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THE 3rd INTERNATIONAL CONFERENCE ON HEALTH SCIENCE 2016

"Optimizing the Mental Health under SDGs"

Poltekkes Kemenkes Yogyakarta

PROCEEDING BOOK

Inna Garuda Hotel Yogyakarta, Indonesia
November, 6th 2016

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INNA GARUDA HOTEL YOGYAKARTA, INDONESIA
November 6th, 2016



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THE EFFECT OF ASPHYXIA ON THE DEVELOPMENT OF CHILDREN

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Abstract

Children who survive asphyxia may experience long-term morbidity. Asphyxia is a condition of air exchange disruption that occurs as a result of the failure to start and maintain breathing during birth. The aim of this study was to measure the development of children aged 2-4 years who were born with asphyxia. This study was a retrospective cohort design studying preterm babies born in the period 2011-2013 in Dr. Sardjito Central Hospital Yogyakarta, Indonesia, was applied. Asphyxia was assessed based on positive pressure ventilation resuscitation status and APGAR score in the 5th minute, while children's development was assessed using Denver II test. Analysis used Logistic regression. This study showed that There were 60 child and primary caretaker pairs who participated in this research. Children born with asphyxia had a 2.1 times (95% CI: 1.01-4.04) greater risk of abnormal development compared children born without asphyxia. Asphyxia has a significant influence on abnormal development children after controlling for other factors. Therefore, it is expected that this result can be applied and implemented by clinicians to re-establish prevention programs for asphyxia by eliminating or minimizing risk factors, as well as programs of early stimulation for children with asphyxia.

Keywords: asphyxia, development, children

Background

Asphyxia is a condition of air exchange disruption that occurs as a result of the failure to start and maintain breathing during birth^{1,2,3}. The incidence of asphyxia in developing countries is approximately 3%¹. The assessment of asphyxia still varies, according to the Neonatal Resuscitation Program (NRP), in which the evaluation of the newborn begins at birth. Therefore, it is recommended that the assessment of asphyxia broadened to incorporate the baby's resuscitation status^{4,5}. Children who survive asphyxia may experience disruption to various organs, causing long-term morbidity and abnormal development^{6,7}. Measuring their development post-asphyxia becomes important as a basic tool to plan, monitor and evaluate clinical interventions related to each child's health⁸.

The children age of under five is a golden age in range of the development of an individual. In this age, a child experiences the extraordinary growth and development, either from the side of physic, motoric, emotion, cognitive or psychosocial so that it is also called as a critical age⁹. The critical age is a period or step which determines the human quality in the age of future.¹⁰ 80% of the brain growth happens in the golden era, if there is no a good treatment, so that in the future age can not be improved especially in the broken brain.¹¹

Under 5-age is the sensitive time/periode, especially the growth and the development because it can affect the development for the future. In U.S. the disorder of the development is found on 12-16% of children population. A research in Indonesia showed that 20-30% under 5-age children experienced the growth disorder, most of them are on the lateness/delay in aspect of rough motoric and language.¹¹ Approximately, 16% of under 5-age children in

Indonesia experienced the growth disorder of nerve and brain, starting from light until heavy ones caused by pregnancy disorder, child-birth disorder and clash in the part of body/head in the time of birth-child.¹² The development of child pictured the measurement of individual's function maturity and it is an important indicator in evaluating the quality of children's life. Therefore, the child development have to be controlled periodically. Based on the background mentioned above, the further research needs to be done to prove the relationship between baby-birth and asphyxia towards the child development in the time of pre-schooling. Because of that, writer is interested to conduct the further research concerning about "The Effect of Asphyxia On the Development of Children".

Method

Indonesia is an archipelago. Children comprise the largest proportion of the population in Indonesia, at 33.9 percent or 82.6 million people. The largest distribution of children is those in the age range of 0-6 years, at 32.6 million¹³The Dr. Sardjito Hospital, is the central referral hospital. Babies born at this hospital who suffer from asphyxia represent approximately 5% of the total number of birth¹⁴

This research used a retrospective cohort design. This study first determined the research population as all preterm born and living babies delivered at Dr. Sardjito Hospital in 2011-2013; these were divided into groups of children with asphyxia and without asphyxia. Children with asphyxia were defined by the administration of positive pressure resuscitation and an APGAR score of less than 7 in the 5th minute. Non-asphyxia was determined when the baby did not receive positive pressure resuscitation and the APGAR score in the 5th minute was between 7-10. Each subject was followed-up, by examining the children individually according to the address found in their medical records to measure their current development (at age 2-4 years).

Participants of this study were 60 child and primary caretaker pairs who participated in this study. The population comprised all infants born at Dr. Sardjito Hospital in 2011-2013 who met the following inclusion criteria: preterm birth (gestation less than 37 weeks), no major or multiple congenital abnormalities, alive, and with a complete medical record. The exclusion criteria were: children who could not be found or who had died. The exposed group was the total sample of those exposed (30), while the non-exposed group was constructed by matching based on birth times close to those of the exposed group (30)

Data sources/measurement in this study was the exposure in this study was asphyxia. Data were obtained from Sardjito Hospital medical records for 2011-2013. The outcome was childhood development status measured using Denver II. Denver II consisted of 4 dimensions: (soft motoric, hard motoric, language and personal social). The researched covariates and the variables possibly functioning as confounders were birth weight, nutrition status of children, parent's job, parent's education and the status social economic of parents. The possibility of bias was controlled using various methods. Selection bias was anticipated by choosing exposed and unexposed groups that filled the same criteria. In this study, blinding was performed for the data collection, in which the outcomes data were collected by people who were not aware of the exposure status of the children.

This study used the bivariate analysis used chi square tests, and the multivariate analysis used Logistic regression. The p-value of the likelihood ratio to the chi-square was used as a guide to the model's goodness of fit. All p-values were two-tailed and statistical significant level was set as less than 0.05.^{15,16}

Result

Data taking of asfixia and non-Asphyxiababy was conducted in Dr. Sardjito Hospital on 16-18th September 2015 and got 60 respondents, meanwhile to complete the data of the development of pre-schooling aged children was done by going home-visit on 19-28th September, 2015. Home visit was conducted in city of Yogyakarta and regency of Sleman and got respondents of 22 for city of Yogyakarta and in regency of Sleman got total of 38 of pre-schooling children as many as the determined samples which have been calculated so that it was got the data as follows:

Subject Comparability

Tabel 1. Subject Comparability (Asphyxia vs. Non-Asphyxia Groups)

Variabel	N	(%)	Asphyxia		P-value
			Yes	no	
Birth weight					
< 1500	21	35	11	10	0,78
≥ 1500	39	65	19	20	
Mother Education					
Primary	42	70	23	19	0,26
Secondary	18	30	7	11	
Father Education	46	76,7	24	22	0,54
Primary	14	23,3	6	8	
Secondary					
Father Job	4	6,7	29	28	0,55
Unemployment	56	93,3	1	2	
Employment					
Economy status	10	16,7	8	2	0,03
Low	50	83,3	22	28	
High					
Nutrition status	29	48,33	17	12	0,19
Abnormal	31	51,66	13	18	
Normal					

Table 1 shows that majority (65%) of respondents of birth weight are ≥ 1500 gram. In the level of parents education majority of mother and father education are the primary school (70% and 76,7%). Meanwhile, majority of father education status having respondents (93,3%) have jobs. Further, family economy status, majority (83,3%) stay in the level of the have and for the respondents of nutrition status, most of them (51,6%) have a normal nutrition status.

Table 2 Correlation between neonatorumasphyxia and the development of 2-4 year-aged children

Asphyxia	Development				P-value	95 % CI	RR
	Abnormal		Normal				
	n	%	n	%			
Asphyxia	24	80	6	20	0,001	1,31-3,60	2,1
No Asphyxia	11	36,7	19	63,3			

Table 2 shows that there is a correlation between Asphyxia and the development of 2-4 year-aged children. This is shown by p-value 0,001 < 0,05. RR is 2,1, meaning the respondents of born Asphyxiaexperienced the risk of abnormal development 2 times higher compared with the respondents that didn't experience the history of asphyxia.

Table 3 The Effect of asphyxia to the development of children based on the social, fine motor function, language and gross motor function

Asphyxia	Development				P-value	95 % CI	RR
	Abnormal		Normal				
	n	%	n	%			
Social/ Personal							
-Asphyxia	12	40	18	60			
- No Asphyxia	9	30	21	70			
Fine Motor function							
- Asphyxia	4	13,3	26	86,7	0,161	0,47-33,7	1,2
- No Asphyxia	1	3,3	29	96,7			
Language							
- Asphyxia	17	56,7	13	43,3	0,008	1,18-4,99	2,4
- No Asphyxia	7	23,3	23	76,7			
Gross motor functions							
- Asphyxia	11	36,7	19	63,3	0,005	1,33-22,7	5,5
- No Asphyxia	2	6,7	28	93,3			

Table 3 Shows that there is no correlation betweenAsphyxiaand sosial personal and fine motor function development. There are relationship between Asphyxia and the language and gross motor functiondevelopment.

Table 4. The Effect of asphyxia and covariates on the development of children

Variable	Development of Children				CI 95%
	B	SE	P-Value	Exp(B)	
Asphyxia	0,75	0,37	0,04	2,11	1,01 - 4,40
Nutrition Status	0,62	0,39	0,11	1,86	0,85 - 4,04
Birth Weight	0,46	0,35	0,18	1,58	0,79 - 3,15
Mother Education	0,55	0,58	0,35	1,72	0,54 - 5,45
Economic Status	0,15	0,41	0,70	1,16	0,51 - 2,63

Table 4 shows that there is a correlation between Asphyxia and the development of 2-4 year-aged children with RR value is 2,11, meaning the respondents of born Asphyxia experienced the risk of abnormal development two times (95% CI: 1,01 – 4,04) higher compared with the respondents that didn't experience the history of asphyxia.

Discussion

Majority of respondents with the history of asphyxia experienced the growth disorder. The aspect of the growth disorder is the development of language and rough motoric up to intelligence. This happens because in the time of baby born experienced asphyxia or stop breathing spontaneously at the same time the supply of oxygen to brain will be disturbed even stop so that brain can not work optimally, besides, combination of decreasing oxygen supply (hipoxia) and blood supply (iscemia) resulted in the change of biochemistry inside body which can cause the event of nerve cell death and brain disorder.¹⁷ When brain doesn't get oxygen supply will cause several nerve vessels in brain experienced disorder so that it can cause the disorders ranging from rough motoric, fine motor function, until intelligence. This case is in accordance if asphyxia can result in the bleeding of brain, brain damage, and then the lateness of growth. One of the risk factors existing motoric disorder on children is asphyxia. Asphyxia may result in the severe brain damage. The severe brain damage makes the cognitive development come late, the motoric development be delayed, and cerebral palsy.¹⁸

The majority of baby born ≥ 1500 gram doesn't arise as main variable related with a child development but on baby that the majority are born ≤ 1500 gram will take the higher risk experiencing the growth disorder, this is, because of organ maturity which has not been perfect. The function of perpiration, urogenity, neurology have not been formed perfectly. The growth of nerve system mostly depend on the degree of maturity. In the lower weight of body, the centre of reflex is lack of development because of the weak nerve development, so that on the very small baby it is more difficult to wake up and to possess weak crying. It not only happens on the babyhood, this event will also influence nerve system in the time of entering under five age, so that it causes the development disorders. The low baby born often suffers from bleeding of intraventricular caused by premature-born baby often suffers apneu, severe asphyxia and syndrome of respiration disorder. As a result, baby becomes hipoxia and hiperapnoe can cause the blood vessels to brain is lessened so that the functions of brain are experiencing disorder too. In the age of pre-schooling a child with the history of the very low weight birth will experience the development disorder, especially in the aspect of rough motoric.¹⁹

The majority of children's nutrition is in the normal stage. The lack of giving nutrition will affect the function of body especially at the age of golden age. In this age, the growth of brain is very rapid, so it needs nutrition to help brain work. Nutrition is one of the important components in supporting on going process of the growth and development which becomes the needs to grow and develop during the growth period. States that nutrition is the most important thing in the growing process. As long as the growing process of pre-natal, the lack of nutrition will affect the growth at ovum implantation until giving birth and the quality of child development for the future. Nutrition also gives influences the birth weight of a child, in the time of pregnancy if the nutrition supply of mother is fulfilled, so the birth weight of a child will be optimum. Aspects of parents' education and economic status do not have the direct effect towards the child development.

Conclusion

There is a correlation between neonatorum asphyxiawith the development of 2-4 year-aged childern. Need efforts to prevent and early detection on childern with asphyxiaborn to prevent a toddler development.

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