

Maternal factors influencing gestational age and birth weight of newborns

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Objective

To investigate if maternal demographics and biochemical markers obtained in first trimester screening can be useful in helping clinicians identify mothers who are at higher risk of delivering preterm or small for gestational age babies.

Methods

This is a retrospective, single centre study of 12 599 mothers who presented for first trimester screening and delivered at KK Women's and Children's Hospital (Singapore) over 3 years period from 2010-2012. Maternal demographics such as height, weight, BMI, age, parity, smoking status, ethnicity, ovulation induction, as well as biochemical markers including PAPP-A in MoM (multiples of median) and b-HCG in MoM were analysed to find out which factors are significant for preterm or small for gestational age babies.

Results

Maternal BMI ($p < 0.01$), age ($p < 0.01$), and PAPP-A MoM ($p < 0.01$) measured during first trimester screening were found to be significant in affecting gestational age at birth of newborns. Mothers with BMI $> 27.5 \text{ kg/m}^2$, > 35 years old and PAPP-A MoM < 0.5 were at higher risk of preterm delivery (< 37 weeks gestational age at birth). These factors were also found to increase risk of delivering extremely preterm (< 28 weeks), very preterm (28-32 weeks) and moderately preterm (32-36 weeks) compared to mothers with normal BMI (18.5-22.9 kg/m^2), < 35 years old, and PAPP-A > 1 . Maternal ethnicity, smoking status, parity, ovulation induction and b-hCG MoM were not found to be significant in affecting gestational age at birth after accounting for confounders. Analysis was also done to compare the factors significant in influencing baby's birthweight, particularly for babies who were small for gestational age (< 10 th percentile for gestational age). 709 babies were found to be SGA and 9939 were normal weight for gestational age according to Singapore's local standards. Of the factors analysed, maternal BMI ($p < 0.01$), parity ($p < 0.01$), b-hCG MoM ($p = 0.002$) and PAPP-A MoM ($p < 0.01$) were found to be significant in affecting babies who were SGA. Mothers with BMI $> 27.5 \text{ kg/m}^2$, multiparous, b-hCG MoM < 0.5 , and PAPP-A MoM < 0.5 were found to have higher risk for delivering babies who were SGA. Maternal smoking status, age, ethnicity, ovulation induction were not found to be significant in influencing baby's weight at birth after accounting for confounders.

Conclusion

SGA babies and preterm babies are at higher risk of both short and long term mortality and morbidity. We found that a combination of maternal demographics and biochemical markers obtained in the first trimester screening can be useful in helping clinicians identify mothers who may be at high risk for SGA or preterm delivery. More resources may be allocated to monitor closely these high risk pregnancies for any complications so as to allow for timely intervention and management if required.