[2,3]

Global estimates of birth asphyxia is 9% of neonatal deaths in 2008.[4] Further analysis of the Indonesian Basic Health Research (Riskesdas) 2007, asphyxia was the second major cause of infant death after infection (13,8%).[5] The incidence of birth asphyxia in Dr. Soetomo hospital in 2009 was 8%.[6]

Several factors that influence the occurence of birth asphyxia, among others, maternal age, booking status, pre-eclampsia, primigravidity, maternal fever, maternal education, preterm babies, prolong labour, fetal distress, history of stillbirths, breech presentation, low birth weight.[7,8] Data related to risk factors of birth asphyxia is still limited in Indonesia. This study aimed to identify the risk factors of birth asphyxia in two hospitals in Jakarta.

METHODS

This study was conducted on purposively selected samples in one goverment and private hospitals in Jakarta. The data were extracted from medical records of delivery during the period of January 1 to December 31, 2011. The women who gave birth less than 28 weeks of gestasion were excluded from this analysis.

The data collected were demographic characteristics and clinical risk factors of birth asphyxia. The dependent variable was birth asphyxia while the independent variables were maternal age, maternal education level, occupations, parity, gestational age, premature rupture of membranew (PROM), prolonged labour, fetal distress, malpresentation/position, intra-uterine growth retardation (IUGR), and fetal nuchal cord.

Birth asphyxia was defined as an Apgar score of less then seven at one minute after birth.[9,10] An Apgar score consists of five components: appearance, pulse, grimace, activity, and respiration, ranging from zero to ten.[2] The score in this study was determined by professional health workers.

Age was grouped into three categories: 13-20, 21-35 years, 36-46 years. Education level was divided into three categories: low (uneducated up to completed primary school), middle (completed junior high school), and high (completed senior high school or more). Parity was divided into nulliparous (has never given birth), primiparous (one live birth), and multiparous (two or more live births). premature rupture of membranes (PROM) was grouped into yes and no (yes = diagnosed as PROM by profesional health workers, or likewise).

Prolonged labour was categorized into yes and no (yes = diagnosed as prolong labour by professional health workers, or likewise). Fetal distress was divided into yes and no (yes= diagnosed as fetal distress by professional health workers). Malpresentation/position was divided into yes and no (yes = diagnosed as malpresentation/position by professional health workers). Intra-uterine growth retardation (IUGR) was categorized as yes and no (yes = diagnosed as IUGR by professional health workers). Fetal nuchal cord was grouped into yes and no (yes= diagnosed as fetal nuchal cord by professional health workers). Gestasional age was devided into full term (37-41 weeks of gestation), preterm (delivered at less than 37 weeks of gestation), postterm (42 weeks of gestation or more).[11,12]

Logistic regression was used to identify several factors related to the risk of birth asphyxia.[13] The data analysis used STATA version 9.

Ethical approval was obtained from the National Institute for Health Research and Development Ethics Committee, Ministry of Health, Republic of Indonesia.

RESULTS

Out of 4191 samples obtained, as many as 2777 samples were found with complete data. These sample were used for analysis.

Table 1 showed that the proportion of birth asphyxia was 6.5% (180/2777). Mothers aged 13-20 years compared to 21-35 years were less likely to have birth asphyxia babies. Compared to the respective reference groups, unemployed/houswife, private employees, enterpreneur/traders, laborer, nulliparous, multiparous, premature rupture of membrane, fetal distress, and intra-uterine growth retardation were more likely to have birth asphyxia.

Those who had birth asphyxia and did not have birth asphyxia were similarly distributed in terms of prolonged labour, malpresentation/position, and fetal nuchal cord.

Table 2, the final model, showed that compared with higher educated mothers, those who had low educational level had 4.3-fold higher risk to have babies with birth asphyxia. In addition, middle educated mothers had 3.3-fold higher risk to have babies with birth asphyxia.

In terms of gestasional age at birth, those who had preterm births had 3.1-fold higher risk for birth asphyxia compared with those with full term birth. Meanwhile, although not significant those who had postterm births had 63% more risk to have babies with birth asphyxia (P=0.118).

Table 1. Several demographic, clinical characteristic, and risk of birth asphyxia

	Birth asphyxia				Crude odds ratio	95% Confidence interval	*P*
	No (n=2597)		Yes (n=180)				
	n	%	n	%			
Maternal age (year)							
21-35	1987	76.5	140	77.8	1.00	Reference	
13-20	151	5.8	6	3.3	0.56	0.25-1.29	0.178
36-46	459	17.7	34	18.9	1.05	0.71-1.55	0.801
Occupation							
Military/police/civil servants/state	146	99.3	1	0.7	1.00	Reference	
Unemployed/housewife	1800	92.8	140	7.2	11.36	1.57-81.76	0.016
Private employees	531	94.8	29	5.2	7.97	1.07-59.02	0.042
Enterpreneur/traders	84	96.6	3	3.4	5.21	0.53-50.92	0.156
Laborer	36	83.7	7	16.3	28.39	3.38-238.11	0.002
Parity							
Primiparaous	884	95.0	47	5.0	1.00	Reference	
Nulliparous	1012	92.5	82	7.5	1.52	1.05-2.20	0.026
Multiparous	701	93.2	51	6.8	1.37	0.90-2.05	0.132
Premature rupture of membranes							
No	2345	93.8	155	6.2	1.00	Reference	
Yes	252	91.0	25	9.0	1.50	0.96-2.34	0.072
Fetal distress							
No	2472	94.1	154	5.9	1.00	Reference	
Yes	125	82.8	26	17.2	3.34	2.12-5.25	0.000
Intra-uterine growth retardation							
No	2560	93.7	173	6.3	1.00	Reference	
Yes	37	84.1	7	15.9	2.79	1.23-6.37	0.014
Prolonged labour							
No	2539	93.5	176	6.5	1.00	Reference	
Yes	58	93.5	4	6.5	0.99	0.36-2.77	0.992
Malpresentation/position							
No	2295	93.5	159	6.5	1.00	Reference	
Yes	302	93.5	21	6.5	1.00	0.63-1.60	0.998
Fetal nuchal cord							
No	2572	93.6	177	6.4	1.00	Reference	
Yes	25	89.3	3	10.7	1.74	0.52-5.83	0.367

Table 2. Relationship between maternal education and gestational age, and the risk of birth asphyxia

	Birth asphyxia				Adjusted odds ratio	95% confidence interval	P
	No (n=2597)		Yes (n=180)				
	n	%	n	%			
Maternal education							
High	733	28,2	17	9,4	1.00	Reference	
Middle	1233	47,5	99	55,0	3.31	1.95-5.62	0.000
Low	631	24,3	64	35,6	4.31	2.46-7.58	0.000
Gestasional age at birth							
Full term	2243	94.8	123	5.2	1.00	Reference	
Preterm	257	85.1	45	14.9	3.07	2.12-4.48	0.000
Postterm	97	89.0	12	11.0	1.63	0.88-3.19	0.118

*Adjusted to each other among the variables listed on this table, maternal age, occupations, parity, and fetal distress

DISCUSSIONS

This study have several limitations such as an Apgar score is not a spesific indicator, the records of blood gas and acid status were not available for further assessments of hypoxia and acidosis. Furthermore, this study was only conducted at two hospitals in Jakarta, therefore the results could not be applied to the large population.

One of the main causes of neonatal death in preterm babies was asphyxia.[14] This study noted that preterm birth were at 3.1-fold higher risk for birth asphyxia compared to full term births. This result was consistent with a study by Lee in Southern Nepal who revealed preterm birth had 2.28-fold higher risk for birth asphyxia as well as a study by Pitsawong in Thailand, who reported preterm birth had a 2.08-fold increased risk for birth asphyxia.[15,16] This study was also in line with a study done by Utomo in the Dr. Soetomo hospital in Surabaya who demonstrated that prematurity increased the risk for birth asphyxia by 4.1-fold.[6] Svenvik in Sweden also found preterm births was the most evident risk factor for low Apgar score.[17] Immature lungs can lead preterm babies to respiratory distress and the episode of not breathing at birth was due to the stiffnes of the lungs which will result in birth asphyxia.[18]

This study also found lower educated mothers had higher risk to have birth asphyxia compared to high educated mothers. This finding was similiar with study performed by Tabassum in Pakistan which showed Maternal literacy decreased the risk for birth asphyxia (OR=0.5).[8] Lee also suggested that increasing maternal education and literacy significantly decreased the risk of birth asphyxia (RR=0.57).[15]

On the other hand, Rachatapantanakorn found birth asphyxia was not related with maternal education.[19] The different methodologies for defining birth asphyxia may influence the findings.

Education affects an individual's attitude and behaviour such as improved knowledge of health and care seeking.[20] The higher education the more knowledgeable with respect to the utilization of health facilities.[20] In other words, low education levels prevent women from making decisions independently and accessing the best choices for their health.[21] In Indonesia, Riskesdas 2013 reported that lower educated mothers choose to give birth at home.[22] Education for girls and young women save lives by allowing a mother to make better decisions.[23]

In conclusion, the mother who had lower and middle education levels as well as preterm baby had higher risk for having birth asphyxia baby.

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