Comparison of newborn and placental weights between adolescent and adult women

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Background. Low placental weight is associated with adverse perinatal outcomes. Adolescent pregnant women are associated with higher preterm labour, low birth weight and fetal growth restriction rates than adult pregnant women.
Objective. To compare placental and newborn weights between groups of adolescent (≤19 years old) and adult mothers (20 - 28 years old).
Methods. A prospective cross-sectional study was conducted with primiparous mothers who had their deliveries at ≥37 weeks' gestation, and without maternal chronic disease or obstetrical intercurrence. Adolescents were divided into two groups (group A1, aged <15 years; group A2, 15 - 19 years), and the outcomes compared with a control group of adult mothers aged 20 - 28 years (group B). Group A1 included 23 newborns and 18 placentas, group A2 comprised 28 newborns and 28 placentas, and group B included 27 newborns and 27 placentas. The placental and newborn weights were compared between the groups using Student's *t*-test for paired samples.
Results. The mean (standard deviation (SD)) weights of the newborns and placentas in group A were significantly lower than those in group B: 3167.8 g (359.6) v. 3404.0 g (136.8) (p=0.0016) and 573.7 g (98.7) v. 651.0 g (109.8) (p=0.0028), respectively. The mean (SD) newborn and placental weights in group A1 were significantly lower than those in group A2: 2996.0 g (373.7) v. 3309.0 g (273.6) (p=0.0012) and 513.0 g (94.9) v. 612.5 g (73.8) (p=0.0026), respectively.
Conclusion. The placental and newborn weights were significantly lower in the adolescent groups, and this difference was more pronounced in the younger of the adolescent groups.

S Afr J Obstet Gynaecol 2018;24(2):49-51. DOI:10.7196/SAJOG.2018.v24i2.1296

In recent years, studies have shown an association between placental weight, fetal weight and perinatal health.[1,2] The relationship between placental weight and fetal weight is still poorly understood; however, the incidence of stillbirth is higher in women with lower placental weight.[3] In these cases, adverse fetal outcome is related to insufficient surface area for gas exchange and nutrient transport.[4] Knowledge regarding the risk factors associated with abnormal placental weight, and the exact mechanisms underlying the association between placental growth and perinatal health, is essential in identifying groups of pregnant women who are at high risk for unfavorable outcomes.

Although the incidence of gestational diabetes, hypertension, antepartum haemorrhage and surgically assisted deliveries is lower in adolescent than in adult pregnancy, high preterm labour rates, low birth weight and fetal growth restriction are encountered in teenage pregnancies.[5-7] Considerable exposure to social risk factors, low education levels and high smoking rates have been described in some studies.[8] Other studies have indicated raised incidence of pre-eclampsia, admission to intensive neonatal care units and neonatal death.[9,10] It is believed that the biological immaturity of young pregnant women results in competition for nutrients between the mother and the fetus,[11] and therefore in a higher likelihood of low birth weight and low placental weight.

The aim of this study was to compare the weight of placentas and newborns in adolescent (aged <15 and 15 - 19 years) and adult (20 - 28 years) mothers to assess the risk associated with young maternal age.

Methods

Between January 2011 and March 2012, a prospective cross-sectional study was conducted, with 78 newborns and 73 placentas of singleton pregnancies whose mothers had their deliveries at ≥37 weeks' gestation at the Alzira Reis Maternity Hospital in Niteroi, Rio de Janeiro, Brazil. This study was approved by the Research Ethics Committee (ref. no. 05018712.5.0000.5243) at the Fluminense Federal University (UFF), and patients who participated voluntarily in the study signed the informed consent form. The inclusion criterion was the following: primiparous women who had their deliveries by either vaginal delivery or caesarean section.

The sample was divided into the following groups: group A (aged ≤19 years: 51 newborns and 46 placentas) and group B (20 - 28 years: 27 newborns and 27 placentas). Group A was subdivided into group A1, comprising pregnant women aged <15 years (23 newborns and 18 placentas) and group A2, pregnant women 15 - 20 years (28 newborns and 28 placentas). The groups were not matched according to gestational age at delivery, newborn sex or maternal body mass index. The exclusion criteria were twin pregnancies and maternal chronic disease or obstetrical intercurrence. The placental weight of five newborns of group A was not available.

The newborns were weighed immediately after birth in the delivery room. The placentas were weighed at approximately the same time, after expulsion. The placental membranes were not damaged; hence, the secundines contained ~30 - 40 cm of sectioned umbilical cord, ~10 cm from the product. Both newborn and

placenta were weighed on a digital scale (Filizola, São Paulo, Brazil) by the same examiner.

The data were entered in an Excel 2007 spreadsheet (Microsoft Corp., USA) and analysed using SPSS version 15.0 software (SPSS Inc., USA). The statistical analysis was performed based on the difference between two means and standard deviations (SDs) using Student's *t*-test for paired samples, and the results were considered significant when $p \leq 0.05$.

Results

The following groups were studied: group A (aged <19 years: 51 newborns and 46 placentas) and group B (20 - 28 years: 27 newborns and 27 placentas). Group A was subdivided into group A1 (<15 years: 23 newborns and 18 placentas) and group A2 (15 - 20 years: 28 newborns and 28 placentas). The placental weights of the 5 newborns in group A were not available because of placental damage.

The mean (SD) weight of the newborns in group A (3167.8 g (359.6)) was significantly lower than that in group B (3404.0 g (136.8); p=0.0016). The mean (SD) weight of the placentas in group A (573.7 g (98)) was significantly lower than in group B (651.0 g (109.8) (p=0.0028). The mean (SD) weight of the newborns and placentas in group A1 was significantly lower than in group A2: 2996.0 g (373.7) v. 3309.0 g (273.6) (p=0.0012) for newborns and 513.0 g (94.9) v. 612.5 g (73.8) (p=0.0026) for placentas. Additionally, the mean weights of the newborns and placentas were significantly lower in group A1 than in group B: 2996.0 g (373.7) v. 3404.0 g (136.8) (p <0.001) and 513.0 g (94.9 v. 615.0 g (109.8) (p=0.0025) for newborns and placentas, respectively. However, there were no significant differences between group A2 and group B: 3309.0 g (273.6) v. 3404.0 g (136.8) (p=0.1113) for newborns, and 612.5 g (73.8) v. 615.0 g (109.8) (p=0.9212) for placentas (Table 1).

Discussion

Adolescent pregnancy remains a significant concern, particularly in developing countries. The reasons for this problem are probably rooted in educational and social issues.[8]

Fetal growth, birth weight and placental weight have been correlated with maternal nutritional status earlier in life.[12] It has been suggested that competition for essential nutrients between the mother and the fetus is implicated in this association.[11] In addition, psychological, metabolic and nutritional stress interfere with hormonal regulation and, therefore, with the amount of nutrient transporters.[12,13]

Although placental weight correlates with newborn weight, Hutcheon *et al.*[3] have shown that placental weight is an independent risk factor for adverse perinatal outcomes; however, the exact mechanisms underlying this correlation are yet to be completely clarified. In the present study, low birth and placental weights were observed in pregnant adolescent women, particularly those <15 years of age. This fact seems to make sense when we consider the findings previously described in the literature, and the risks associated with pregnancies at the lower extreme of reproductive age. A study that assessed the risk factors associated with adverse perinatal outcomes in pregnancies in teenage as well as older patients showed that groups at both ends of the reproductive age spectrum exhibited lower Apgar scores and lower birth weight than the control group.[14]

Considering that the population of adolescent pregnant women is at increased risk for multifactorial nutritional deficiency, Wallace *et al.*[15] demonstrated that inter-pregnancy weight change (gain or loss) increases the risk of gestational complications and extreme placental weight. Low maternal haemoglobin concentration also increases perinatal risks, and this has been demonstrated in pregnant adolescents, with outcomes such as low birth weight and lower Apgar scores; however, it is not yet known if there is a relationship with placental weight.[16] MacNamara *et al.*[17] analysed 87 600 singleton pregnancies and reported that low placental weight was associated with chronic hypertension, pre-eclampsia, anaemia and gestational diabetes. Anaemia is common in pregnant adolescents,[16] and may explain the results of the present study.

The strength of the study was the inclusion of only low-risk pregnant women, because some maternal chronic diseases of obstetrical intercurrence could have resulted in a bias in our results.

Table 1. Comparison of mean (SD) newborn and placental weights between adolescent (teenager and older adolescent) and adult mothers

Variable	Group* (*n*): Weight, mean (SD) g		95% CI	*t*†	*p*-value
Newborn	A (51): 3167.8 (359.6)	B (27): 3404.0 (136.8)	92.83 - 379.57	3.28	0.0016
Placenta	A (46): 573.7 (98.7)	B (27): 651.0 (109.8)	27.56 - 127.04	3.10	0.0028
Newborn	A1 (23): 2996.0 (373.7)	A2 (28): 3309.0 (273.6)	130.67 - 495.30	3.45	0.0012
Placenta	A1 (18): 513.0 (94.9)	A2 (28): 612.5 (73.8)	32.21 - 132.79	3.30	0.0028
Newborn	A1 (23): 2996.0 (373.7)	B (27): 3404.0 (136.8)	252.65 - 563.35	5.28	<0.001
Placenta	A1 (18): 513.0 (94.9	B (27): 615.0 (109.8)	38.08 - 165.92	3.22	0.0025
Newborn	A2 (28): 3309.0 (273.6	B (27): 3404.0 (136.8)	22.68 - 212.68	–1.62	0.1113
Placenta	A2 (28): 612.5 (73.8)	B (27): 615.0 (109.8)	–47.93 - 52.92	0.099	0.9212

SD = standard deviation; CI = confidence interval.
*A (*n*=51), <20 years old; B (*n*=27), 20 - 28 years old; A1 (*n*=23), <15 years old; A2 (*n*=28), 15 - 19 years old.
†Student's *t*-test.

A limitation of the study was not to match groups with regard to the gestational age at delivery, newborn sex or maternal body mass index.

Conclusion

We believe that this study opens new perspectives for future research regarding placental weight and adverse perinatal outcomes in adolescent pregnant women, mainly in high-risk situations as intrauterine growth restriction, anaemia and pre-eclampsia.

In summary, the results of this study indicate that there is a greater cause for concern with adolescent pregnancies than with adult pregnancies, particularly at the younger end of this age group. The results confirm that prenatal care should be precocious in this group of mothers, to identify high-risk conditions for adverse perinatal outcomes in the first trimester of pregnancy, allowing preventive and therapeutic measures to be taken to decrease neonatal morbidity and mortality.

Acknowledgements. None.

Author contributions. AC – data collection, EAJ – writing, EFMS – review, BdCF – supervision, FAPV – methodology.

Funding. None.

Conflicts of interest. None.

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Accepted 4 August 2018.