Outcome of Teenage Pregnancy in Rajavithi Hospital

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Objective: *To compare maternal and neonatal outcomes between pregnant teenage girls (age < 20 yrs) and pregnant adults (age 20-34 yrs).*
Material and Method: *Seven hundred and fifty pregnant teenagers admitted and delivered at Rajavithi Hospital during November 8, 2006 and December 22, 2007 were enrolled in the study. A control group included 750 pregnant adults delivered during the same period.*
Results: *Preterm labor was the significant antepartum complication in the teenage mothers while diabetes mellitus was the significant one in the adult mothers as compared to those in the other groups. Teenage mothers had significantly higher incidence of cesarean delivery than that in the adult mothers. The neonates of the teenage mothers showed higher number of complications than those of the adult mothers.*
Conclusion: *Pregnant teenage girls had more maternal and neonatal complications than those of pregnant adults.*

Keywords: *Adult pregnancy, Teenage pregnancy, Neonatal outcomes, Maternal outcomes, Pregnancy complications, Pregnancy outcome*

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Teenage or adolescent period of females is the transitional stage of physical and mental development between childhood and adulthood. Therefore, pregnancies occurring in teenage girls are generally classified to have a higher risk than those in adult females. Nevertheless, risk outcomes in adolescence pregnancy are in ambiguity. Several studies reported conflicting results of medical and obstetrical complications in teenage pregnancy. Some researchers observed that pregnant teenagers showed higher incidences of anemia[1], pregnancy induced hypertension (PIH), and premature labor[1,2] than those in pregnant adults; while the others have reported similar results of these incidences when comparing between both groups[3,4].

Currently, the incidence of teenage pregnancy is considered high as compared to the earlier days. The main contributing factors are earlier onset of puberty and earlier first sexual intercourse in teenagers compared with those in the past. In Rajavithi Hospital, the biggest tertiary hospital of the Ministry of Public Heath in Thailand, the relatively high incidence of teenage pregnancy has been reported to be about 12-14% during 2002-2007[5].

The present study was conducted to compare the pregnant teenage girls (age < 20 yrs) with pregnant adult women (age 20-34 yrs) in the following variables: 1) Maternal outcomes of pregnancy such as route of delivery, antepartum, intrapartum and postpartum complications, 2) Neonatal outcomes of pregnancy such as birth weight, Apgar score at 1 and 5 min and neonatal complications.

Material and Method

The present study was approved by Rajavithi Hospital Ethics Committee. Written informed consent was obtained from the participants. This cohort study was carried out between 8 November 2006 and 22

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December 2007 at Rajavithi Hospital. The present study group included 750 teenage mothers (< 20 years) who were delivered in Rajavithi Hospital during the study period. During the same period, the authors included the control group of 750 adult mothers (20-34 years) who were delivered after each study case in ratio 1:1. Both groups were taken care of during labor and delivery by doctors and nurses on duty under routine protocol. The sample size was calculated according to the similar study of Kunaviktikul and Skulsuthavong[1] in Chiang Mai. They reported that pregnancy induced hypertension (PIH) was the highest significant relative risk when comparing between teenage and adult mother (6.6%: 3.1%), p = 0.0035. So these values were brought by using the following formula[6]:

$$n = \frac{[Z_{1-\alpha}\sqrt{2p(1-p)} + Z_{1-\beta}\sqrt{p_1(1-p_1) + p_2(1-p_2)}]^2}{(p_2-p_1)^2}$$

Where n = sample size in each group

p_1 = proportion of PIH incidence cases in teenage mother

p_2 = proportion of PIH incidence cases in adult mother

$p = (P_1 + P_2)/2 = (0.066 + 0.032) = 0.048$

α = type I error = 0.05

β = type II error = 0.20 (The power calculation used in the present study was 80%)

$Z_{1-\alpha}$ = standard value from Table Z at confidence level = 1.96

$Z\beta$ = standard value from Table Z at power of test = 0.84

$$n = \frac{[1.96\sqrt{2 \times 0.048 \times 0.952} + 0.84\sqrt{0.066(1-0.066) + 0.031(1-0.031)}]^2}{(0.031-0.066)^2}$$

= 579.15 cases

= 580 cases

To compensate for patients' s lost contact in the follow-up, 20% was added to the number calculated. Then the total number of subjects needed in each group was 580 + 116 = 696 cases

All participants were interviewed and the information of the demographic characteristics was recorded in the designed record forms. The demographic characteristic, maternal and neonatal data were analyzed using Chi-square test, Fisher exact test, unpaired t-test, arithmetic mean, median, standard deviation and range. The level of statistical significance was set at $p < 0.05$. All statistical analyzes conducted used the computer software program SPSS/PC version 11.5 (SPSS, Chicago, IL, USA).

Results

During the study period, 750 pregnant teenage women were delivered at Rajavithi Hospital, from the total of 6,089 deliveries. This teenage pregnancy incidence was 12.29%. The characteristics of the present study and control population are shown in Table 1. All characteristics are significantly different in both groups.

Table 2 compares the antepartum complications between teenage and adult mothers. Diabetes mellitus and premature labor were the two complications with significantly different incidences in both groups ($p < 0.002$ and $p = 0.001$, respectively). Mode of delivery carried by teenage or adult mothers are compared in Table 3. Cesarean delivery in the teenage group was significantly higher than that in the adult group (18.7%: 13.3%, p = 0.006). In contrast, vacuum extraction in the teenage group was significantly lower than that in the adult group (0.8%: 2.8%, p = 0.006). Intrapartum and postpartum complications were similar between teenage and adult mothers (Table 4).

Table 5 shows indications for cesarean delivery. Non-reassuring fetal status was the only indication with higher incidence in the study teenage group than in the control adult group (19.3%: 9%, p = 0.029). The neonatal outcomes were compared between teenage and adult mothers (Table 6). The neonates of the teenage group had significantly higher complications than those of the adult group. However, five complications exhibited non-significant difference between two groups. Those are: Apgar score < 7 at 5 min, intrauterine growth restriction (IUGR), congenital anomalies, respiratory distress syndrome (RDS) and postterm.

Discussion

The significant higher incidences of nearly risk-prone characteristics, *i.e.* antenatal care, revealed that a teenager was not a good candidate for pregnancy (Table 1). Fewer antenatal care of teenage mothers reflects less responsibility and/or less maternal care in this group. Regarding marital status, the percentage of teenage marriage was significantly lower than that of adult marriage. This result is similar to those of Kongnyuy et al[7], which studied in Cameroon and Isaranurug et al[8], which reported in Thailand. Some of these characteristics such as gravidity and parity may influence some maternal outcomes like cesarean section. However, the objective of the present study was only to compare those outcomes between both groups_but not the risk

Table 1. Comparison of characteristics between teenage mothers and adult mothers

	Teenage mothers 750 cases (%)	Adult mothers 750 cases (%)	p-value
Age at delivery (yrs)			
(mean ± SD)	17.93 ± 1.42	26.70 + 3.94	<0.001[b]
(min-max)	(13.25-19.92)	(20.00-34.00)	
Gravidity	1 (1-4)	2 (1-7)	<0.001[c]
Parity	0 (0-2)	0 (0-4)	<0.001[c]
Median (min-max)			
Marital status	(749)	(750)	<0.001[a]
single parent	686	718	OR 0.485
married	63	32	(95% CI 0.313-0.752)
Antenatal care			
Yes	674 (89.9)	725 (96.7)	<0.001[a]
No	76 (10.1)	25 (3.3)	OR 0.31 (1.96-3.50)
Planned pregnancy			
Yes	492 (60.1)	230 (30.0)	<0.001[d]
No	324 (39.6)	537 (70.0)	
Rape	2 (0.2)	0 (0)	

[a] Statistical significance difference by Chi-square test, [b] Statistical significance difference by unpaired t-test,
[c] Statistical significance difference by Mann-Whitney test, [d] Statistical significance difference by Fisher's exact test

Table 2. Comparison of antepartum complications between teenage and adult mothers

	Teenage mothers 750 cases (%)	Adult mothers 750 cases (%)	p-value
Asthma	6 (0.8)	2 (0.3)	0.288
Anemia	75(10)	54 (7.2)	0.053
Heart disease	6 (0.8)	3 (0.4)	0.342
Diabetes mellitus	2 (0.3)	15 (2.0)	<0.002[a]
			OR 0.13 (0.02-0.60)
Mild preeclampsia	7 (0.9)	5 (0.7)	0.774
Severe preeclampsia	12 (1.6)	15 (2.0)	0.568
Gestational hypertension	3 (0.4)	1 (0.1)	0.374
PROM	84 (11.2)	92 (12.3)	0.574
Placenta previa	0 (0)	2 (0.3)	0.500
Placental abruption	1 (0.1)	0 (0)	1.000
Superimposed mild/severe preeclampsia	3 (0.4)	8 (1.1)	0.145
Eclampsia	1 (0.1)	0 (0)	1.000
Premature labor	91 (12.1)	53 (7.1)	0.001[a]
			OR 1.81 (1.27-2.59)
HIV sero positive	2 (0.3)	4 (0.5)	0.687
SLE	2 (0.3)	1 (0.1)	1.000
Multifetal pregnancy	5 (0.6)	5 (0.6)	1.000
STD	6 (0.8)	5 (0.6)	0.762
Oligohydramnios	5 (0.6)	5 (0.6)	1.000
Polyhydramnios	1 (0.1)	2 (0.3)	1.000

SLE = systemic lupus erythematosus, STD = sexually transmitted disease, PROM = premature rupture of membranes, HIV = human immunodeficiency virus
[a] Statistical significance difference by Chi-square test

Table 3. Comparison of mode of delivery between teenage and adult mothers

	Teenage mothers 750 cases (%)	Adult mothers 750 cases (%)	p-value
Mode of delivery			
Vaginal spontaneous	567 (75.6)	594 (79.2)	0.108
Breech assisting	3 (0.4)	3 (0.4)	1.000
Forceps extraction	34 (4.5)	32 (4.1)	0.900
Vacuum extraction	6 (0.8)	21 (2.8)	0.004[a]
Cesarean section	140 (18.7)	100 (13.3)	0.005[a]
Type of labor	(749)	(749)	0.058
Spontaneous	669 (89.3)	648 (86.5)	
Induction	49 (6.5)	74 (9.9)	
Elective cesarean delivery	31 (4.1)	27 (3.6)	

[a] Statistical significance difference by Chi-square test

Table 4. Comparison of intrapartum and postpartum complications between teenage and adult mothers

Complications	Teenage mothers 750 cases (%)	Adult mothers 750 cases (%)	p-value
Intrapartum			
CPD	41 (5.4)	37 (4.9)	0.64
Fetal distress	9 (1.2)	6 (0.8)	0.60
Shoulder dystocia	3 (0.4)	1 (0.1)	0.37
Entrapped fetal head	2 (0.3)	0 (0)	0.50
Other	6 (0.8)	7 (0.9)	0.78
Postpartum			
PPH	22 (2.9)	26 (3.5)	0.56
Retained placenta	1 (0.1)	3 (0.4)	0.37
Puerperal infection	4 (0.5)	1 (0.1)	0.21
Wound disruption	3 (0.4)	4 (0.5)	0.72
Perineal tear	4 (0.5)	6 (0.8)	0.50
Perineal hematoma	2 (0.2)	1 (0.1)	1.000
Uterine atony	4 (0.5)	5 (0.6)	1.000
Maternal death	1 (0.1)	0 (0)	0.18

CPD = cephalopelvic disproportion

factors of the adverse outcomes. So the subjects were not divided to subgroups according to gravidity and parity.

Anemia was the antepartum complication found significantly higher in teenage mothers in many previous studies[1-3,9-13]. In the present study, a comparable incidence of anemia was demonstrated in both groups similar to some researches[8,14,15]. The authors suggested that criteria for diagnosis of anemia, antecedent anemia, different races and countries should probably explain these controversial results. According to the antepartum complications in the present study, diabetes mellitus (DM) was significantly higher in the adult mothers while previous research reports the similar incidence of such complication between teenage and adult mothers[2,4,14-16]. DM during pregnancy in the USA has increased progressively with maternal age, showing from 8.3 per 1,000 singleton live-born infants of maternal age under 20 years old to 16.3, 25.1, and 33.8 per 1,000 singleton live-born infants of maternal age 20-24, 25-29, and 30-34 years old, respectively[17]. The higher incidence of premature labor in the study group corresponded with a higher number of preterm babies in the same group. Reports

Table 5. Comparison of indications for cesarean delivery between teenage and adult mothers

	Teenage mothers 140 cases (%)	Adult mothers 100 cases (%)	p-value
CPD	41 (29.3)	37 (37.0)	0.212
Fetal distress	9 (6.4)	4 (4.0)	0.566
Failed induction	14 (10.0)	8 (8.0)	0.656
Placenta previa	0 (0.0)	2 (2.0)	0.173
Non-reassuring fetal status	27 (19.3)	9 (9.0)	0.029[a]
			0R 2.42 (1.08-5.41)
Previous cesarean section	10 (7.1)	11 (11.0)	0.356
Breech presentation	17 (12.1)	10 (10.0)	0.682
PROM with unfavorable cervix	4 (2.9)	1 (1.0)	0.374
Severe preeclampsia with unfavorable cervix	4 (2.9)	7 (7.0)	0.364
Multifetal pregnancy	4 (2.9)	2 (2.0)	0.687
Oligohydramnios	4 (2.9)	5 (5.0)	1.000

CPD = cephalopelvic disproportion, PROM = premature rupture of membranes
[a] Statistical significance difference by Chi-square test

Table 6. Comparison of neonatal outcomes between teenage and adult mothers

	Teenage mothers 750 cases (%)	Adult mothers 750 cases (%)	p-value
Gestational age (wks) (mean ± SD)	37.97 ± 2.64	38.35 ± 2.04	0.027[c]
Birth weight	2,853.58 ± 538.04	2,998.63 ± 465.32	<0.001[b]
Preterm	158 (20.9)	89 (11.8)	<0.001[a]
Term	596 (78.7)	663 (87.8)	<0.001[a]
Postterm	3 (0.4)	2 (0.3)	0.637
Apgar score at 1 min median (min-max)	9 (0-10)	9 (1-10)	0.007[c]
Apgar score < 7	38 (5.1)	19 (2.5)	0.014[a]
			0R 2.05 (1.17-3.60)
Apgar score at 5 min median (min-max)	10 (0-10)	10 (1-10)	0.014[c]
Apgar score < 7	19 (2.5)	8 (1.1)	0.050
Low birth weight (< 2500 gm)	132 (17.4)	92 (12.2)	0.008[a]
IUGR	30 (4.0)	22 (2.9)	0.323
Admission to NICU	55 (7.3)	28 (3.7)	0.003[a]
Stillbirth	7 (0.9)	0 (0)	0.015[d]
Congenital anomalies	11 (1.5)	8 (1.1)	0.645
Respiratory distress syndrome	14 (1.8)	6 (0.8)	0.113

NICU = newborn intensive care unit, IUGR = intrauterine growth restriction
[a] = Statistical significance difference by Chi-square test, [b] = Statistical significance difference by unpaired t-test,
[c] = Statistical significance difference by Mann-Whitney test, [d] = Statistical significance difference by Fisher exact test

on premature labor in teenage mothers have been controversial. The first group[1,2,9-13,15,16,18-20] had similar results to the present study while the second group[3,14,21-24] revealed the comparable premature labor between teenage and adult mothers. Finding the causes of premature labor has been under investigation[25]. Mental or physical stress, one of the plausible causes, should be explained by the inferior marital status of the teenage mothers (Table 1). All intrapartum and postpartum complications were comparable between teenage and adult mothers in the present study. Similar results have been shown in many previous

studies[4,8,15,16]. Reports on perineal tear are controversial. Kongnyuy[7] reported the significant higher perineal tear in the teenage group while Briggs[12] revealed the significant higher third or fourth degree perineal tear in the adult group.

The higher incidence of teenage cesarean delivery in the present study was somewhat different from those observed in other studies, which reported the significant lower incidence of cesarean delivery in the teenage mothers[2,9,11,12,14,15,21,22]. A report by Ebeigbe and Gharoro[24] was the only study having similar result to the present study. When the indications for cesarean delivery were analyzed, non-reassuring fetal status was the only indication that had a significantly higher incidence in the study group than that in the control group.

One of the causes of non-reassuring status was unhealthy fetus due to the low birth weight and premature babies in the study group. Although the mean gestational age at delivery and birth weight in the study group were significantly lower than those in the control group, these had no clinical significance since in both groups the mean gestational age at delivery was term ($\geq$ 37 weeks) and the mean birth weights were more than 2,500 grams. Many previous studies[8,14,15,21,22] had similar results to the present study in both mean gestational age at delivery and mean birth weight.

However, when classified as low birth weight, most studies[2,8,11,12,20,23], including the present study, reported that teenage mothers had a significantly higher incidence in low birth weight than that in the adult mothers. Only Thato et al[14] and Usta et al[22] reported the comparable low birth weight in both groups. The incidence of stillbirth, one of the neonatal complications found to be significantly higher in the study group, corresponded with that reported by Kunaviktikul and Skulsuthavong[1] in Chiang Mai, northern of Thailand. However, many previous studies reported differently that the rate of stillbirth was similar in both groups[2,7,9,22,23]. It should be noted that stillbirth comes from many causes and teenage pregnancy is one of the risk factors. The higher significant rate of admission to neonatal intensive care unit (NICU) in the present study group, similar to that reported in Jordan by Al Ramahi and Saleh[15], did not lead to any important point because there were many indications for admission to NICU. Congenital anomaly was one of these indications. Chen et al[26] reported the increased risks of congenital anomalies in central nervous, gastrointestinal and musculoskeletal integument systems. However, the present study and the other studies[2,15,23] found similar congenital anomalies rate between both groups.

In conclusion, teenage mothers had significantly higher incidences of antepartum complication (premature labor), neonatal complications (stillbirth, preterm babies and low birth weight) and cesarean delivery but significantly lower incidence of diabetes mellitus than those found in the control adult mothers.

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ผลของการตั้งครรภ์ในหญิงวัยรุ่นในโรงพยาบาลราชวิถี

เอกชัย โควาวิสารัช, สุภานัน ชัยราช, เกษร โตแสง, สุวรรณา อัศวพิริยานนท์, อุไรวรรณ โชติเกียรติ

วัตถุประสงค์: *เพื่อเปรียบเทียบผลของการตั้งครรภ์ด้านมารดาและทารกระหว่างหญิงตั้งครรภ์วัยรุ่น (อายุ < 20 ปี) กับหญิงตั้งครรภ์วัยผู้ใหญ่(อายุ 20-34 ปี)*

วัสดุและวิธีการ: *หญิงตั้งครรภ์วัยรุ่นจำนวน 750 คน ที่รับไว้และคลอดที่โรงพยาบาลราชวิถีศึกษาในช่วงเวลาตั้งแต่วันที่ 8 พฤศจิกายน พ.ศ. 2549 ถึง วันที่ 22 ธันวาคม พ.ศ. 2550 ได้รับการคัดเลือกเข้ามาในการศึกษา โดยมีกลุ่มควบคุมเป็นหญิงตั้งครรภ์วัยผู้ใหญ่จำนวน 750 คน ที่คลอดในลำดับจากหญิงตั้งครรภ์วัยรุ่นนั้นในช่วงเวลาเดียวกัน*

ผลการศึกษา: *ภาวะเจ็บครรภ์คลอดก่อนกำหนดเป็นภาวะแทรกซ้อนระหว่างตั้งครรภ์ก่อนคลอดที่พบในกลุ่มหญิงตั้งครรภ์วัยรุ่นมากกว่าอย่างมีนัยสำคัญ ในขณะที่โรคเบาหวานเป็นภาวะแทรกซ้อนระหว่างตั้งครรภ์ก่อนคลอดที่พบในกลุ่มหญิงตั้งครรภ์วัยผู้ใหญ่มากกว่าอย่างมีนัยสำคัญ เมื่อเทียบกับอีกกลุ่มหนึ่ง หญิงตั้งครรภ์วัยรุ่นคลอดโดยการผ่าตัดคลอดทางหน้าท้องมากกว่ากลุ่มหญิงตั้งครรภ์วัยผู้ใหญ่อย่างมีนัยสำคัญ ทารกแรกคลอดของกลุ่มหญิงตั้งครรภ์วัยรุ่นมีภาวะแทรกซ้อนมากกว่ากลุ่มหญิงตั้งครรภ์วัยผู้ใหญ่*

สรุป: *หญิงตั้งครรภ์วัยรุ่นคลอดมีภาวะแทรกซ้อนทั้งทางมารดาและทารกมากกว่าหญิงตั้งครรภ์วัยผู้ใหญ่*