

Adolescent Perinatal Outcomes in South West Sydney, Australia

Alexander J. Garner, MBBS; Annette Robertson, RN, RM, MSc, PhD;
Charlene Thornton, MScMed, GDipMidwifery, BNurs, PhD;
Gaksoo Lee, RN, RM, Grad Dip Sci; Angela Makris, MBBS, FRACP, PhD;
Sally Middleton, BAppSc(Phty); Colin Sullivan, MBBS, PhD, FRACP, FAA, FTSE;
and Annemarie Hennessy, MBBS, MBA, PhD

Abstract

Objective: To compare perinatal outcomes, blood pressures throughout pregnancy, rates of hypertensive disorders of pregnancy, preeclampsia, gestational diabetes mellitus, and immediate obstetric outcomes in adolescents younger than 20 years at delivery and those in the 20- to 34-year age group.

Patients and Methods: Questionnaires were administered to pregnant women at Campbelltown and Liverpool hospitals within South West Sydney, Australia, as part of a broader study of sleep-disordered breathing in pregnancy between February 1, 2009, and February 28, 2013. Data collected included demographic data, blood pressure readings, pregnancy complications, delivery type, and neonatal outcomes. Adolescents were compared with older women using Student *t* tests and χ^2 statistics.

Results: A total of 103 adolescents were compared with 2291 women aged 20 to 34 years. Adolescents were more likely to be primiparous, had longer average gestations, and had lower pre-pregnancy body mass index. Adolescents had lower rates of cesarean section delivery and gestational diabetes mellitus. There was no significant difference in smoking rates, perinatal mortality rate, small for gestational age, intrauterine growth restriction, Apgar score of less than 7 at 5 minutes, admission to special care nursery, or hypertensive disorder of pregnancy rates. Adolescents had lower booking systolic and diastolic blood pressures, and their highest antenatal systolic blood pressures were lower.

Conclusion: Adolescents have birth outcomes similar to those of their older counterparts. Adolescents had lower booking blood pressures. This may have implications for the screening and diagnosis of hypertensive disorders of pregnancy in adolescents.

© 2018 Mayo Foundation for Medical Education and Research. Published by Elsevier Inc. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>) ■ Mayo Clin Proc Inn Qual Out 2018;2(1):10-15



From the School of Medicine, Western Sydney University, Penrith, NSW, Australia (A.J.G., A.R., C.T., A.M., A.H.); Liverpool Hospital, Liverpool, NSW, Australia (G.L.); and Sydney Medical School, University of Sydney, Sydney (S.M., C.S.), NSW, Australia.

Adolescent pregnancy is defined as pregnancy occurring in women younger than 20 years at time of delivery. In Australia in 2013, there were 14.6 live births per 1000 adolescent women. This number has been steadily decreasing over the past decade but still remains significantly above Australia's overall birth rate of 1.9 per 1000.¹ Previous studies have consistently shown adolescents to be at an increased risk of preterm delivery, low birth weight and small for gestational age (SGA) infants, and increased maternal and infant mortality.²⁻⁸ These trends have been shown internationally and nationally.⁹

Hypertension is common in pregnancy, affects up to 6% to 8% of all pregnancies, and is

reported to be increased in adolescents.¹⁰ Hypertensive disorders in pregnancy (HDP) are defined using the criteria set out by the International Society for the Study of Hypertension in Pregnancy.¹¹ The literature varies on whether adolescents are at an increased risk of preeclampsia, with some studies reporting an increased risk^{3,5} and others a decreased risk.^{4,6,12} Theoretically, adolescents would be at an increased risk for preeclampsia due to their higher rates of primiparity¹²; however, they would also be protected by lower rates of chronic hypertension, gestational diabetes, and other comorbidities.^{3,7,13}

The Sydney South West Local Health District has a rapidly growing population

and services one of the most socioeconomically disadvantaged communities in New South Wales, Australia.¹⁴ Within this population, socioeconomic factors have been shown to be independent risk factors for adverse pregnancy outcomes and lifestyle choices, for example, higher rates of smoking in pregnancy,¹⁵ lower rates of breast-feeding,¹⁶ and higher rates of admission to special care nursery (SCN).¹⁷ Furthermore, adolescence has been shown to be an independent risk factor for smoking in pregnancy and not breast-feeding.^{15,16}

The aim of this study was to assess the effect and outcomes of adolescent pregnancy on obstetric birth outcomes in metropolitan hospitals in Southwestern New South Wales. The maternal outcomes assessed were a formal diagnosis of HDP, gestational diabetes mellitus (GDM), delivery type, induction, and blood pressures throughout pregnancy. Birth outcomes measured were rates of intrauterine growth restriction, SGA, Apgar scores, gestational age at delivery, perinatal mortality rate, admission to SCN, and exclusive breast-feeding at discharge from hospital.

PATIENTS AND METHODS

Patients recruited for this study were part of a broader study (National Health and Medical Research Council project 0711-215M Sleep Disordered Breathing in Pregnancy: Frequency and Impact); patients provided written consent prior to being enrolled in the study and data collected. All pregnancies were accepted regardless of maternal age, including those aged younger than 18 years.

Questionnaires were administered to pregnant women at Campbelltown and Liverpool hospitals, 2 metropolitan hospitals within the Sydney South West Local Health District, as part of a larger study of sleep-disordered breathing during pregnancy, conducted between February 1, 2009, and February 28, 2013. All women younger than 34 years with singleton pregnancies were included and were divided into 2 groups: adolescents (age at delivery <20 years) were compared with those aged 20 to 34 years at delivery. Anthropomorphic data were collected at the first antenatal clinic visit including height, pre-pregnancy weight, booking weight, pre-pregnancy and booking body mass index

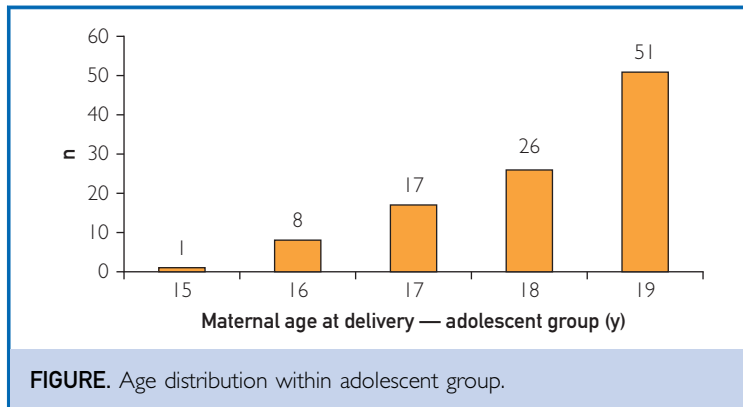
(BMI; calculated as the weight in kilograms divided by the height in meters squared), and booking blood pressures (mm Hg). Highest antenatal and postnatal blood pressures (mm Hg) were collected retrospectively. All delivery and neonatal data were collected in accordance with state perinatal statistical collection requirements. The age of the mother at delivery was determined by the easily verified date when the pregnancy ended, not by the estimated date of conception. Only the first pregnancy for each woman was included in the analysis.

Hypertensive disorders in pregnancy were defined using the criteria set out by the International Society for the Study of Hypertension in Pregnancy.¹¹ Gestational diabetes mellitus was defined by criteria set out by the Australasian Diabetes in Pregnancy Society.¹⁸ Within our population, women underwent a 2-hour oral glucose tolerance test at 26 to 28 weeks of gestation. Delivery type was classified as vaginal delivery, cesarean section, or assisted delivery (including forceps and vacuum extraction). Intrauterine growth restriction was defined as birth weight less than third percentile for gestational age and sex, and SGA as a birth weight less than 10th percentile for gestational age and sex.

Continuous variables were summarized using mean \pm SD, and categorical variables were summarized using number (percentage). Continuous variables that were normally distributed were compared between adolescents and women between the ages of 20 and 34 years at delivery using the Student *t* test. Continuous variables that were nonnormally distributed were compared using the rank sum test. When sample sizes were small, as indicated by more than 20% of the cells of a contingency table having expected values of less than 5, a Fisher exact test was used to compare categorical variables between adolescents and women between the age of 20 and 34 years at delivery; otherwise, a χ^2 test was used. A *P* value of less than .05 was used to denote statistical significance. All analyses were performed with IBM SPSS v.20.

RESULTS

A total of 3511 questionnaires and outcomes were attained for singleton pregnancies at all ages. There were a total of 176 adolescents



and 73 were excluded for incomplete data sets, leaving 103 adolescents aged between 15 and 19 years at delivery. The average age was 18 years within the adolescent group. The Figure shows the age distribution within this group. There were no adolescents younger than 15 years at delivery in this study. There were 2291 complete data sets for women aged 20 to 34 (inclusive) years, with 365 excluded for incomplete data. Those aged 35 years or older at delivery (679 cases) were excluded from analysis. Maternal demographic characteristics for both groups are summarized in Table 1. Adolescents had a lower average pre-pregnancy BMI (23.4 vs 26.7 kg/m²; $P < .001$) and gestation at recruitment (20 vs 27 weeks; $P < .001$). They were more likely to be primiparous; however, there was no significant difference in smoking rates between the 2 groups.

Obstetric and neonatal outcomes are presented in Table 2. Adolescent mothers had a longer average gestation at delivery (39.5 vs

39.0 weeks; $P = .02$). There was no significant difference in total perinatal mortality rate, SGA, intrauterine growth restriction rates, or Apgar scores of less than 7 at 5 minutes. The odds ratio for perinatal mortality in an adolescent mother compared with a woman aged 20 to 34 years was 5.04 (95% CI, 0.58-43.56; $P = .14$). There was no significant difference between the 2 groups for admission to the SCN. Adolescents had a significantly higher rate of normal vaginal delivery (79.6% vs 65.7%; $P = .004$) and thus a lower rate of cesarean section (14.6% vs 27.2%; $P = .004$). There was no significant difference between the 2 groups in induction rates. Adolescents were less likely to be exclusively breast-feeding at discharge from hospital (62.1% vs 72.6%; $P = .001$).

There was no difference between the 2 groups for HDP diagnosis (8.7% vs 9.2%; $P > .99$). There were no cases of preeclampsia within the adolescent group. Adolescents had a significantly lower rate of GDM (4.0% vs 16.3%; $P < .001$). Adolescents had lower booking systolic and diastolic blood pressures (see Table 3). Rates of HDP diagnosis were stratified by age group (Table 4).

DISCUSSION

We found that adolescents had significantly lower booking systolic and diastolic blood pressures. They had lower rates of GDM, CS, and exclusive breast-feeding at discharge. There was no difference in the rates of HDP or adverse neonatal outcomes.

Van der Klis et al⁹ conducted a large population-based study on teenage pregnancy in South Australia. Similar to our study, they showed a lower rate of cesarean section delivery in the adolescent group. However, their adolescent group was more likely to develop HDP than their older counterparts, whereas this study showed no difference. Their population had a higher number of mothers younger than 18 years, and this may have contributed to this difference. Furthermore, our study excluded twin and triplet births, a known risk factor for HDP.¹⁹ In terms of neonatal outcomes, van der Klis et al showed adolescents to have a significantly higher rate of SGA, SCN admission, and perinatal mortality rate, whereas our study showed no difference. Potential contributors to this difference

TABLE 1. Maternal Demographic Characteristics^{a,b}

| Variable | Age (y) | | P value |
|--|--------------------------|--------------------------|---------|
| | <20 | 20-34 | |
| No. of patients | 103 | 2291 | |
| Average age (y) | 18±1.0 (15-19) | 28±4.0 (20-34) | <.001 |
| Pre-pregnancy BMI (kg/m ²) | 23.4±4.70 (16.5-39.3) | 26.7±6.89 (16.5-44.1) | <.001 |
| Smokers | 22 (21.4) | 450 (19.6) | .70 |
| Gestation age at recruitment (wk) | 20±5.2 (12-39) | 27±5.5 (5-41) | <.001 |
| Primiparous | 93 (90.3) | 863 (37.6) | <.001 |

^aBMI = body mass index.
^bValues expressed as mean ± SD (range) or No. (percentage) of patients.

TABLE 2. Obstetric and Neonatal Outcomes^{a,b}

| Variable | Age (y) | | P value |
|--|---------------------|---------------------|---------|
| | <20 | 20-34 | |
| Obstetric outcomes | | | |
| Gestation at delivery, mean ± SD (range) | 39.5±1.48 (35-42) | 39.0±1.94 (20-42) | .02 |
| HDP | 9 (8.7) | 212 (9.2) | >.99 |
| GDM | 4 (4.0) | 370 (16.3) | <.001 |
| Delivery outcomes | | | |
| Normal vaginal delivery | 82 (79.6) | 1507 (65.7) | .004 |
| Cesarean section | 15 (14.6) | 625 (27.2) | |
| Assisted delivery | 6 (4.9) | 159 (6.9) | |
| Apgar score of <7 at 5 min | 1 (1.0) | 51 (2.2) | .73 |
| Induction with prostaglandins | 28 (27.2) | 585 (25.5) | .73 |
| Birth outcomes | | | |
| Live birth | 102 | 2277 ^c | |
| Neonatal death | 1 | 5 ^c | |
| Total perinatal mortality rate | 9.6 per 1000 births | 6.5 per 1000 births | .14 |
| SGA (<10th percentile) | 8 (7.9) | 231 (10.3) | .61 |
| IUGR (<3rd percentile) | 6 (5.9) | 76 (3.4) | .16 |
| SCN admission | 13 (12.6) | 352 (15.4) | .58 |
| Breast-feeding exclusively at discharge | 64 (62.1) | 1665 (72.6) | .001 |

^aGDM = gestational diabetes mellitus; HDP = hypertensive disorders in pregnancy; IUGR = intrauterine growth restriction (<3rd percentile); SCN = special care nursery; SGA = small for gestational age (<10th percentile).

^bValues are presented as No. (percentage) of patients unless indicated otherwise.

^cMissing neonatal outcome data in 9 patients.

include their lower rates of nulliparity, higher rates of smoking, and the age distribution within our respective cohorts. Furthermore, they compared adolescents with all mothers aged 20 years or older, whereas we limited our comparison to mothers aged 20 to 34 years to remove the confounding effects of advanced maternal age. Finally, they demonstrated that adolescents attended fewer antenatal visits than did their older counterparts, a trend that has been repeatedly demonstrated in adolescents.^{3,9} Given our study design, we did not have any data on the number of prenatal visits in adolescents, but both study sites have a strong adolescent support strategy.

Many previous studies have investigated booking blood pressures in an attempt to predict HDP and preeclampsia. Higher blood pressures as early as 8 weeks of gestation have been documented in women who will go on to develop HDP,²⁰ and most studies agree that systolic, diastolic, or mean blood pressures are higher in those who will eventually develop HDP in the first trimester.^{19,21,22} Nijdam et al¹⁰ developed a prediction model for hypertension in pregnancy in nulliparous women, of

which booking antenatal systolic and diastolic blood pressures were a major component. Not all studies demonstrate a positive effect however. Cnossen et al²³ demonstrated that systolic blood pressure and diastolic blood pressure

TABLE 3. Blood Pressures^a

| Variable | Age (y) | | P value |
|---|----------------------|----------------------|---------|
| | <20 | 20-34 | |
| Booking blood pressures (mm Hg) | | | |
| Systolic | 104±9.2 (80-130) | 108±10.6 (80-152) | .002 |
| Diastolic | 62±6.75 (50-85) | 65±7.8 (40-90) | .001 |
| Highest antenatal blood pressure (mm Hg) | | | |
| Systolic | 117±9.9 (90-150) | 120±11.8 (80-180) | .02 |
| Diastolic | 73±8.5 (60-100) | 74±9.0 (50-115) | .24 |
| Highest postnatal blood pressure (mm Hg) | | | |
| Systolic | 119±12.2 (90-145) | 120±12.6 (90-198) | .87 |
| Diastolic | 74±9.9 (45-97) | 74±9.6 (43-120) | .77 |

^aValues expressed as mean ± SD (range).

TABLE 4. HDP Diagnosis by Age Group^a

| Age (y) | No. (%) | Odds ratio | P value |
|---------|-------------|------------------|---------|
| <20 | 103 (3.5) | 1.00 | |
| 20-24 | 567 (19.3) | 0.92 (0.44-1.95) | .83 |
| 25-30 | 920 (31.4) | 0.95 (0.46-1.97) | .89 |
| 31-34 | 1344 (45.8) | 1.34 (0.65-2.76) | .43 |

^aHDP = hypertensive disorders in pregnancy.

were poor predictors of preeclampsia, and that mean arterial pressure was a better indicator. Our results show that despite having lower booking blood pressures and a lower highest antenatal systolic blood pressure, adolescents had the same incidence of HDP diagnosis as their older counterparts. Our results may demonstrate that the prediction of HDP in adolescents requires a lower threshold for blood pressures, perhaps throughout the entire pregnancy. To our knowledge, no other studies have investigated the lower blood pressures among pregnant adolescents and the subsequent development of HDP. Further research may be required to investigate this trend and determine any clinical significance, such as altered criteria for HDP, for adolescent mothers.

In our study population, adolescents had a lower rate of cesarean section. This is consistent with previous studies,^{3-5,7,8,13} including Australian studies.⁹ Kara et al²⁴ demonstrated that despite adolescents having lower rates of cesarean section than older women aged 20 to 34 years, there were no differences in obstetric or neonatal outcomes, including birth weight and Apgar scores. Furthermore, in their study population, there was no significant difference in the indication for cesarean section. Likewise, our adolescents were less likely to be breast-feeding exclusively on discharge from hospital, a trend shown consistently in previous studies.^{7,24} Apostolakis-Kyrus et al²⁵ demonstrated that among adolescents who were less likely to initiate breast-feeding, the major contributing factors were lower age, black race, unmarried, lack of Medicaid, smoking status, lack of prenatal care, cesarean delivery, and preterm birth. Our results thus contribute to the body of evidence showing adolescents to have lower rates of cesarean section and breast-feeding.

There are several limitations to this study. First, this was a secondary analysis of a larger

study of sleep-disordered breathing during pregnancy, and as such it was not specifically designed to investigate adolescents. There was therefore no information on other factors known to be associated with adverse outcomes in adolescents such as ethnicity²⁶ and socioeconomic status.^{9,13} We had no information on the level of education or income. Furthermore, we had no data on the number of antenatal visits to compare between the 2 groups. The initial questionnaire included the Epworth Sleepiness Scale and the Berlin Questionnaire, validated tools for the screening of sleep-disordered breathing. Regarding this analysis, only data on pre-pregnancy BMI from the initial questionnaire were included; all other data were collected from the medical record. Second, we defined adolescent pregnancy by the easily verified date of delivery rather than the estimated date of conception, and as such, we will have missed several cases of adolescent pregnancy. However, given our large sample size (2394), this is unlikely to have had a substantial effect on our results. Our adolescent group was skewed toward those aged 18 to 19 years. Previous studies have shown younger adolescents to be at a higher risk of adverse outcomes,^{2-5,7,8} and this could have potentially resulted in different rates of complications had that lower age group been included. Finally, because of the nature and extent of the missing data in those excluded, we were not able to compare the characteristics between these groups, and as such, we are unable to assess the risk of bias.

CONCLUSION

Our study demonstrates that adolescents have birth outcomes similar to those of their older counterparts. Adolescents within this study had similar rates of HDP but significantly lower rates of GDM. Adolescents were less likely to deliver by cesarean section and to breast-feed exclusively on discharge from hospital. We also demonstrated that adolescents have lower booking blood pressures, and their highest antenatal systolic blood pressures were lower. This may have implications for the screening and diagnosis of HDP in adolescents, and more research is required to determine the clinical significance of our findings. Lower BMIs and rates of GDM also have

implications for the delivery of health services to this population.

Abbreviations and Acronyms: BMI = body mass index; GDM = gestational diabetes mellitus; HDP = hypertensive disorder in pregnancy; SGA = small for gestational age; SCN = special care nursery

Grant Support: This work was funded by a National Health and Medical Research Council grant.

Potential Competing Interests: The authors report no competing interests.

Correspondence: Address to Alexander J. Garner, MBBS, School of Medicine, Western Sydney University, Locked Bag 1797, Penrith, NSW 2751, Australia (alexjgarnerresearch@gmail.com).

REFERENCES

1. Australian Bureau of Statistics. Births, Australia, 2013. 2014. <http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/3301.02013?OpenDocument>. Accessed July 30, 2015.
2. Chen XK, Wen SW, Fleming N, Demissie K, Rhoads GG, Walker M. Teenage pregnancy and adverse birth outcomes: a large population based retrospective cohort study. *Int J Epidemiol.* 2007;36(2):368-373.
3. Conde-Agudelo A, Belizan JM, Lammers C. Maternal-perinatal morbidity and mortality associated with adolescent pregnancy in Latin America: cross-sectional study. *Am J Obstet Gynecol.* 2005;192(2):342-349.
4. de Vienne CM, Creveuil C, Dreyfus M. Does young maternal age increase the risk of adverse obstetric, fetal and neonatal outcomes: a cohort study. *Eur J Obstet Gynecol Reprod Biol.* 2009;147(2):151-156.
5. Eure CR, Lindsay MK, Graves WL. Risk of adverse pregnancy outcomes in young adolescent parturients in an inner-city hospital. *Am J Obstet Gynecol.* 2002;186(5):918-920.
6. Ganchimeg T, Ota E, Morisaki N, et al; WHO Multicountry Survey on Maternal Newborn Health Research Network. Pregnancy and childbirth outcomes among adolescent mothers: a World Health Organization multicountry study. *BJOG.* 2014; 121(suppl 1):40-48.
7. Jolly MC, Sebire N, Harris J, Robinson S, Regan L. Obstetric risks of pregnancy in women less than 18 years old. *Obstet Gynecol.* 2000;96(6):962-966.
8. Malabarey OT, Balaya J, Klam SL, Shrim A, Abenham HA. Pregnancies in young adolescent mothers: a population-based study on 37 million births. *J Pediatr Adolesc Gynecol.* 2012; 25(2):98-102.
9. van der Klis KA, Westenberg L, Chan A, Dekker G, Keane RJ. Teenage pregnancy: trends, characteristics and outcomes in South Australia and Australia. *Aust N Z J Public Health.* 2002; 26(2):125-131.
10. Nijdam ME, Janssen KJ, Moons KG, et al. Prediction model for hypertension in pregnancy in nulliparous women using information obtained at the first antenatal visit. *J Hypertens.* 2010;28(1): 119-126.
11. Brown MA, Lindheimer MD, de Swiet M, Van Assche A, Moutquin JM. The classification and diagnosis of the hypertensive disorders of pregnancy: statement from the International Society for the Study of Hypertension in Pregnancy (ISSHP). *Hypertens Pregnancy.* 2001;20(1):IX-XIV.
12. Abalos E, Cuesta C, Carroli G, et al; WHO Multicountry Survey on Maternal and Newborn Health Research Network. Pre-eclampsia, eclampsia and adverse maternal and perinatal outcomes: a secondary analysis of the World Health Organisation Multicountry Survey on Maternal and Newborn Health. *BJOG.* 2014;121(suppl 1):14-24.
13. Karabulut A, Ozkan S, Bozkurt AI, Karahan T, Kayan S. Perinatal outcomes and risk factors in adolescent and advanced pregnancies: comparison with normal reproductive age women. *J Obstet Gynaecol.* 2013;33(4):346-350.
14. New South Wales Health, South Western Sydney Local Health District. Health profile of local communities. 2014. <https://www.swslhd.nsw.gov.au/planning/content/pdf/SWVSLHD%20Community%20Profile%20Summary%20070814.pdf>. Accessed September 9, 2015.
15. Mohsin M, Forero R, Berthelsen A, Bauman A, Jalaludin B, Gyaneswarar R. Social influences for smoking in pregnancy in south western Sydney antenatal clinic attendees. *Aust N Z J Obstet Gynaecol.* 2007;47(3):207-212.
16. Yeoh BH, Eastwood J, Phung H, Woolfenden S. Factors influencing breastfeeding rates in south-western Sydney. *J Paediatr Child Health.* 2007;43(4):249-255.
17. Phung H, Bauman A, Tran M, et al. Factors that influence special care nursery admissions to a district hospital in South-western Sydney. *J Paediatr Child Health.* 2005;41(3):119-124.
18. Nankervis A, McIntyre HD, Moses R, et al; Australasian Diabetes in Pregnancy Society. ADIPS consensus guidelines for the testing and diagnosis of gestational diabetes mellitus in Australia Version 2. 2013. <http://adips.org/downloads/ADIPSConsensusGuidelinesGDM-03.05.13VersionACCEPTEDFINAL.pdf>. Accessed October 29, 2015.
19. Duckitt K, Harrington D. Risk factors for pre-eclampsia at antenatal booking: systematic review of controlled studies. *BMJ.* 2005;330(7491):565.
20. Hermida RC, Ayala DE, Mojón A, et al. Blood pressure patterns in normal pregnancy, gestational hypertension and preeclampsia. *Hypertension.* 2000;36(2):149-158.
21. Levy N, Bramwell G, Wierenga A, Fletcher H, McFarlane-Anderson N. Booking blood pressures and plasma nitrite in Jamaican women with pre-eclampsia. *J Obstet Gynaecol.* 2007; 27(4):383-387.
22. Poon LC, Kametas NA, Valencia C, Chelemen T, Nicolaides KH. Hypertensive disorders in pregnancy: screening by systolic diastolic and mean arterial pressure at 11-13 weeks. *Hypertens Pregnancy.* 2011;30(1):93-107.
23. Cnossen JS, Vollebregt KC, de Vrieze N, et al. Accuracy of mean arterial pressure and blood pressure measurements in predicting pre-eclampsia: systematic review and meta-analysis. *BMJ.* 2008;336(7653):1117-1120.
24. Kara F, Uygur D, Yesildaglar N. Adolescent pregnancy and cesarean section. *Int J Gynaecol Obstet.* 2003;81(2):231-232.
25. Apostolakis-Kyrus K, Valentine C, DeFranco E. Factors associated with breastfeeding initiation in adolescent mothers. *J Pediatr.* 2013;163(5):1489-1494.
26. Penfield CA, Cheng YW, Caughy AB. Obstetric outcomes in adolescent pregnancies: a racial/ethnic comparison. *J Matern Fetal Neonatal Med.* 2013;26(14):1430-1434.