

Obstetric Characteristics and Outcomes of Teenage Pregnancies

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Objective:

To quantify the age-related risks of adverse pregnancy outcomes in primigravid women aged less than 20 years.

Methods:

We conducted a retrospective cohort study based on the data in the Obstetrics Clinical Information System of our hospital for the period 2006 to 2008. Pregnancy outcomes of primigravid women were compared in age-groups of less than 20 years (n = 394) and 20 to <35 years (n = 6838).

Results:

There was a lower rate of gestational diabetes mellitus with an odds ratio (OR) of 0.1, and 95% confidence interval (CI) of 0.01-0.4 in the teenage group. Apart from a lower mean gestational age at delivery, they had a higher rate of preterm labour at less than 37 weeks (OR = 2.0; 95% CI, 1.3-2.9) with a significantly higher rate of extremely preterm labour between 24 and 28 weeks (2.5; 0.7-8.4). The teenage group had a lower incidence of induction of labour (OR = 0.7; 95% CI, 0.5-0.8) but a higher rate of augmented labour (1.7; 1.4-2.1). They were more likely to achieve spontaneous vaginal delivery (OR = 3.9; 95% CI, 2.9-5.1), with a significantly lower risk of instrumental delivery (0.4; 0.2-0.5) and elective (0.1; 0.03-0.6) and emergency Caesarean section (0.3; 0.2-0.5). Babies of the teenage group had a lower mean birth weight, with more low-birth-weight babies (OR = 1.7; 95% CI, 1.2-2.4) and less macrosomic babies (0.2; 0.05-0.8). Despite more of their babies having low Apgar scores at 5 minutes (OR = 2.6; 95% CI, 0.9-7.4), the neonatal outcome was good.

Conclusion:

Teenage pregnancies carry a higher risk of preterm delivery. Nevertheless, they had a higher chance of spontaneous vaginal delivery and good neonatal outcomes.

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Keywords: Infant, low birth weight; Maternal age; Obstetric labor, premature; Pregnancy in adolescence; Pregnancy outcome

Introduction

Teenage pregnancy has long been classified as a high-risk group with increased adverse obstetric outcomes in the literature. They were found to have a higher incidence of preterm delivery¹, intrauterine growth restriction², anaemia, sexually transmitted disease³, pregnancy-induced hypertension⁴, pre-eclampsia⁵, Caesarean section, intrapartum complications⁶, babies with low birth weights⁷ and low Apgar scores⁸, and neonatal mortality was also believed to be higher¹. Some studies suggested that this was predominantly caused by the poor social, economic, and behavioural factors⁹,

and non-utilisation of prenatal care¹⁰. Other studies, however, showed that such pregnancies resulted in good maternal and neonatal outcomes¹¹⁻¹³.

There is paucity of literature on the situation in Hong Kong over the recent 10 years. Being a well-developed city in China, Hong Kong has an easily accessible health care system, and all residents enjoy obstetric care at low cost. The society has become more liberal, and teenage mothers enjoy good support from

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their families and friends. In addition, a Comprehensive Child Development Service (CCDS) has been established in our department since 2006. This provides multidisciplinary antenatal and postnatal care to these teenage pregnant women, and it was in this context that we conducted this study.

After optimising relevant social and behavioural factors, we compared the obstetric characteristics and outcomes of teenage pregnant women with those of women aged 20 to 34 years in our hospital. In so doing, it was hoped the results could provide more information on how to improve the management of teenage pregnancies in the future. The findings could also be compared to hospitals without such a CCDS programme in Hong Kong and in other countries. Thus, this study aimed to quantify the age-related risks of adverse pregnancy outcomes in primigravid women aged less than 20 years.

Methods

Study Design and Materials

This was a retrospective cohort study conducted in a publicly funded regional hospital in Hong Kong, with an average delivery rate of 5500 births each year. The study samples were drawn from the Obstetrics Clinical Information System (OBSCIS), a well-established computer database containing obstetrics information of all women who delivered in our hospital.

All teenaged pregnant women who planned to deliver in our hospital and were under the age of 20 years and unmarried, were recruited under the care of CCDS. This was led by a dedicated advanced practice nurse. The women received their antenatal care in our hospital and were assessed by a doctor and a nurse at each visit. While the doctor focused on their physical well-being, the nurse mainly addressed their psychological and social concerns and needs¹⁴. Outreach social workers ran an onsite booth to assist these teenagers. If needed, teenagers were specifically referred to social workers by the nurse. We studied samples encountered between the years 2006 and 2008, because these teenage mothers shared the same CCDS care. Pregnancy outcomes were compared by age at delivery in women younger than 20 years and age 20 to <35 years. To minimise the confounding effect of parity on pregnancy outcomes, only primigravid women were

included. Women aged 35 years or more were excluded to minimise the intrinsic adverse effects of advanced age on pregnancy outcomes. In our hospital, all women referred for antenatal care and delivery underwent physical examination and investigations at the first visit. The latter included: complete blood count, and if consented to Venereal Disease Research Laboratories and human immunodeficiency virus (HIV) antibody checks. An oral glucose tolerance test was performed on women at risk of gestational diabetes mellitus (GDM). Routinely, a complete blood count was also performed at around 28 to 30 weeks of gestation.

If present, any GDM or an impaired glucose tolerance was documented. Hypertension included all pre-existing and chronic hypertension. Pregnancy-induced hypertension included: gestational hypertension, pre-eclampsia and eclampsia. Sexually transmitted diseases included: syphilis, testing positive for HIV, and genital warts. Early preterm labour was defined as gestation of <32 completed weeks. Postdate labour was defined as >40 weeks of gestation, and post-term labour as >41 weeks of gestation. Methods of inducing labour included artificial rupture of membranes (ARM), and the use of oxytocin and prostaglandin. Methods for augmenting labour included ARM and oxytocin. Low birth weight was defined as less than 2500 g. Macrosomia was defined as a birth weight exceeding 4000 g. Postpartum haemorrhage included primary and secondary forms; primary postpartum haemorrhage was defined as a blood loss exceeding 500 ml.

Statistical Analysis

The Chi-square and Fisher's exact tests were used to analyse the categorical data. The Student *t*-test was used to analyse continuous data. The data were considered statistically significant if *p* value was <0.05; *p* values of <0.01 and <0.001 were highlighted. Odds ratio with 95% confidence intervals was used to quantify risk. The reference group for odds ratios consisted of women aged 20 to <35 years.

Results

There were 7678 primigravid deliveries in our hospital over the period 2006 to 2008. Teenage pregnancy contributed to 5.1% (*n* = 394) of these deliveries. The mean age of the teenage group was 18 years and that of women aged 20 to <35 years was 28 years. In the

teenage group, 39 (10%) were aged ≤ 16 years; the youngest teenager was 13 years old. In this group, there was a lower incidence of GDM and the mean gestational age at delivery was significantly lower (Table 1). The teenage group also had a higher frequency of preterm labour (<37 weeks and between 24 and 28 weeks).

The teenage subjects had lower rates of induced labour, higher rates of augmented labour (Table 2), and were more likely to achieve spontaneous vaginal delivery. They also had a lower chance of instrumental vaginal delivery, elective and emergency Caesarean section. Teenage women delivered babies with a lower mean birth weight (Table 2). In this group the frequency of low birth weight (<2500 g) babies was higher and that of macrosomic (>4000 g) babies lower. There was a higher rate of babies with 5-minute Apgar score of <6 in the teenage group (Table 3). However, their babies were no more frequently admitted to the neonatal unit. There was no difference between the groups in terms of neonatal and perinatal mortality.

Discussion

In our hospital, the frequency of teenage primigravid pregnancies was 5.1%. This was much

higher than 1.4% (figure for the general population in Hong Kong)¹⁵. This could be because we serve a region in Hong Kong that is relatively less well-off. It is populated with more new immigrants and socially deprived people. Teenage pregnancies tend to occur more frequently in communities where individuals receive less attention and care from family members^{16,17}.

In our study, there was a lower frequency of GDM in the teenage group, which was consistent with Raatikainen et al's findings¹² and could be due to fewer teenagers being overweight. The women's body weights were not recorded in the computer system, but many previous studies confirmed that fewer teenage mothers were overweight¹⁸. This very low frequency (0.3%) of GDM in teenage was encouraging. Despite the majority being Chinese and therefore in a high-risk population, their GDM risk was low. Whether the teenager should be excluded from the universal screening for GDM (if it is to be implemented in the Chinese population) requires more data from different obstetric units in Hong Kong.

As noted in many earlier studies, teenagers were significantly more likely to deliver prematurely¹⁹. Our data showed that they were even more likely to have

Table 1. Antenatal characteristics*

	<20 years (n = 394)	20 to <35 years (n = 6838)	Odds ratio†
Multiple pregnancy	1 (0.3%)	75 (1.1%)	0.3 (0.03-1.7)
Polyhydramnios	0	9 (0.1%)	-
Placenta praevia	0	40 (0.6%)	-
Gestational diabetes mellitus	1 (0.3%)	298 (4.4%)	0.1 (0.01-0.4)‡
Epilepsy	0	5 (0.1%)	-
Hypertension	5 (1.3%)	193 (2.8%)	0.4 (0.2-1.1)
Pregnancy-induced hypertension	8 (2.0%)	174 (2.5%)	0.8 (0.4-1.6)
Anaemia	13 (3.3%)	198 (2.9%)	1.1 (0.6-2.0)
Thromboembolism	0	2 (0.03%)	-
Sexually transmitted disease	1 (0.3%)	26 (0.4%)	0.7 (0.1-4.9)
Spontaneous rupture of membranes >24 hrs	9 (2.3%)	89 (1.3%)	1.8 (0.9-3.5)
Gestational age at delivery (weeks)	39.2 \pm 1.657	39.4 \pm 1.659	-§
Preterm labour <37 weeks	31 (7.9%)	286 (4.2%)	2.0 (1.3-2.9)¶
Preterm labour 29-32 weeks	3 (0.8%)	38 (0.6%)	1.4 (0.4-4.5)
Preterm labour 24-28 weeks	3 (0.8%)	21 (0.3%)	2.5 (0.7-8.4)§
Postdate >40 weeks	44 (11.2%)	908 (13.3%)	0.8 (0.6-1.1)
Postterm >41 weeks	5 (1.3%)	56 (0.8%)	1.6 (1.6-3.9)

* Data are shown as mean \pm standard deviation, or No. (%)

† The reference group for the odds ratios consisted of women aged 20 to <35 years

‡ p < 0.001

§ p < 0.05

¶ p < 0.01

extremely premature labour (at 24-28 weeks). This has been attributed to higher frequencies of anaemia, pregnancy-induced hypertension and infections in teenagers²⁰, but our data did not show any significant differences with respect to these risks. In fact, our Hong Kong teenagers were usually well nourished, even though they were from a lower socioeconomic population. More frequent preterm labour could be caused by the intrinsic biological factors in teenagers such as an immature body build. Delivering a premature baby with a lower birth weight could also be an adaptive response to facilitate vaginal delivery. Indeed, our study showed

that teenagers delivered more low-birth-weight babies (<2500 g). Their babies also had a lower mean birth weight, and fewer of their babies were macrosomic. These findings were consistent with those of Chen et al²¹. Teenage itself increases the risk of adverse birth outcomes that is independent of important socioeconomic and behavioural factors. It seems that comprehensive antenatal care for teenagers may reduce the risk of poor obstetric outcomes but will not eliminate it.

Outcomes of labour in our teenage mothers were significantly better than those in the control group. They

Table 2. Intrapartum and postnatal outcome*

	<20 years (n = 394)	20 to <35 years (n = 6838)	Odds ratio [†]
Induction of labour	104 (26.4%)	2411 (35.3%)	0.7 (0.5-0.8) [‡]
Artificial rupture of membranes	75 (19.0%)	1527 (22.3%)	
Oxytocin	95 (24.1%)	2251 (32.9%)	
Prostaglandin	12 (3.0%)	339 (5.0%)	
Augmentation of labour	213 (54.1%)	2805 (41.0%)	1.7 (1.4-2.1) [‡]
Artificial rupture of membranes	200 (50.8%)	2492 (36.4%)	1.8 (1.5-2.2) [‡]
Oxytocin	45 (11.4%)	821 (12.0%)	0.9 (0.7-1.3)
Second stage (>1 hr)	16 (4.1%)	342 (5.0%)	0.8 (0.5-1.3)
Mode of delivery			
Spontaneous vaginal delivery	335 (85.0%)	4071 (59.5%)	3.9 (2.9-5.1) [‡]
Instrumental vaginal delivery	25 (6.3%)	1102 (16.1%)	0.4 (0.2-0.5) [‡]
Forceps	0	1 (0.01%)	
Ventouse	25 (6.3%)	1101 (16.1%)	0.4 (0.2-0.5) [‡]
Elective Caesarean section	2 (0.5%)	229 (3.3%)	0.1 (0.03-0.6) [‡]
Emergency Caesarean section	32 (8.1%)	1426 (20.9%)	0.3 (0.2-0.5) [‡]
Birth weight (g)	3027.9 ± 482.6	3119.7 ± 482.6	
Low birth weight (<2500 g)	44 (11.2%)	472 (6.9%)	1.7 (1.2-2.4) [‡]
Macrosomia (>4000 g)	2 (0.5%)	171 (2.5%)	0.2 (0.05-0.8) [‡]
Anal sphincter tear	0	7 (0.1%)	-
Postpartum haemorrhage	6 (1.5%)	154 (2.3%)	0.7 (0.3-1.5)

* Data are shown as mean ± standard deviation, or No. (%)

† The reference group for the odds ratios consisted of women aged 20 to <35 years

‡ p < 0.001

Table 3. Neonatal outcome*

	<20 years (n = 394)	20 to <35 years (n = 6838)	Odds ratio [†]
5-min Apgar score <6	4 (1.0%)	27 (0.4%)	2.6 (0.9-7.4) [‡]
Stillbirth	1 (0.3%)	15 (0.2%)	1.21 (0.2-8.8)
Neonatal death (0-28 days)	1 (0.3%)	9 (0.1%)	1.9 (0.2-15.3)
Neonatal unit admission	52 (13.2%)	820 (12.0%)	1.1 (0.8-1.5)
Perinatal mortality	0	1 (0.01%)	-

* Data are shown as No. (%)

† The reference group for the odds ratios consisted of women aged 20 to <35 years

‡ p < 0.05

were less likely to have labour induction, which could be one reason why they achieved more spontaneous vaginal deliveries. In fact, greater connective tissue elasticity, better myometrial function, and greater cervical compliance in teenagers all contribute to good outcomes^{22,23}. Moreover, among teenagers smaller proportions had instrumental vaginal deliveries and Caesarean sections, which would very likely be of benefit for future deliveries later in their lives. This finding contradicts previous assertions that teenagers needed more Caesarean deliveries⁶. General improvement of nutrition and health care in teenagers may have maximised their growth to its full potential. This reduces problems due to a contracted pelvis and poses a favourable effect on vaginal delivery. However, only 39 (10%) of the teenagers in our study were aged ≤ 16 years. These younger teens were theoretically more immature both physically, psychologically and socially and thus posed higher obstetric risks (contracted pelvis, preterm labour, and low-birth-weight babies). This small proportion of younger teens might have biased our findings. Further studies could be conducted to compare the obstetric risks in younger and older teens.

Teenage women received more augmentation of labour by ARM. The percentages having labour augmentation by amniotomy were generally high in our department, probably due to active management of labour by midwives who might be inclined to try even harder in teenage women, so as to avoid Caesarean deliveries. Neonatal outcomes in babies born to teenage mothers were good. Although more of the babies had a 5-minute Apgar score of <6 , they were not more frequently admitted to the neonatal unit. Moreover, their rates for stillbirths, neonatal deaths, and perinatal mortality were not higher, which could be explained by good paediatric support. Continuous advancement in neonatal resuscitation skills might also have contributed to such good outcomes.

Our findings confirmed those of another local study conducted 14 years ago by Lao and Ho³, which indicated that pregnancy outcomes can be made favourable with improved medical care and support. Less GDM, fewer Caesarean sections, more preterm labour, more low-birth-weight babies but good neonatal outcomes among teenagers are encountered in both studies. The findings appear more significant because

we excluded the advanced age-group that carries higher obstetric risks, and we only included primigravidae.

The CCDS programme launched in recent years has offered comprehensive support and continual care for teenage mothers. In this scheme, the mother receives care from the same nursing midwife during the antenatal and postnatal periods. This facilitates a better patient-nurse relationship and encourages regular attendance. Regular assessment of their sociobehavioural status (smoking, drinking and substance abuse, diet, family background, relationship problems, and financial status) helps to optimise the environment for a healthy pregnancy. Issues such as future plans for contraception, marriage, childcare, education and career are also discussed. Readily available outreach social workers on site also play an important part, by following up social problems. We believe this CCDS programme contributed to the favourable obstetric and neonatal outcomes achieved. Quinlivan and Evans²⁴ also advocated a teenage-specific antenatal clinic so as to reduce the rate of preterm births. Future prospective studies should be conducted to compare obstetric outcomes in teenage mothers with and without access to CCDS programme. This could be undertaken by comparing different centres in Hong Kong or via an open option to participate in the programme on voluntary basis. In these teenagers, other long-term outcomes (future social status, childcare issues, time of next pregnancy, and the health of their offspring) could also be evaluated in collaboration with paediatricians.

Our computer database (OBSCIS) does not contain extensive epidemiological data. Had such data been available, we could have analysed more demographic characteristics (body weight, height, ethnicity, booking time, smoking status, recreational drug use, enrolment time, education level, and family income), and study their impact on pregnancy outcomes of these teenagers. In the near future, we will adopt another computer database named the Antenatal Record System, in which more epidemiological data will be collected. Further studies will then be possible to analyse the relation of many other factors to pregnancy outcomes.

Conclusion

We have demonstrated that teenage pregnancy confers a higher risk of preterm delivery and low-birth-weight babies, but this did not translate into poorer

neonatal outcomes. Teenage women had a higher chance of spontaneous vaginal delivery. We believe that their good outcomes can be accounted for by the comprehensive antenatal care we offered. Despite such favourable obstetric outcomes, teenage pregnancies have other implications. Teenage mothers are more likely to be unemployed, dropout of school, live in poverty, and their offspring exhibit poorer cognitive development, lower

educational attainment, more frequent criminal activity, and a higher risk of abuse, neglect, and behavioural problem during childhood²⁵. Second, teenage births are associated with a higher risk of preterm delivery and stillbirth²⁶. Every effort should be made to improve sex education and postnatal contraception, until such time that the individuals are socially and financially prepared for their next pregnancy.

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