The Obstetrics and Neonatal Outcomes of Teenage Pregnancy in Naresuan University Hospital

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Objective: *It is evident that the incidence of teenage pregnancy has been increasing in the past decades and consequently poses significant problems on maternal and child health. The present study was aimed to compare obstetric and neonatal outcomes between teenage and non-teenage pregnancy.*
Material and Method: *A retrospective cohort study was conducted to investigate 957 singleton pregnant women attending labor rooms in Naresuan University Hospital between October 2006 and September 2013 by comparing the pregnancy outcomes of 268 teenage pregnancy (woman age less than 20 years at the first time of antenatal care visit) with 689 non-teenage pregnancy (woman age 20 to 34 years). The obstetrics and neonatal complication was the main outcome of interest.*
Results: *The incidence of teenage pregnancy was 15.24% during seven years of study. As opposed to non-teenage mothers, complete attending antenatal care visit was less likely to be found among teenage mothers, 66.5% vs. 90.5% respectively ($p<0.001$). Higher proportion of normal vaginal delivery was found in teenage mothers (59.7% vs. 36.4%). The occurrence of cephalo-pelvic disproportion (CPD) seemed to be lower in teenage group as compared to non-teenage group, 14.5% vs. 26.4% ($p<0.001$). In addition, postpartum hemorrhage was unlikely to occur in teenage group, 3.8% vs. 8.4% ($p = 0.016$). The proportion of preterm birth was found to be higher in teenage pregnancy compared to non-teenage pregnancy (16.2% vs. 5.5%, $p<0.001$). At birth, the higher proportion of infants who had low Apgar scores (<7) at 1-minute was found in teenage pregnancy, 7.1% vs. 3.1% ($p = 0.01$).*
Conclusion: *Even though obstetric complications were less likely to occur among teenage pregnancies, most of the neonatal untoward consequences were observed in mothers with younger ages. The finding suggests the need of appropriate health care services for teenage mothers as to monitor harmful complications to both mother and her child.*

Keywords: *Teenage pregnancy, Obstetric outcome, Neonatal outcome*

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Teenage pregnancy remains a major public health concern in both developed and developing countries with significant medical consequences for teenage mothers and her offspring[1-5]. Changing population characteristics, differences in sexual activity, and contraceptive failure indicate that the occurrence of teenage pregnancy will not decline in the coming decades[5]. In developing countries that are expected to follow the sexual behavior patterns of developed countries without offering the appropriate levels of education and services, the consequences will be adolescent fecundity and increase in sexually transmitted infections (STIs) prevalence[6]. In Thailand, it was documented that the number of adolescents giving birth had risen from 31.1 per 1,000 women in 2000 to 53.8 per 1,000 women in 2012[7]. This incidence was much higher than that of Asia-Pacific countries such as Japan, South Korea, China, and Singapore where approximately two to six cases of teenage mothers per 1,000 women was reported[7].

The undesirable clinical outcomes due to teenage pregnancy found in both mothers and infants were explored by existing literature. For example, many studies showed that teenage pregnancy are associated with maternal anemia[8-14], intrauterine growth retardation (IUGR)[14], pregnancy-induced hypertension (PIH)[8,9,15], premature rupture of membrane (PROM)[13], and sexually transmitted disease during pregnancy[16-18]. In addition, infants born to teenage mothers are more likely to be preterm[8-15], and low birth weight[8-15,19]. It is also evident that severe asphyxia might present at early minutes of life for those who were born to teenage mothers[19]. In long-term, permanent physical or mental disability for instance,

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stunted growth, and poor development can be detected in these children[7].

In our setting, the increasing number of teenage mothers has been noticed in clinical practice during the past few years, in accordance with medical complications due to teenage pregnancy to both mothers and infants. Therefore, the present study aimed to compare obstetric complications in ante-, intra-, and post-partum periods, and to identify neonatal outcomes as a result of teenage pregnancy.

Material and Method

A retrospective cohort study was conducted in Naresuan University Hospital, Phisanulok, Thailand between October 2006 and September 2013. All 2,271 pregnancies attended labor rooms during this period were recruited in the study. Twins and multiple pregnancies including birth before admission (BBA) were primarily excluded from the study. Since the maximum age definition of non-teenage mothers was less than 35 years, mothers aged more than 35 years were automatically excluded. Therefore, the study population comprised of 957 singleton pregnancies that were classified into two comparison groups, teenage pregnancy (n = 268) and non-teenage pregnancy (n = 689). The study was approved by the Institutional Review Board. All mother and child data were obtained from the electronic medical records and registered data in labor rooms. Maternal characteristics were prenatally recorded such as age (years), gestational age at delivery (weeks), hematocrit, number of antenatal care visits during pregnancy, co-morbidities, and route of delivery. Teenage pregnancy was defined as pregnant women who had maternal age at first antenatal care (ANC) less than 20 years. Non-teenage pregnancy was defined as pregnant women who had maternal age at first ANC 20 to 34 years. Because of the exceeding maternal age of 35 years considered as elderly gravida, they might associate with obstetric and neonatal outcomes under the present study. Therefore, we limited the age of non-teenage mothers not more than 35 years. Outcomes of interest were obstetric and neonatal outcomes. Obstetrics outcomes were divided into three periods, (i) antenatal periods such as antepartum hemorrhage, intrauterine growth restriction, and pregnancy-induced hypertension (PIH), (ii) intra-partum periods such as cephalo-pelvic disproportion (CPD), fetal distress, premature rupture of membrane (PROM), abnormal presentation (the presence of breech, transverse lie), and (iii) post-partum period including postpartum hemorrhage (PPH). These obstetric outcomes were used as binary variables and coded as yes (1) and no (0). Neonatal outcomes were also used as binary variables such as preterm birth, still birth, macrosomia, and the presence of low Apgar score (less than 7) at 1- and 5-minute. Child's birth weight was measured in grams.

Data were analyzed by using STATA statistical software version 12.1 (STATA Corporation, TX). Mean and standard deviation (SD) was used to describe continuous variable. Student's t-test with equal variances was employed to compare mean between the groups. Chi-square or Fisher's exact test, in case of violating Chi-square assumption, was used to analyze the difference in proportion between the groups. A *p*-value less than 0.05 was considered statistically significant.

Results

In the 2,271 pregnancies, there were 346 teenage pregnancies during the seven years of study accounted for the incidence of 15.24% teenage pregnancies in the present study.

There was a statistical difference in the number of ANC visit between teenage and non-teenage group, in that teenage mothers were less likely to attend ANC than non-teenage mothers, 66.5% and 90.5%. For comorbidities, gestational diabetes mellitus (GDM) was the only one that was statistical difference between two groups (0.7% vs. 3.0% respectively). Teenage mothers were more likely to give birth via vaginal delivery (59.7%) than non-teenage mothers (36.4%) who needed other operative assistances. The difference was statistically significant (Table 1).

During intra-partum period, the presence of CPD was statistically significant between teenage and non-teenage pregnancies. That was CPD were less likely to occur in teenage pregnancies compared to non-teenage pregnancies, 14.5% vs. 26.4% ($p<0.001$). The other complications during this period found no statistical significances between two groups. The occurrence of postpartum hemorrhage in teenage pregnancy was 3.8%, whereas that in non-teenage group was 8.4%. This finding was statistically significant (Table 2).

Table 3 showed the comparison of neonatal outcomes between teenage and non-teenage pregnancies. The proportion of preterm birth was higher in teenage mothers compared to non-teenage mothers (16.2% vs. 5.5%, $p<0.001$). Four cases of still birth were present only in teenage pregnancies. There was statistical

Table 1. Maternal characteristics by pregnancy groups

Characteristics	Teenage, n (%)	Non-teenage, n (%)	*p*-value
Number of ANC visit (n = 268, 689)			
0	15 (5.6)	12 (1.7)	<0.001
1-4	75 (27.9)	54 (7.8)	
More than 4	178 (66.5)	623 (90.5)	
Comorbidities (n = 268, 689)			
Anemia	67 (25.0)	148 (21.5)	0.26
GDM	2 (0.7)	21 (3.0)	0.035
Condyloma infection	4 (1.5)	4 (0.6)	0.23
HIV-infection	0 (0)	6 (0.87)	0.19
Mode of delivery (n = 263, 688)			
Vaginal	157 (59.7)	247 (36.4)	<0.001
Operative vaginal delivery	75 (28.5)	326 (47.9)	
Cesarean section	31 (11.8)	107 (15.7)	
Gestation age (weeks), mean ± SD	37.8±2.8	38.6±1.7	<0.001*

ANC = antenatal care; GDM = gestational diabetes mellitus
* t-test with equal variances

Table 2. The comparison of obstetric complications

Complications	Teenage (n = 268), n (%)	Non-teenage (n = 689), n (%)	*p*-value
Antepartum			
Antepartum hemorrhage	0 (0)	0 (0)	-
Intrauterine growth restriction	5 (1.8)	19 (2.7)	0.49
Pregnancy-induced hypertension	3 (1.1)	12 (1.7)	0.57
Intra-partum			
Cephalo-pelvic disproportion	39 (14.5)	182 (26.4)	<0.001
Abnormal presentation	6 (2.2)	32 (4.6)	0.09
Fetal distress	13 (4.8)	41 (5.9)	0.64
Premature rupture of membrane	11 (4.1)	32 (4.6)	0.86
Postpartum			
Postpartum hemorrhage*	10 (3.8)	57 (8.4)	0.016

* Classified by estimated blood loss on each procedure: >500 ml for vaginal delivery, >1,000 ml for caesarian section, and >500 ml for others operative vaginal delivery

Table 3. Neonatal outcomes by pregnancy groups

Outcomes	Teenage, n (%)	Non-teenage, n (%)	*p*-value
Preterm* (n = 266, 685)			
Yes	43 (16.2)	38 (5.5)	<0.001
No	223 (83.8)	647 (94.5)	
Still birth (n = 268, 689)			
Yes	4 (1.5)	0 (0)	0.006
No	264 (98.5)	689 (100)	
Birth weight (grams), mean ± SD	2,860±551	3,035±478	<0.001
Macrosomia (n = 268,688)			
Yes	2 (0.7)	5 (0.7)	1.00
No	266 (99.2)	683 (99.2)	
Apgar score <7 (at 1-minute)	19 (7.1)	21 (3.1)	0.01
Apgar score <7 (at 5-minute)	4 (1.5)	6 (0.8)	0.47

* Preterm was defined as gestational age <37 weeks

difference between birth weight of infants born to teenage mothers and non-teenage mothers. That is birth weight of infants born to teenage mothers on average was 2,860 grams (SD = 551), whereas those born to non-teenage mothers had on average 3,035 grams (SD = 478). At birth, the higher proportion of infants who had Apgar scores <7 at 1-minute was found in teenage pregnancies, compared to non-teenage pregnancies, 7.1% vs. 3.1% ($p = 0.01$). However, there was no difference in the proportion of low Apgar score between two groups at 5-minutes.

Discussion

The incidence of teenage pregnancy during seven years shown in the present study was 15.24% which was higher than that of previous studies in Thailand and WHO's reports of teenage pregnancies in South East Asia[20-22]. The higher incidence might partly due to our context-specific setting where the majority of teenage mothers were more likely to live in urban area with limited health care accessibility. In addition, reason may be associated with demography of population in the present study which living in urban and rural area (agriculture society), a study by the United Nations Population Fund Thailand Country Office reported that early marriage, lack of education and low socioeconomic status were associated with being pregnant at younger ages. These factors can be attributable to the increased number of teenage mothers in our setting[7].

Regarding maternal characteristics, the proportion of required antenatal care visits during pregnancy (more than four times) was lower in teenage mothers, compared to non-teenage. It can be thought that teenage mothers were less likely to be aware of the importance of being pregnant, and they might have not sufficient knowledge of anti-natal care. Besides, unwanted pregnancy and limited access to health care cannot be ruled out and could be the other explanation on lower ANC visits in teenage mothers[9,10]. Consistent with previous studies[22-23], the prevalence of anemia in pregnancy in both pregnant groups was not different, even though it is one of the major problems in teenage pregnancy[9-13] and is commonly found in lower northern region of Thailand.

Additionally, the present study showed that teenage had higher normal vaginal delivery[4,8,13,14] and lower operative vaginal delivery and caesarean section rate than non-teenage pregnancy[9,11]. Some studies show significantly lower incidence of cesarean sections/perineal tears in teenage mothers compare to other non-teenage mothers[13]. The present study demonstrated that the mean gestational age at delivery significantly higher in non-teenage mothers. However, there was no clinically significant on this aspect. There is much controversy that the risk associated with teenage pregnancy is attributable to biological factor, life style, and socioeconomic condition. With the exception of very young adolescents (<16 years), teenage pregnancy itself is not biologically harmful[24].

The only obstetric complication that was significantly different between both pregnancy groups was cephalo-pelvic disproportion; the teenage pregnancies were unlikely to exhibit CPD during intra-partum period. It is because higher incidence of early gestational age and preterm birth was observed in teenage pregnancies. Many studies confirmed this finding. For example, study in a teaching hospital in rural India shown that nearly three times more at risk of delivering preterm and nearly twice at risk of delivering low birth weight babies[8]. Postpartum hemorrhage was more common in non-teenage pregnancy in the present study. This may be due to route of delivery in non-teenage pregnancy was operative vaginal delivery and cesarean delivery that cause more blood loss than normal vaginal delivery[9,11].

For the outcomes on neonates, the finding of present study was similar to previous literature, that is neonatal outcomes of teenage mother are at high risk of many adverse effects including preterm delivery, low birth weight and neonatal, and infant morbidity and mortality[1]. Many study found that adverse birth outcome associated with teenage pregnancies is attributable to low socioeconomic status, inadequate prenatal care, and inadequate weight gain during pregnancy[2,9,10]. Because of higher incidence of preterm infants in teenage pregnancy, we would expect low Apgar score after birth. Moreover, it is worth noting that even though early gestation age and insufficient ANC attending in teenage mothers, birth weight of their newborn on average were more than 2,500 grams, suggesting normal weight infants.

Although the present study was able to identify a large cohort group of teenage pregnancies and had enough power to detect the main differences on obstetric and neonatal outcomes between teenage and non-teenage pregnancy, some methodological aspects should be concerned. The main limitation of the present study lies on the fact that the observed association of teenage pregnancy and its outcome could be partly due to confounding factors; therefore, it is not possible to establish the causation. However, our

primary aim was to only describe the characteristics of obstetric and neonatal outcomes found in teenage pregnancies, such that it can provide some sensible information for the future study on examining the risk of teenage pregnancy on undesirable mother-and-child outcomes. In addition, since the variables investigated under the present study were based on routine database, the missing value was detected to some extent for all variables. It could be problematic because the outcome of interest could be underestimated or even misleading. The comprehensive data collection, including precise variable measurement on mothers and neonates is needed for our future research.

Early booking ANC and adequate maternity care are important measures in order to screen for biological risks among teenage pregnancy. To overcomes risk factors, focusing on providing high quality ANC i.e., promoting health education for teenage and adequate and effective antenatal care and prepare safe delivery that provide and run by trained personnel, should improve the obstetric and perinatal outcome in teenage pregnancy, which is still an unresolved problem in developing countries, despite various government programs[13]. Other measurement to cope with teenage pregnancy recommended by WHO is to prevent new pregnancy among teenagers[25]. This prevents policymakers and planners from putting the measures needed to drastically and quickly cut the rising number of teenage pregnancy[7].

Conclusion

Even though obstetric complications were less likely to occur among teenage pregnancies, most of the neonatal consequences were observed in mothers with younger ages. The finding suggests the need of appropriate health care services for teenage mothers as to monitor harmful complications to both mother and her infant.

What is already known on this topic?

Previous literatures from Thailand and worldwide reported increasing risk of adverse pregnancy outcomes in teenage pregnancy. However, they have controversial aspect about maternal anemia, PIH and cesarean section rate in teenage pregnancy.

What this study adds?

The incidence of teenage pregnancy tends to be increasing in Thailand especially in rural and urban area (agriculture society) and rate of sexually transmitted infections higher in teenage pregnancy.

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Potential conflicts of interest

None.

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ผลลัพธ์ทางสูติศาสตร์และทารกแรกเกิดของการตั้งครรภ์ในวัยรุ่นของโรงพยาบาลมหาวิทยาลัยนเรศวร

พิริยา นฤขัตรพิชัย, ดิตถาวุธ ครุฑเมือง, ธานินทร์ ฉัตราภิบาล

วัตถุประสงค์: *อุบัติการณ์ของการตั้งครรภ์ในวัยรุ่นเพิ่มมากขึ้นในช่วงทศวรรษที่ผ่านมา และก่อให้เกิดปัญหาสำคัญต่อสุขภาพของมารดาและทารก การศึกษานี้มีจุดมุ่งหมายที่จะเปรียบเทียบผลลัพธ์ทางสูติศาสตร์และทารกแรกเกิดระหว่างการตั้งครรภ์ในวัยรุ่นกับการตั้งครรภ์ที่ไม่ใช่วัยรุ่น*

วัสดุและวิธีการ: *การศึกษาตามรุ่นแบบใช้ข้อมูลย้อนหลังในสตรีตั้งครรภ์ 957 ราย ซึ่งคลอดที่โรงพยาบาลมหาวิทยาลัยนเรศวร ตั้งแต่ เดือนตุลาคม พ.ศ. 2549 ถึง กันยายน พ.ศ. 2556 โดยกลุ่มสตรีตั้งครรภ์ที่มาฝากครรภ์ครั้งแรกอายุน้อยกว่า 20 ปี ถือว่าเป็นการตั้งครรภ์ในวัยรุ่น ซึ่งมีจำนวน 268 ราย กลุ่มเปรียบเทียบคือกลุ่มสตรีที่มาฝากครรภ์ครั้งแรกอายุ 20-34 ปี จำนวน 689 ราย ถือว่าเป็นการตั้งครรภ์ที่ไม่ใช่วัยรุ่น ผลลัพธ์หลักที่ศึกษาคือ ภาวะแทรกซ้อนทางสูติศาสตร์และทารกแรกเกิด*

ผลการศึกษา: *อุบัติการณ์ของการตั้งครรภ์ในวัยรุ่น คือ 15.24% ในช่วงระหว่าง 7 ปี ที่ทำการศึกษา การฝากครรภ์ครบตามเกณฑ์พบได้น้อยกว่าในกลุ่มสตรีตั้งครรภ์ในวัยรุ่น ซึ่งตรงข้ามกับสตรีตั้งครรภ์ที่ไม่ใช่วัยรุ่น 66.5% เทียบกับ 90.5% ตามลำดับ ($p<0.001$) สัดส่วนของการคลอดปกติทางช่องคลอดพบสูงกว่าในกลุ่มสตรีตั้งครรภ์ในวัยรุ่น (59.7%) เทียบกับสตรีตั้งครรภ์ที่ไม่ใช่วัยรุ่น (36.4%) การเกิดภาวะไม่ได้สัดส่วนระหว่างศีรษะทารกและอุ้งเชิงกรานดูเหมือนว่าจะต่ำกว่าในกลุ่มวัยรุ่น 14.5% เทียบกับ 26.4% ($p<0.001$) นอกเหนือจากนั้นการตกเลือดหลังคลอดเกิดขึ้นน้อยกว่าในกลุ่มวัยรุ่น 3.8% เทียบกับ 8.4% ($p = 0.016$) สัดส่วนของการคลอดก่อนกำหนดพบสูงกว่าในกลุ่มการตั้งครรภ์ในวัยรุ่น 16.2% เทียบกับ 5.5% ($p<0.001$) ในขณะคลอดสัดส่วนของทารกแรกเกิดที่มีคะแนน Apgar น้อยกว่า 7 ที่ 1 นาที พบสูงกว่าในกลุ่มตั้งครรภ์ในวัยรุ่น 7.1% เทียบกับ 3.1% ($p = 0.01$) แต่อย่างไรก็ตาม ไม่พบความแตกต่างของคะแนน Apgar ต่ำที่ 5 นาทีในทั้ง 2 กลุ่ม*

สรุป: *แม้ว่าพบภาวะแทรกซ้อนทางสูติศาสตร์ค่อนข้างน้อยในการตั้งครรภ์วัยรุ่น แต่ยังคงพบภาวะผิดปกติของทารกแรกเกิดในมารดาอายุน้อย การค้นพบนี้สนับสนุนว่าสตรีตั้งครรภ์ในวัยรุ่นต้องการการบริการดูแลสุขภาพที่เหมาะสม เพื่อติดตามดูแลภาวะแทรกซ้อนที่อันตรายต่อตัวมารดาและเด็กทารกแรกเกิด*