# Teenage Pregnancy and Pregnancy Outcomes

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## *Abstract*

**Objectives**: To determine pregnancy outcomes especially the risk of preterm birth in teenage gravidas. Other maternal and neonatal morbidities were also evaluated.

**Methods**: Medical records of 296 teenage pregnant women (aged below 20 years) who attended our antenatal clinic between May 1, 2010 and April 30, 2011 and delivered in our institution were identified as case. Adult gravidas (aged ≥ 20 years) who attended antenatal clinic on the nearest date of case were selected as control. Data on maternal characteristics and pregnancy outcomes between both groups were compared.

**Results**: Among 3,440 pregnant women who attended our antenatal clinic during the study period, 296 were teenage (8.6%). Comparing to the controls by univariable analysis, teenage mothers had significantly increased risks of preterm birth (22.3% vs 10.5%), low birth weight (LBW; 14.9% vs 8.4%), birth asphyxia (3.7% vs 0.7%), and neonatal intensive care unit (NICU) admission (3.0% vs 0.3%). Risk of preeclampsia between both groups was not significantly different (3.4% vs 3.7%). After controlling for potential confounders by multivariable analysis, there was only a trend toward increasing risk of preterm birth in the teenage group with adjusted relative risk of 1.2 (95% CI, 0.6-2.5). LBW, birth asphyxia, and NICU admission were also not significantly different between the two groups in multivariable analysis.

**Conclusion**: We observed a trend toward an increased risk of preterm birth in teenage gravidas, but the result did not attain statistical significance. Risks of preeclampsia, LBW, birth asphyxia, and NICU admission in teenage mothers were not significantly increased compared to adult gravidas.

**Keywords**: pregnancy complications, preterm birth, teenage pregnancy

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## การตั้งครรภ์ในวัยรุ่นและภาวะแทรกซ้อนจากการตั้งครรภ์

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**วัตถุประสงค์**: เพื่อศึกษาผลของการตั้งครรภ์ โดยเฉพาะการคลอดก่อนกำหนดและภาวะแทรกซ้อนอื่นต่อมารดาและทารกในสตรีตั้งครรภ์วัยรุ่นเทียบกับสตรีตั้งครรภ์ปกติ

**วิธีดำเนินการวิจัย**: ทำการเก็บข้อมูลของกลุ่มศึกษาคือสตรีตั้งครรภ์วัยรุ่น (อายุน้อยกว่า 20 ปี) จำนวน 296 ราย ที่ฝากครรภ์ระหว่างเดือนพฤษภาคม พ.ศ. 2553 ถึง เดือนเมษายน พ.ศ. 2554 และคลอดที่วชิรพยาบาล และกลุ่มเปรียบเทียบคือสตรีตั้งครรภ์ปกติ (อายุ 20-34 ปี) จำนวน 296 ราย ที่มาฝากครรภ์ครั้งแรกในวันที่ใกล้เคียงกับกลุ่มศึกษาที่สุด โดยเก็บข้อมูลพื้นฐานของมารดาและผลของการตั้งครรภ์ และนำข้อมูลของกลุ่มตัวอย่างทั้งสองกลุ่มมาเปรียบเทียบกัน

**ผลการวิจัย**: จากสตรีตั้งครรภ์ทั้งหมด 3,440 ราย ที่มาฝากครรภ์ในช่วงเวลาดังกล่าว อัตราการตั้งครรภ์ในสตรีวัยรุ่นเท่ากับ ร้อยละ 8.6 (296/3,440) สตรีตั้งครรภ์วัยรุ่นมีอัตราการคลอดก่อนกำหนดสูงกว่าสตรีตั้งครรภ์ปกติ คือ ร้อยละ 22.3 เทียบกับ ร้อยละ 10.5 ภาวะแทรกซ้อนอื่นของทารกในสตรีตั้งครรภ์วัยรุ่นก็สูงกว่าทารกในสตรีตั้งครรภ์ปกติ ได้แก่ ทารกแรกคลอดน้ำหนักตัวน้อย ร้อยละ 14.9 เทียบกับ ร้อยละ 8.4 ภาวะขาดออกซิเจนของทารกแรกคลอด ร้อยละ 3.7 เทียบกับ ร้อยละ 0.7 และ การรับการรักษาในหออภิบาลกุมารเวชกรรม ร้อยละ 3.0 เทียบกับ ร้อยละ 0.3 เมื่อเทียบกับสตรีตั้งครรภ์ปกติ แต่ไม่พบความแตกต่างกันของความเสี่ยงต่อการเกิดภาวะความดันโลหิตสูงระหว่างตั้งครรภ์ระหว่างกลุ่มตัวอย่างทั้งสองกลุ่ม คือ ร้อยละ 3.4 เทียบกับ ร้อยละ 3.7 จากการวิเคราะห์โดยควบคุมปัจจัยที่น่าจะเกี่ยวข้องพบว่า สตรีตั้งครรภ์วัยรุ่นมีแนวโน้มที่จะมีการคลอดก่อนกำหนดสูงว่าสตรีตั้งครรภ์ปกติแต่ไม่ถึงระดับที่มีนัยสำคัญทางสถิติโดยมีความเสี่ยงสัมพัทธ์ (adjusted relative risk) เท่ากับ 1.2 (ช่วงความเชื่อมั่นร้อยละ 95; 0.6-2.5) แต่ภาวะทารกน้ำหนักตัวน้อย ภาวะขาดออกซิเจนในทารกแรกคลอด และการรับการรักษาในหออภิบาลกุมารเวชกรรมแตกต่างกันอย่างไม่มีนัยสำคัญทางสถิติ

**สรุป**: การตั้งครรภ์ในสตรีตั้งครรภ์วัยรุ่นมีแนวโน้มเพิ่มความเสี่ยงในการคลอดก่อนกำหนด แต่ไม่มีนัยสำคัญทางสถิติ สำหรับความเสี่ยงต่อการเกิดภาวะความดันโลหิตสูงจากการตั้งครรภ์ ทารกน้ำหนักตัวน้อย ภาวะขาดออกซิเจนในทารกแรกคลอด และการรับการรักษาในหออภิบาลกุมารเวชกรรม แตกต่างกันอย่างไม่มีนัยสำคัญทางสถิติเมื่อเปรียบเทียบในกลุ่มสตรีตั้งครรภ์วัยรุ่นและสตรีตั้งครรภ์ปกติ

## Introduction

Teenage pregnancy is defined as pregnancy in a woman under the age of 20.[1] The prevalence rates of pregnancies among teenagers vary across countries, depending on many factors e.g. culture and sexual behavior, age at marriage, socioeconomic status, educational level, knowledge of contraception, etc.[2] According to the global statistics, teenage birth rates range from only 2.9 per 1,000 women in South Korea to 143 per 1,000 women in sub-Saharan African countries.[3] In Thailand, the rate in 2003 was 107 per 1,000 women.[4] More recently, data from the World Health Organization (WHO) has shown that Thailand surges to the second spot of countries with the highest numbers of pregnant women aged 15-19 years.[5] This increasing rate of pregnant adolescents would certainly affect the population pyramid and socioeconomic status of the country as well as sexual and reproductive health including unsafe abortion, sexual transmitted diseases, and cervical cancer risk of the women. Besides, the impact of teenage pregnancy on adverse maternal and neonatal outcomes has been reported including preterm Birth,[6-11] low birth weight (LBW),[6,8-10,12] preeclampsia,[13] birth asphyxia,[9,12] or neonatal intensive care unit (NICU) admission.[10,12] However, others failed to demonstrate such findings[14,15]

Considering the increasing rate of pregnancies among Thai adolescents over the past decade and the inconsistent results from prior studies, more researches on this topic are needed. The primary aim of this study was to determine the risk of pregnancy complications especially preterm birth in teenage mothers. Other outcomes of interest were preeclampsia, LBW, birth asphyxia, and NICU admission.

## Methods

This retrospective cohort study was carried out after an approval of the Institutional Review Board. Eligibility criteria were pregnant women who sought their first antenatal care at our antenatal clinic between May 1, 2010 and April 30, 2011 and delivered in our institution. Exclusion criteria were those who had: known underlying disease (i.e., chronic hypertension, renal disease, or overt diabetes mellitus), multiple pregnancy, major fetal malformation, or had previous cesarean delivery. All teenage women (aged below 20 years) who started their antenatal booking during the study period were identified as case. Control was women (aged 20-34 years) who attended our antenatal clinic next to each case in a ratio of 1:1.

Based on findings from the study of Kovavisarach et al[9] who found 21% prevalence rates of preterm birth in teenage and 12% in adult mothers, the sample size was calculated using 5% type I error and 20% type II error. After adding 10% to the number calculated, total of 293 teenage pregnancies and 293 adult pregnancies were required. We estimated that one year period of our antenatal care service in our institution should meet these numbers, so we collected pregnant women who met our inclusion criteria in the whole one year of study period.

Data collection included maternal age, parity, body mass index (BMI), gestational age (GA) at first booking, number of antenatal visits, GA at delivery and route of delivery, infant birth weight, and pregnancy complications. BMI was calculated from the height and prepregnancy weight. GA was calculated based on the last menstrual period or ultrasound examination as appropriate. The primary outcome of interest was preterm birth while the secondary outcomes were preeclampsia, LBW, birth asphyxia, and NICU admission. Preterm birth included a delivery prior to the completion of 37 weeks of gestation. Preeclampsia was defined using the standard of the National High Blood Pressure Education Program Working Group.[16] A neonatal birth weight less than 2,500 g was considered as LBW. Birth asphyxia referred to 1-minute Apgar score below 7.[17]

Statistical analysis was performed using the SPSS software package version 11.5 (SPSS Inc., Chicago, IL,

USA). Continuous variables were compared by the Student t-test or Mann Whitney U test. Categorical variables were compared by Chi-square test or Fisher's exact test as appropriate. The relative risks (RRs) with 95% confidence interval (95% CI) of the primary and secondary outcomes in the teenage group were analyzed by multivariable analysis adjusted for potential confounders. p-value < 0.05 was considered statistically significant.

## Results

Total of 3,440 women had their first antenatal booking in our institution during the study period. Of these, 296 women (8.6%) were teenagers with mean age of 17.4 ± 1.4 years. Mean age of the 296 control was 26.6 ± 4.0 years. Other characteristic features of these teenage and adult pregnancies were shown in Table 1. The teenage group had significantly lower BMI but significantly higher rate of nullipara than the adult group. Regarding antenatal care, teenage mothers had first antenatal booking significantly later and poorer antenatal care (< 4 antenatal visits) than adult pregnancies.

Birth outcomes of teenage and adult women are shown in Table 2. Rate of preterm delivery was higher in teenage than adult gravidas, 22.3% vs 10.5% (p-value < 0.001). In the same direction, teenage gravidas had significantly lower neonatal birth weight than adult gravidas: median of 2,950 g (700-5,220 g ) vs 3,100 g (1,500-4,300 g) (p-value < 0.001). On the other hand, LBW infants were found at higher frequency in teenage than adult gravidas, 14.9% vs 8.4% (p-value = 0.015). Both groups had vaginal delivery as a more common route, however, teenage mothers had significantly lower proportional rate of cesarean delivery than the adult pregnancies.

Table 3 compares maternal and neonatal complications between the two groups. By univariable analysis, teenage mothers had significantly higher risks of preterm birth, LBW, birth asphyxia, and NICU admission than the adult group. After controlling for some potential confounders by multivariable analysis, there was only a

**Table 1** Characteristics of teenage and adult pregnant women (n=592)

| Characteristics | Teenage group (n=296) | Adult group (n=296) | p-value |
|---|---|---|---|
| Age (years), mean ± SD | 17.4 ± 1.4 | 26.6 ± 4.0 | < 0.001* |
| Parity, n (%) | | | < 0.001** |
| nullipara | 224 (75.7) | 119 (40.2) | |
| primi/multipara | 72 (24.3) | 177 (59.8) | |
| Body mass index (kg/m$^2$), mean ± SD | 24.9 ± 4.2 | 26.8 ± 4.0 | < 0.001* |
| Gestational age at first visit (weeks), mean ± SD | 24.9 ± 15.1 | 17.7 ± 9.4 | < 0.001* |
| Number of antenatal visit, n (%) | | | < 0.001** |
| < 4 | 110 (37.2) | 54 (18.2) | |
| ≥ 4 | 186 (62.8) | 242 (81.8) | |

* p-value by student t-test

** p-value by chi-square test

**Table 2** Birth outcomes of teenage and adult pregnant women (n=592)

| Characteristics | Teenage group (n=296) | Adult group (n=296) | p-value |
|---|---|---|---|
| Gestational age at delivery (weeks), median (minimum-maximum) | 38.0 (22-42) | 38.0 (30-41) | 0.002* |
| Route of delivery, n (%) | | | 0.007** |
| Cesarean route | 56 (18.9) | 85 (28.7) | |
| Vaginal route | 240 (81.1) | 211 (71.3) | |
| normal delivery | 227 (76.7) | 194 (65.5) | |
| vacuum extraction | 12 (4.1) | 13 (4.4) | |
| forceps extraction | 1 (0.3) | 4 (1.4) | |
| Birth weight (g), median (minimum-maximum) | 2,950 (700-5,220) | 3,100 (1500-4,300) | < 0.001* |

* p-value by Mann Whitney U test

** p-value by chi-square test compared between cesarean and vaginal routes

**Table 3** Pregnancy outcomes of teenage and adult pregnant women (n=592)

| Outcomes | Teenage group (n=296) | Adult group (n=296) | Crude RR (95% CI) | Adjusted RR* (95% CI) |
|---|---|---|---|---|
| Preeclampsia | 10 (3.4) | 11 (3.7) | 1.1 (0.5-2.6) | 1.0 (0.4-2.7)* |
| Preterm birth | 66 (22.3) | 31 (10.5) | 2.4 (1.5-3.9) | 1.2 (0.6-2.5)** |
| Low birth weight | 44 (14.9) | 25 (8.4) | 1.9 (1.1-3.2) | 1.0 (0.4-2.6)*** |
| Birth asphyxia | 11 (3.7) | 2 (0.7) | 5.7 (1.2-25.8) | 1.9 (0.2-16)*** |
| NICU admission | 9 (3.0) | 1 (0.3) | 9.3 (1.2-73.5) | 2.8 (0.1-113.8)*** |

Abbreviations: CI, confidence interval; NICU, neonatal intensive care unit; RR, relative risk

* adjusted for parity, body mass index, gestational age at first visit, and number of antenatal visit

** adjusted for parity, body mass index, gestational age at first visit, number of antenatal visit, and preeclampsia

*** adjusted for parity, body mass index, gestational age at first visit, number of antenatal visit, and preterm birth

trend toward increasing risk of preterm birth in the teenage group with adjusted RR of 1.2 (95% CI, 0.6-2.5). LBW, birth asphyxia, and NICU admission were also not significant different between the two groups in multivariable analysis. We also studied the impact of antenatal care to preterm birth and found risk of poor antenatal care to preterm birth with adjusted RR of 2.7 (95% CI 1.6-4.3).

## Discussion

Our study found 86 teenage pregnancies per 1,000 women in our institution during 2010-2011. Other previous Thai population-based studies conducted in 2000-2007 reported 90 to 159 teenage mothers per 1,000 women.[6,7,9] One major reason for the different findings from these studies was the periods when each study was

conducted. Our lower rate of teenage pregnancies may reflect a partial success of the national policy, the Youth Friendly Health Services,[18] which was launched in 2009 in order to reduce the national adolescent pregnancy rate. However, the pregnancy rate of this young age group in our study was still high based on the standard recommendation of WHO which announced that average number of pregnancies for every 1,000 girls in the 15-19 age group in Asia should be at or less than 56.[5] Other factors which may influence the prevalence of teenage pregnancy were: personal background of the women themselves e.g., socioeconomic status, educational level, knowledge of contraception, etc.[2] As has also been found in one study from Thailand that Thai pregnant teenagers had very low level of knowledge in contraception.[19] Thus, aside from the national policy and the attempt of the health care sectors, family and societal attention from the parents, teachers, and social media/ workers are also important to reduce the events of teenage pregnancy.

Our study focused on preterm birth in teenage mothers because it is one of the most important pregnancy complications affecting maternal and neonatal outcomes.[20] We found 22.3% of our teenage mothers having preterm delivery. This was similar to the figures reported by other studies in Thailand which found 15-22% rates of preterm delivery from their young age gravidas.[6,9,12] In comparison to adult gravidas, our study also demonstrated a significantly higher rate of preterm birth in teenage mothers than the adult which was consistent with the findings of previous studies, 22.3% vs 10.5% in our study and 9-20% vs 7-14% in other reports.[6,7] However, we were not able to confirm this in multivariable analysis after other possible confounding factors were adjusted. This emphasized multifactorial cause of preterm birth. Other factors e.g. lower socioeconomic status and/or level education, poor nutrition, poor antenatal care, and etc. may also contribute to this event aside from young age of pregnant women. An impact of poor antenatal care to preterm birth was also demonstrated in our study with an adjusted RR of 2.7 which was similar to the study by Maharungruangrat et al[21] who reported that the early teenage mother with poor antenatal had the relative risk of preterm delivery of 2.0 (95% CI 1.3-3.0) comparing to those with good antenatal care. This finding was in agreement with the results from previous reports that teenage mother may have low responsibility and/or poor knowledge of their pregnancy status leading to poor antenatal care and an ultimate unfavorable outcome of preterm birth.[6,19]

Although we found other unfavorable pregnancy outcomes of LBW, birth asphyxia, and NICU admission occurring significantly more common in teenage pregnancies than in adult gravidas by univariable analysis, these could not be confirmed by multivariable analysis. The low incidence of these events in our limited sample population might not have adequate power to confirm such findings. Other limitations of our study were to be noted. Preterm cases in our study included both spontaneous and therapeutic induction of preterm labor. This may have led to an imprecise rate of preterm birth directly related to teenage pregnancy. In addition, other possible predisposing factors (socioeconomic status, educational level or perception of maternal self-care, etc.) leading to teenage pregnancy and pregnancy adverse events could not be collected from our retrospective study. Future prospective research conducted in a larger sample size and with more detail data of teenage pregnancy and its outcomes is warranted.

In conclusion, this study demonstrated that there was a trend toward an increased risk of preterm birth in teenage gravidas, but the result did not attain statistical significance. Risks of preeclampsia, LBW, birth asphyxia, and NICU admission in teenage mothers were not significantly increased compared to adult gravidas.

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