

Difference of Mortality and Morbidity between Neonates in Adolescent Pregnancy and Young Adult Pregnancy

Irman Permana¹, Fiva A Kadi², Tetty Yuniati², Aris Primadi², Sjarief Hidajat²

¹Department of Child Health, Faculty of Medicine, Universitas Swadaya Gunung Jati, Waled Hospital, Cirebon, Indonesia

²Department of Child Health, Faculty of Medicine, Universitas Padjadjaran/Hassan Sadikin General Hospital, Bandung, Indonesia

Keyword:

Morbidity,
mortality,
neonate,
adolescent pregnancy,
young adult pregnancy

Abstract

Adolescents are an important target population which proportion close to half of the world's population. They need special attention because of their influence on the condition of health and well-being of society globally. Pregnancy in adolescents is one of the challenges in health sector faced by all countries in the world including Indonesia. A retrospective cohort study was carried out in Department of Child Health Hasan Sadikin General Hospital Bandung using secondary data from medical record. The aim of this study was to identify the morbidity and mortality of neonates born by adolescent mothers or by young adults in Hassan Sadiki General Hospital from March-May 2018. Data was analyzed using logistic regression. Six hundred and eighty-four neonates were studied, of which 306 born by adolescent mothers and 378 were born by young adult mothers. Logistic regression showed that neonates born by adolescent mothers were at a higher risk of experiencing stillbirth 2.7 times higher compared to neonates born by young adult mothers (RR 2.66 [95% CI: 1,402-5,047]) $p = 0,002$. The risk of neonates born by adolescent mothers to experience low birth weight was 1.25 times (RR: 1.25 [95% CI: 1.07-1.46]) $p = 0.005$, preterm infants 1.2 times (RR: 1.2 [95% CI: 1,200-1,502]) $p = 0.008$ and neonatal asphyxia 1.5 times (RR: 1.48 [95% CI: 1.15-1.91]) $p = 0.002$ compared to neonates born by young adult mothers. Perinatal death and stillbirth, preterm infants, low birth weight, asphyxia amongst neonates born by adolescent mothers were higher than neonates born by young adult mothers.

Corresponding Author: irmanpermana@yahoo.com (Irman Permana)

INTRODUCTION

The total population of adolescents aged 10–19 years old in Indonesia in 2016 was around 44.74 million, representing 17.2% of total population of Indonesian with 22 millions of whom were adolescent.¹ Problems that arise during adolescence that are related to reproductive health include pre-marital sex behavior, marriage at a young age, adolescent pregnancy and bad habits using various harmful substances with various consequences that affect physical, mental, and social health.²⁻⁵ According to the United Nations Development Economic and Social Affairs (UNDESA), Indonesia was a country with high rate of adolescence marriage, ranked 37th out of 188 countries and the second highest among ASEAN countries after Cambodia with marriages below the age of 18 ranging from 14 to 17%.⁴⁻⁵ The consequences of early marriage and the associated pre-marital sex is an increase in the adolescent pregnancy. Adolescent pregnancy has a negative impact on the health of adolescents and their infants as well as broad social and economic impacts nationally, regionally, and globally.²⁻⁵

Research from various countries in the world regarding the outcomes of neonates from adolescent mothers showed diverse data. The 2012 Indonesian Demographic and Health Survey found that neonatal, infant and under-five mortality rates in adolescents were relatively higher compared to other age groups.^{4,6} Several scientific publications on the mortality of infants born by adolescent mothers also concluded that infant mortality in the form of early neonatal death, perinatal death and stillbirth was higher than that of infants born by mothers in young adult age groups.⁷⁻¹²

Published research results also conclude that pregnancy in adolescent is at risk of giving birth to infants with multiple morbidity in the form of preterm infants, low birth weight (LBW), and asphyxia and is more at risk for neonatal mortality which is also influenced by sociodemographic aspects.¹³⁻¹⁷ In other studies it was also found that adolescent pregnancy causes meconium aspiration syndrome, respiratory distress syndrome, perinatal infection, birth trauma,

congenital defects. Moreover, fetal growth is inhibited higher than pregnancy in young adulthood.^{8,13}

The differences in research design, sociodemographic factors and differences in setting between communities and clinics produce different outcome data on morbidity in various publications with different meaningful numbers.

Research and scientific publications on the outcome of neonates born by adolescent mothers have not yet been carried out in Indonesia. Therefore, research on this subject is expected to produce data that provides an overview of neonatal morbidity and mortality especially from those born by adolescent mother in Indonesia.

METHODS

A retrospective cohort study was conducted in March-May 2018. Subjects were selected from neonates born by mothers aged 10–24 years at Hasan Sadikin Hospital General Hospital, Bandung. Exclusion criteria: twin infants and incomplete data on Maternal Perinatal Database and medical records.

The sampling technique that was used in this study was total sampling. The data was gathered from the secondary data questionnaire in the Neonatal Perinatal Database of the Neonatology Division of Hasan Sadikin General Hospital.

Neonatal Mortality: infant mortality that occurs at 0–28 days of life. This study focused on perinatal mortality rate, stillbirth rate and early neonatal mortality rate. Neonatal morbidity: Incidence or prevalence of all types of infant illness that occur at the age of 0-28 days of life. This study focused on the incidence of LBW, preterm births, asphyxia, respiratory problems, congenital abnormalities and birth trauma. Adolescent pregnancy: maternal age between 10 and 19 years. Young Adult Pregnancy: maternal age between >19–24 years.

RESULTS

Based on data from the baby birth register from January 2016 to December 2017 with a total of 4975 infants born in Hassan Sadikin General

Hospital, 684 infants met the inclusion criteria and born by mothers aged 10–24 years. 306 of them were born by adolescent mothers and 378 were born by young adult mothers.

The general characteristics of the study subject can be seen in Table 1.

Based on analysis results, it was found that asphyxia, gestational age and maternal age group increased the risk of perinatal death, even for risk asphyxia 11.08 times compared with no perinatal death (p value <0.001 , 95%CI 13.52–51.44). The results of the analysis revealed that only birth weight and asphyxia would increase the risk of early neonatal deaths by 8.29 (values $p <0.05$, 95%CI 1.54–34.66) and 6.06 (p values <0.001 , 95%CI 2.21–16.62) times, compared without early neonatal deaths. Complications in labor were associated with a risk of up to 9.32 times greater to cause stillbirth (p value 0.001, 95%CI 2.38–36.45). moreover, the maternal age group and maternal education showing a slightly increased risk of stillbirth compared to complicating labor (lower OR values; 2.94 and 2.02 respectively).

The results in table 3 shows the data obtained from infant morbidity from adolescent mothers reveled that there was a higher risk for the occurrence of all outcomes of morbidity in the form of LBW, preterm infants, congenital abnormalities, asphyxia, respiratory distress, and birth trauma, although with relative risks and varying levels of statistical significance.

The risk of infants born by adolescent mothers to experience LBW was 1.25 times higher compared to infants born by young adult mothers (RR: 1.25 [95% CI: 1.07-1.46]). The risk for the occurrence of preterm infants amongst babies born by the adolescent mothers group was 1.2 times higher than those born by young adult mothers (RR: 1.2 [95% CI: 1,200-1,502]). The risk for the occurrence of asphyxia in infants born by adolescent mothers was 1.5 times greater compared to infants of young adult mothers (RR: 1.48 [95%CI: 1.15-1.91]).

Other morbidity events also showed a relatively higher risk in the infant group of adolescent mothers

Table 1. General Characteristics of Infants Born to Mother Aged 10-24 Years

Characteristics	n = 684
Age Group, n (%)	
Adolescent	306 (44,7)
Young Adult	378 (55,3)
Residence, n (%)	
Bandung	264 (38,6)
Outside Bandung	420 (61,4)
Labour Complication, n (%)	
Yes	349 (51,0)
No	335 (49,0)
Mother's education, n (%)	
Elementary school	91 (13,3)
Junior high school	315 (46,1)
Senior high school	278 (40,6)
Income, n (%)	
Low	107 (15,6)
Middle	500 (73,1)
High	77 (11,3)
Parity, n (%)	
Primipara	545 (79,7)
Multipara	139 (20,3)
Gestational Age (weeks), n (%)	
<37 weeks	270 (39,5)
≥37 weeks	414 (60,5)
Sex, n (%)	
Male	346 (50,6)
Female	338 (49,4)
Birth Weight n (%)	
Low birth weight (LBW)	330 (48,2)
Normal	354 (51,8)
Asphyxia	
Yes	178 (26,0)
No	506 (74,0)
Birth Trauma, n (%)	
Yes	5 (0,7)
No	679 (99,3)
Respiratory distress, n (%)	
Yes	61 (8,9)
No	623 (91,1)
Mode of delivery, n (%)	
Vaginally	454 (66,4)
Cesarean section	23 (3,6)

Table 2. Logistic Regression of Factors Associated with Perinatal Death, Early Neonatal Death and Stillbirth

Variables	B	SE	p	Adjusted OR (95%CI)
Perinatal Death				
Age Group	1.320	0.325	<0.001	2.5 (1.88–2.65)
Gestational Age	1.371	0.351	<0.001	3.94 (1.98–7.83)
Asphyxia	3.437	0.425	<0.001	11.08 (13.52–51.44)
Early Neonatal Death				
Birth Weight	1.987	0.795	0.042	7.29 (1.54–34.66)
Asphyxia	1.802	0.515	<0.001	6.06 (2.21–16.62)
Stillbirth				
Age Group	1.078	0.533	0.003	2.94 (1.03–8.36)
Labour Complication	2.232	0.696	0.001	9.32 (2.38–36.45)
Mother's Education	0.703	0.350	0.045	2.02 (1.02–4.02)

compared to the group of infants from young mothers, [95% CI: 0.56–43.98]) and congenital abnormalities (RR: 1.57 [95% CI: 0.72–3.41]).

although it was not statistically significant ($p > 0.01$) that is for the incidence of birth trauma (RR: 4.94

Table 3. Logistic Regression of Neonatal Morbidity in Adolescent and Young Adult Pregnancy

Variables	Adolescent (n=306)	Young Adult (n=378)	p	RR (95%CI)
Birth Weight				
LBW	166 (54.2%)	164 (43.4%)	0.005	1.25 (1.07–1.46)
Normal	140 (45.8%)	214 (56.6%)		
Preterm Infants				
Yes	106 (38.1%)	132 (26.2%)	0.008	1.188 (1.200–1.502)
No	172 (61.9%)	233 (63.8%)		
Asphyxia				
Yes	97 (31.7%)	81 (21.4%)	0.002	1.48 (1.15–1.91)
No	209 (68.3%)	297 (78.6%)		
Birth Trauma				
Yes	4 (1.3%)	1 (0.3%)	0.179	4.94 (0.56–43.98)
No	302 (98.7%)	377 (99.7%)		
Congenital Anomaly				
Yes	14 (4.6%)	11 (2.9%)	0.249	1.57 (0.72–3.41)
No	292 (95.4%)	367 (97.11%)		

DISCUSSION

The 2016 prevalence of adolescence at RSHS was 6.1%, and young adults was 7.6%. The proportion of adolescent deliveries in this study was higher than the results from research in several referral hospitals in several countries such as Switzerland (3%), Italy (2%), and Malaysia (5%). In contrary, this proportion was lower compared to the results from hospitals in other developing countries, which was 11.2% in Iran, 17% in Egypt as well as results from African countries such as Cameroon 25% and South Africa 39%.¹⁸ Since there were 306 deliveries by adolescent from total 4975 births, epidemiologically it can be concluded that there were 60 adolescent mothers in every 1000 births in Hasan Sadikin General Hospital. The birth rate of babies from adolescent mothers in hospitals was higher than the general adolescent birth rate in Indonesia, that is 48 per 1000 births.

In this study the majority of adolescent mothers who gave birth at Hasan Sadikin Hospital Bandung had higher education level and lower socioeconomic level compared to young adult mothers. In studies conducted in Iraq, Northeast India and Malaysia it was also found that the characteristics of education level and socioeconomic condition were significantly associated with pregnancy in adolescents, which were found to be significantly different from pregnancy in young adulthood with $p < 0.05$.¹⁹⁻²¹

Perinatal mortality that occurred amongst adolescent pregnancies was higher than perinatal mortality in the young adult group. This result was similar to the results obtained in India which showed the risk of perinatal death in the adolescent group was twice that of pregnant adults.¹⁸ Research in Italy also showed similar results, which revealed 4-folds higher of perinatal mortality in the adolescent age group compared to the young adult group. The results of this study were also in line with the results from a multi centre study conducted by World Health Organization (WHO) which obtained perinatal mortality rate (PMR) in the adolescent age group was 1.6 times compared to the young adult age group. If the conversion according to the WHO formula for PMR in health facilities is found, PMR in the infant

group of adolescent mothers had a 100 compared to 90 per 1000 births in the infant group of young adult mothers.²²

The risk for stillbirth mortality in the group of infants from adolescent pregnancy was 2.7 times higher compared to the group of infants from young adult pregnancies. This finding was higher than the WHO multicenter study which obtained 1.3 times and also higher compared to the results from a study in Cameroon which found the risk 1.47, and compared to community research in the South Asia Region.²³ The risk of high perinatal and stillbirth deaths was associated with the inadequate preparation of adolescent mothers psychologically, psychologically and socially to do good antenatal care and preparation for labor to produce healthy infants.^{13,14}

Based on the analysis of mortality in adolescent pregnancies, data in countries with lower middle income level, higher stillbirth in adolescent mothers can reach up to more than 30%.^{4,25} The interesting neonatal mortality incidence was obtained in the early neonatal death, where there was no difference between groups of infants from adolescent mothers compared to infants from young adult mothers. This research was similar to the results from a study at a tertiary referral hospital in India.²²

Regarding morbidity, low birth weight is experienced more commonly by neonates from adolescent mothers with statistically significant difference compared to morbidity of lower birth weights amongst neonates from young adult mothers. This figure was not much different from the WHO study in 29 countries that showed statistically significant results. Twenty one population-based American studies based on Centers for Disease Control and Prevention (CDC) birth data stated that the risk of low birth weight babies from adolescent mothers was one and a half times higher than those from adult mothers.¹²

The results of this study were not much different from the risk value for neonates born by adolescent mothers in tertiary homes in India, which was one and a half times, whereas in the Cameroonian study it arrived at two-folds.²⁶ Some physiological changes in pregnancy in adolescent mothers include increasing

linear growth, changes in body weight and fat deposition during and after labor. The majority of which occur during the third trimester of pregnancy, when the fetus experiences rapid growth in the uterus. Differences in physiology with the occurrence of competition for nutrient requirements for the growth of the mother and fetus at the same time, will increase the likelihood of LBW in infants conceived by adolescent mothers.^{27,28} Low birth weight infants are closely related to neonatal mortality, inhibiting cognitive growth and development, and causing chronic diseases in the future.¹³

Preterm infants in this study demonstrated differences in the group of adolescent mothers. This result was similar to a study conducted in South India. In the group of mothers aged 17–19 years, preterm infants had a double risk compared to infants from adult mothers.²⁹ Conversely, the results of this study were not much different from the results from research conducted in the United Kingdom, in which, less-months birth incidence in adolescent mothers had twice the risk compared to adulthood mothers.³⁰

Asphyxia was found in the group of infants from adolescent pregnancy with relative risk 1.5 times to develop asphyxia compared to infants from young adult pregnancies. This result was different from studies in Cameroon tertiary hospitals, and in India which showed no significant difference between asphyxia in adolescent pregnancy compared to adult pregnancy.^{21,26,29} Asphyxia that occurs in infants from adolescent pregnancy can be caused by several physiological changes including increased cardiac output due to increased heart rate and systemic vascular resistance, as well as changes in lung capacity which decreases by 20-30%. The overall condition of the reproductive organs that are immature and unoptimal for labor will lead to the adaptation of the baby that may lead to problems including the possibility of intrauterine hypoxia which further become asphyxia at birth.²⁸

The incidence of birth trauma and congenital abnormalities in infants from adolescent pregnancies were also relatively higher compared to the group of infants from the pregnancy of young adults, although it

was statistically significant. The condition of the pelvic bone immaturity which its growth process still going on until the age of over 15 years or up to 2 years after menarche or more, and the growth of birth canals that goes slower than the rate of general growth in late adolescents, can cause the risk of difficulty during labor results in birth trauma in infants conceived and born.^{27,31} Higher congenital abnormalities are also associated with not optimal cells in the reproductive organs that affect organogenesis process in infants conceived and born.^{32,33}

It is necessary to conduct a community research that involves multicenter regional hospitals to obtain a more comprehensive picture of the condition of adolescent pregnancies in Indonesia.

CONCLUSION

Mortality in the form of perinatal death and stillbirth in neonates born by adolescent mothers was higher than mortality in neonates born by young adult mothers. Morbidity in the form of preterm infants, LBW, asphyxia, congenital abnormalities, and birth trauma in neonates born to adolescent mothers were also higher than that of in neonates born by young adult mothers.

REFERENCES

1. Kementrian Kesehatan Indonesia. Data dan Informasi Profil Kesehatan Indonesia. 2016.
2. Erken A. World apart: reproductive health and right in age of inequality. United Nations Fund and Population Activities. 2017
3. World Health Organization. Health for the world's adolescent: A second chance in the second decade. 2014.
4. Kementrian Kesehatan Indonesia. Situasi kesehatan reproduksi remaja. Pusat Data dan Informasi. 2013.
5. Badan Pusat Statistik. Kemajuan yang tertunda: analisis perkawinan usia anak di Indonesia. 2015.
6. Puslitbang Keluarga Berencana Nasional. Survei

Indikator Kerja: Program kependudukan, keluarga berencana dan pembangunan jangka panjang nasional. 2016.

7. Soejoenoes A. Teenage pregnancy. *Indones J Obstet Gynecol* 2017;5:3:128-30.
8. Socolov DG, Iorga M, Carauleanu A. Pregnancy during adolescent and associated risks: An 8 year hospital-based cohort study (2007-2014) in Romania. *Biomed Res Int* 2017;1:1-9.
9. Darmstadt GL, Shiffman J, Lawn JE. Advancing the newborn and stillbirth global agenda: priorities for the next decade. *Arch Dis Child* 2015;10:s13-8.
10. United Nations Children's Fund. Levels and trend in child mortality. *Unicef Report* 2017.
11. Kozuki N, Lee A, Silveira MF. The Association of parity and maternal age with small for gestational age, preterm, and neonatal and infant mortality: a metaanalysis. *BMC Public Health* 2013;13(S2).
12. Malabarey OT, Balayla J, Klam SL, Shrim A. Pregnancies in young adolescent mother: A population-based study on 37 million birth. *J Pediatr Adolesc Gynaec* 2012;25:98-102.
13. Cinar N, Menekse D. Affect of adolescent pregnancy on health of baby. *J Pediatr Neonatal Care*. 2017;2(1):12-23.
14. Ganchimeg T, Morisaki N, Laopaiboo M, et al. Pregnancy and childbirth outcomes among adolescent mothers: a WHO multicountry study. *BJOG* 2014;121 (Suppl 1):40-8.
15. Menacker F, Martin JA. Birth to 10-14 year old mother, 1990-2002: Trend and health outcomes. *National vital statistics report*, Vol.53(7): 1-19.
16. Penfield CA, Lahiff M, Pies C, Caughey AB. Adolescent pregnancies in the United State: How obstetrics and sociodemographic factors influence risk of cesarean delivery. *Am J Perinatol* 2016;1:1-7.
17. Finer LB, Zolna MR. Declines in unintended pregnancy in United States, 2008-2011. *N Engl J med* 2016;374:843-52.
18. Mukhopadhyay P, Chaudhuri RN, Paul B. Hospital-based perinatal outcomes and complications in Teenage pregnancy in India. *J Health Popul Nutr*. 2010.h.494-500
19. Najim T, Ghathwan KI, Alnakkash U. The Impact of teenage pregnancy on maternal and neonatal outcomes. *Int J Sci Res*. 2015;3: 106-13
20. Suan MA, Ismail AH, Ghazali H. A review of teenage pregnancy research in Malaysia. *Med J Malaysia*. 2015;70(4):214-9.
21. Medhi R, Das B, Das A. Adverse obstetrical and perinatal outcome in adolescent mothers associate with first birth: a hospital-based case-control study in tertiary care hospital in North East India. *Adolesc Health Med Theor* 2016;7: 37-42.
22. World Health Organization. Making every baby count. Audit and review of stillbirths and neonatal deaths. 2016
23. Althabe F, Moore JL, Gibbon L, et al. Adverse maternal and perinatal outcome in adolescent pregnancies: the global network's maternal newborn health registry study. *Reproductive Health*. 2015;12(Supl2): 1-9
24. Dhamayanti M, Asmara A. Remaja: Kesehatan dan permasalahannya. *Badan Penerbit Ikatan Dokter Anak Indonesia*. 2017.
25. World Health Organization. Early marriages, adolescent and young pregnancies: secretariat report. 2012
26. Ngowa JD, Kasia JM, Pisoh WD. Obstetrical and perinatal outcomes of adolescent pregnancies in Cameroon : A retrospective cohort study at Yaounde General Hospital. *Open J Obstetr Ginecol* 2015;5:88-93.
27. Holland Hall, Burstein GR. Adolescent medicine. Dalam: Kliegman RM, Stanton B, St Geme J, Schor NF. *Penyunting. Nelson textbook of pediatrics*. Elsevier Saunders Inc. 2015. h. 926-43.
28. Leppert PC. The Effect of Pregnancy on Adolescent. *Haworth Press, New York University*. 2015. h 65-79

29. Blomberg M. Impact of maternal age on obstetric and neonatal outcome with emphasis on primiparous adolescents and older women: a Swedish Medical Birth Register Study. *BMJ Open* 2014;4:e5840.1-10.
30. Khashan A, Baker PN, Kenny LC. Preterm birth and reduced birthweight in first and second teenage pregnancies: a register-based cohort study. *BMC Pregnancy and Childbirth*.2010;10(36):1-8.
31. Siegel RS, Brandon AR. Adolescents, pregnancy, and mental health. *J Pediatr Adolescent Gynecol*. 2014: 138-150.
32. Yuce T, Aker SS, Seval MM. Obstetric and neonatal outcomes of adolescent pregnancies. *North Clin Istanbul* 2015;2(2):122-127
33. Kawakita T, Wilson K, Grants KL. Adverse maternal and neonatal outcomes in adolescent pregnancy. *J Pediatr Adolesc Gynecol* 2016;29(2):130-36.