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Assessment of Effect of Maternal Lipid Level during Late Pregnancy on the Birth of LGA Newborn

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ABSTRACT

Background: Birth weight is a retrospective indicator of fetal growth and maternal health during pregnancy, but also a subsequent predictor of long-term health outcomes for both the mother and her offspring. The present study was conducted to assess effect of maternal lipid level during late pregnancy on the birth of LGA newborn. **Methods:** 68 post- natal mothers who delivered LGA babies and 68 post- natal mothers who delivered AGA babies were included. Lipid concentration was calculated by the Friedewald equation. Anthropometric parameters of the newborns were measured. **Results:** Group I comprised of LGA and group II had AGA babies. Each group had 68 patients. The mean total cholesterol level (mg/dl) in group I was 232.6 and in group II was 220.4, triglyceride level (mg/dl) was 256.2 in group I and 184.2 in group II, HDL (mg/dl) was 36.2 in group I and 52.4 in group II, LDL level (mg/dl) was 144.6 in group I and 140.2 in group II. The mean birth weight was 3624.2 grams in group I and 3026.8 grams in group II, birth length was 56.2 cm in group I and 52.2 cm in group II and head circumference was 36.2 cm in group I and 31.2 cm in group II. The difference was significant (P< 0.05). **Conclusion:** High maternal TG and Low HDL levels in late pregnancy are independently and significantly associated with the birth of LGA infants.

Keywords: Birth weight, Mothers, Lipid.

INTRODUCTION

Children who are identified as obese during childhood are at a higher risk of developing complications related to metabolic syndrome in adulthood. With increasing prevalence of childhood obesity, it is important to understand the underlying aetiologies associated with it.[1] Foetal growth and development is determined by a combination of genetic and environmental factors. During pregnancy, growth of the foetus is highly influenced by the in- utero environment. Therefore, maternal nutrition plays a major role not only on the mother's own health however, it has a lasting impact on the normal growth and the well-being of the baby.[2]

Birth weight is a retrospective indicator of fetal growth and maternal health during pregnancy, but also a subsequent predictor of long-term health outcomes for both the mother and her offspring. Low birth weight (LBW) is defined as a birth weight below 2500 g and small-for-gestational-age (SGA) as a birth weight less than the 10th percentile for the gestational age.[3] In 2015, 20.5 million infants were born LBW, representing 14.6% of all births. Most (91%) LBW infants were born in low and middle-income countries (LMICs) with almost three-quarters in Asia and subSaharan Africa. It has been estimated that in 2012, one in five infants from LMICs were born SGA, representing 23.3 million births in that year. Both LBW and SGA are important indicators used to identify infants at greater risks of morbidity and mortality.[4]

Imbalanced lipid levels during pregnancy may alter fetal lipid metabolism, thereby impacting fetal growth and birth weight, and the metabolism of both the mother and her offspring. During pregnancy, pronounced changes in lipid metabolism occur characterized by an elevation of maternal lipids to support the physiological adaptation to gestation and the nutritional and hormonal needs of the gestating mother and the growing fetus.[5] The present study was conducted to assess effect of maternal lipid level during late pregnancy on the birth of LGA newborn.

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MATERIALS AND METHODS

The present study comprised of 68 post- natal mothers who delivered LGA babies and 68 post- natal mothers who delivered AGA babies. All were included in the study after obtaining their written consent.

Data pertaining to patients such as name, age etc. was recorded. A thorough clinical examination was performed. 3 mL of blood was collected and serum total cholesterol, triglycerides and HDL cholesterol concentration were measured and LDL cholesterol concentration was calculated by the Friedewald equation. Anthropometric parameters of the

newborns were measured. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

RESULTS

Table 1: Distribution of patients

Groups	Group I	Group II
Babies	LGA	AGA
Number	68	68

[Table 1] shows that group I comprised of LGA and group II had AGA babies. Each group had 68 patients.

Table 2: Assessment of lipid profile.

Lipid profile	Group I	Group II	P value
Total cholesterol	232.6	220.4	0.12
Triglyceride	256.2	184.2	0.01
HDL	36.2	52.4	0.02
LDL	144.6	140.2	0.15

[Table 2, Figure 1] shows that mean total cholesterol level (mg/dl) in group I was 232.6 and in group II was 220.4, triglyceride level (mg/dl) was 256.2 in group I and 184.2 in group II, HDL (mg/dl) was 36.2 in group I and 52.4 in group II, LDL level (mg/dl) was 144.6 in group I and 140.2 in group II. The difference was significant (P< 0.05).

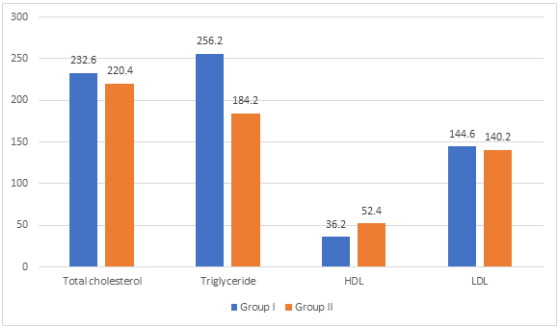

Figure 1: Assessment of lipid profile

Table 3: Assessment of parameters

Parameters	Group I	Group II	P value
Birth weight (g)	3624.2	3026.8	0.05
Birth length (cm)	56.2	52.2	0.02
Head circumference (cm)	36.2	31.2	0.01

[Table 3] shows that mean birth weight was 3624.2 grams in group I and 3026.8 grams in group II, birth length was 56.2 cm in group I and 52.2 cm in group II and head circumference was 36.2 cm in group I and 31.2 cm in group II. The difference was significant (P< 0.05).

DISCUSSION

Macrosomia, defined as a fetal birth weight equal to or greater than 4000 g, irrespective of gestational age, has a serious impact on maternal and fetal perinatal outcomes.[6] Mothers delivering infants with macrosomia are at a higher risk of prolonged labor, caesarean section, postpartum haemorrhage, and perineal trauma.[7] For infants, macrosomia is associated with an elevated risk of shoulder dystocia, clavicular fracture, perinatal asphyxia, brachial plexus injury, and perinatal mortality.[8] Furthermore, children born with macrosomia are more likely to suffer obesity, diabetes mellitus (DM), early cardiovascular disease, and certain cancers later in life.[9] In recent decades, an increasing prevalence of fetal macrosomia has been reported in both developed countries and developing countries.[10] The present study was conducted to assess effect of maternal lipid level during late pregnancy on the birth of LGA newborn.

In present study, group I comprised of LGA and group II had AGA babies. Each group had 68 patients. Wang et al,[11] found that maternal serum triglyceride (TG) and high-density lipoprotein cholesterol (HDL-C) levels were related to macrosomia; each 1 mmol/L increase in TG resulted in a 27% increase in macrosomia risk, while each 1 mmol/L increase in HDL-C level resulted in a 37% decrease in macrosomia risk, even after adjusting for potential confounders. Notably, the risk of macrosomia increased progressively with increased maternal serum TG levels and decreased HDL-C levels. Compared with women with serum TG levels < 2.5 mmol/L, women with TG levels greater than 3.92 mmol/L had an approximately 2.8-fold increased risk of macrosomia. Compared with women with serum HDL-C levels above 2.23 mmol/L, women with HDL-C levels of less than 1.62 mmol/L had a 1.9-fold increased risk of giving birth to an infan with macrosomia. In addition, a higher risk of macrosomia was observed in women with simultaneous hypertriglyceridemia and low serum HDL-C levels compared to those with hypertriglyceridemia or low serum HDL-C alone.

We found that mean total cholesterol level (mg/dl) in group I was 232.6 and in group II was 220.4, triglyceride level (mg/dl) was 256.2 in group I and 184.2 in group II, HDL (mg/dl) was 36.2 in group I and 52.4 in group II, LDL level (mg/dl) was 144.6 in group I and 140.2 in group II. The mean birth weight was 3624.2 grams in group I and 3026.8 grams in group II, birth length was 56.2 cm in group I and 52.2 cm in group II and head circumference was 36.2 cm in group I and 31.2 cm in group II. Amarasingha et al,[12] determined the associations between aetiologies and the birth of Large for Gestational Age (LGA) babies for the first time in a tertiary care setting in Southern Sri Lanka and to determine whether changes in maternal lipid profile are associated with the birth of LGA babies. In the first arm of the study, 149 mothers were interviewed to obtain information on aetiologies and complications associated with birth of LGA babies. In the second arm of the study, 3 mL of blood was collected from 104 mothers and lipid profile was assessed. A significant change was not

observed in the serum cholesterol concentration and the LDL concentration between the LGA and the AGA groups. There was an intermediate correlation (r=0.529) between serum triglyceride levels and the birth weight of the newborn. When maternal serum triglyceride level increases, birth weight of the newborn also increased. There was also a correlation between maternal serum triglyceride level and the length of the newborn (r=0.485) and the head circumference (r=0.228) of the newborn. When maternal serum triglyceride level increases, both the length and the head circumference of the newborns increase.

CONCLUSION

Authors found that high maternal TG and Low HDL levels in late pregnancy are independently and significantly associated with the birth of LGA infants.

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