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Original Research

Comparison of cord blood lipid profile in term appropriate for gestational age versus small for gestational age babies

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ABSTRACT

Introduction- Dyslipidemia is one of the risk factors of coronary vascular disease. Lipid profile at the start of life broadens the understanding of dyslipidemia and their association with coronary heart disease in later life. The aim of present study is to compare the cord blood lipid profile in term appropriate for gestational age versus small for gestational age babies.

Material and methods- 50 cases of SGA babies and 50 AGA babies were selected as controls for a cross-sectional study based on predetermined criteria. A thorough history, a clinical examination, and follow-up with a pre-made questionnaire were used to gather information. In both groups, a lipid profile was completed. After that, a comparison of the lipid profiles in the two groups was made.

Results - No significant difference was found in the lipid profile values between male and female newborns. Serum total cholesterol (TC), LDL, and triglyceride (TG) were significantly higher in terms SGA, as compared to AGA babies. Only TC was seen significantly higher in LBW babies than NBW babies. Regarding HDL level, no significant difference was found between term SGA and AGA babies.

Conclusion- According to the study's findings, SGA newborns have higher serum lipid levels. It may have a significant effect on these newborns' lives in the future, thus long-term monitoring is necessary.

Keywords – AGA, HDL, LDL, SGA, TG, total cholesterol

INTRODUCTION

Infants classified as small for gestational age (SGA) are those whose birth weight falls inside the 10th percentile of their gestational age or falls more than two standard deviations below their gestational age mean.[1] Age-appropriate babies are those whose birth weight falls between the 10th and 90th percentiles (AGA). A crucial stage of human development occurs during the intrauterine phase of growth and development [2]. Low birth infants are linked to several unfavorable health consequences. LBW can result from an SGA baby or from a baby born prematurely (less than 37 weeks of pregnancy). Over 20 billion babies are born with LBW globally, which accounts for 15.5% of all births.[3]

Around the world, coronary artery disease is a major source of morbidity and mortality. An increasing amount of research points to the importance of unfavorable prenatal and early postnatal environments in determining the fetus's and the newborn's disturbed physiological and metabolic milieu. The adjustments that follow put these infants at risk for heart disease in the future. The burden associated with coronary artery disease is more prevalent in developing nations.[4]

An individual's lipid profile offers important insights into their cardiovascular health. Hyperlipidemia is a well-known risk factor for cardiovascular disease that can be identified at any age. Childhood blood lipid levels and later adult blood lipid levels have a significant independent association. If treatment is not received, derangements that start early in infancy will only become worse as children get older.[5]

It is possible to think of early age as the time to start taking preventative measures to reduce the chance of developing cardiovascular diseases in the future. Type 2 diabetes and hypertension are two more metabolic disorders that are made more likely by the other long-term effects of these changes in metabolism. The assessment of lipid levels involves the measurement of many additional atherogenic markers, cholesterol, and its byproducts. Unhealthy lipid levels in the cord blood are a sign of impaired placental function during pregnancy and disordered lipid metabolism. Many high-risk variables for both the mother and the fetus have a negative effect on the functions of the foetal-placental unit. Some of the well-known and well-documented maternal and foetal risk factors include

pregnancy-induced hypertension, chronic maternal diseases like diabetes mellitus and hypertension, antepartum hemorrhage, prolonged labor, premature rupture of the membranes, foetal distress, low Apgar score, low birth weight, and prematurity.[6]

To the best of our knowledge, very few studies have been conducted on this ground in our country. Hence, the present study was done to compare the cord blood lipid profile in term appropriate for gestational age versus small for gestational age babies.

MATERIAL & METHODS

The present cross-sectional study was in neonatal unit and NICU for a period of one year. Approval for the study was taken from ethical review board of allied medical college and hospital before commencement of study. Written Informed consent was taken from parents/guardian of baby after explaining the study.

A total of 50 cases of small gestational age babies admitted in the unit were enrolled in the study. Another 50 appropriate gestational age of Gynae & obstetric department were taken as a control. The selection of the case and control group was done by using following inclusion and exclusion criteria:

The case group was included when neonates of both sexes were gestational age ranging from 32 to 42 weeks, birth weight <10th percentile of of IUGR chart. Control groups were included when neonates of both sexes were gestational age ranging from 32 to 42 weeks, birth weight > 10^{th} and <90^{th} percentile of the IUGR chart. Neonates with congenital anomalies, very sick neonate, neonates with large for gestational age were excluded from this study.

A pre validated questionnaire was used to gather the necessary data through a thorough history collection, clinical examination, and attentive observation of the hospital course. Carefully documenting the mother's or other caregivers' medical history preceded the physical examination. An infantometer was used to measure length, head circumference, chest circumference, and other pertinent anthropometric measurements. An electronic weighing scale was used to record weight. The first day of the most recent menstrual cycle was used to calculate gestational age, which was then verified by a clinical evaluation utilizing a modified version of New Ballard's Scoring.Two to three milliliters of venous blood were drawn 24 hours after birth following enrollment. Blood was drawn and stored in a sterile, dry glass tube with strict aseptic precautions. After allowing the drawn blood to coagulate at room temperature, the lab received it right away. Following a 10-minute centrifugation at 4,000 RPM, the serum was extracted from the blood samples and kept at -20°C until further examination. Using an auto-analyzer , an enzymatic approach was employed to estimate total cholesterol, TG, HDL, and LDL. The Friedewald equation, LDL=TC-HDL+ (TG/2.2) mmol/L, was used to calculate LDL.[7] Following usual process, all data were input, reviewed, double-checked, and examined. The SPSS software version 25.0 was then used to evaluate the results. Percentage was used to report categorical variables. Using an unpaired t-test, a significant relationship of various factors was examined. Level of significance was kept at p less than 0.05.

RESULTS

In the present study among cases 80% were male and 20% were females, among controls 84 % were male and 16% were females. There was no statistically significant results were obtained in gender between cases and controls (p=0.073).

Table;1 showing gender distribution of cases and controls

Study group	Male	Female
Cases	40 (80)	10 (20)
Controls	42 (84)	8 (16)
P value	0.073	

Serum total cholesterol (TC) was significantly higher (<0.001) in term SGA (151±6.8) as compared to term AGA (137±6.3). LDL was higher in term SGA (67.3±19.2) as compared to the term AGA (49.3±23.2). The triglyceride (TG) level of term SGA (136.88±14.2) was significantly higher (<0.01) than the term AGA group (129.3±12.5). HDL levels in term newborns , both SGA (30.2±10.3) and AGA (29.1±9.8) were not found a statistically significant difference (p>0.05) as shown in table 2.

Table :2 showing comparison of lipid profile between cases and controls

Parameter (mg/dl)	Cases	Controls	P value
Total cholesterol	151±6.8	137±6.3	<0.001
LDL	67.3±19.2	49.3±23.2	<0.01
Triglyceride	136.88±14.2	129.3±12.5	<0.01
HDL	30.2±10.3	29.1±9.8	>0.05

Serum total cholesterol was significantly higher (<0.001) in LBW (167.2±8.9) as compared to NMW (150.3±8.1). LDL, TG and HDL levels were not significantly higher in LBW compared to NBW (p>0.05) as shown in table 3

Table :3 showing comparison of lipid profile between low birth weight (LBW) and normal birth weight (NBW)

Parameter (mg/dl)	LBW	NBW	P value
Total cholesterol	167.2±8.9	150.3±8.1	<0.001
LDL	78.2±32.5	68.1±26.3	>0.05
Triglyceride	144.2±47.2	137.2±32.2	>0.05
HDL	33.6±21.5	28.4±19.7	>0.05

DISCUSSION

Prenatal weight and intrauterine growth are arguably the most significant determinants of survival and long-term quality of life. IUGR alters the way that certain bodily systems function, particularly lipid metabolism, which leads to a number of issues, the most significant of which being coronary heart disease. Childhood is when atherosclerosis first appears, and blood cholesterol levels play a significant role in this process. There is a correlation between the rising prevalence of coronary heart disease and higher lipid profiles in SGA infants.[8] Observations on infants provide a chance to investigate risk factor variables at an early developmental stage. The early observations serve as background information for the research on older children and adults.

The present study was conducted among 50 SG and 50 AGA term babies to assess the cord lipid profile contents so that maternal and foetal risk factors can be calculated at earliest.

In this investigation, there was no difference in the lipid values of male and female babies. The results of this study were in line with those of the 1980 Tanzania survey.[9] However, our study's findings disagreed with those of another study. In their investigation, the female newborns' lipid measurements were greater than those of the male neonates.[10,11]

In the current study total cholesterol was significantly higher in terms of SGA babies (151±6.8) than term AGA (137±6.3) babies. LDL was higher in term SGA (67.3±19.2) as compared to the term AGA (49.3±23.2). The triglyceride (TG) level of term SGA (136.88±14.2) was significantly higher (<0.01) than the term AGA group (129.3±12.5). HDL levels in term newborns , both SGA (30.2±10.3) and AGA (29.1±9.8) were not found a statistically significant difference (p>0.05). A similar result was found in the study done by many authors in 1989 at Spain , 2004 at Brazil and 2007 at Iran. [4,12,13] In another study of 150 cases at India in 2011 showed that total cholesterol, LDL and TG level were higher in babies of SGA as compared to AGA.[14] So, the results of this study are consistent with our study

When the values of the lipid parameter were evaluated according to the birth weight (below and over 2.5 kg), we discovered that although the lipid levels in LBW newborns were greater than in NBW babies, the difference was not statistically significant (p>0.05). The only factor that was statistically significant was total cholesterol (TC), which was higher in LBW infants. A related study was discovered in which lipid levels and birth weight were not related.[15] However, a different study found that LBW newborns' total cholesterol was considerably greater than that of NBW babies.[16]

The lipid profile is indicative of underlying cardiovascular health, and there is a clear link between the occurrence of numerous chronic illnesses and abnormalities in the lipid profile. Among the many variables that have been implicated in the development of atherosclerosis, elevated plasma levels of triglycerides and/or cholesterol are thought to be among the most significant. Early in life is when atherosclerosis starts, and research on the lipid profile of cord blood has produced conflicting results.[17] It is primarily the presence of both modifiable and non-modifiable risk variables that determines the incidence of cardiovascular disease. Its well-known secondary variables include diabetes mellitus, insulin resistance, metabolic syndrome, and obesity. Nonetheless, the much-discussed Barker's fetal programming hypothesis—which postulates that early-life malnutrition increases susceptibility to the metabolic syndrome—has completely resurrected our knowledge of the mechanisms that generate these disorders.[18]

This study was limited by its small sample size and single-center methodology. Given the limited scope of this investigation, a multicenter study with a high sample size is advised for more details.

CONCLUSION

Total cholesterol, serum triglycerides, HDL cholesterol, LDL cholesterol, and other lipid profiles were analyzed. All lipids (triglycerides, total cholesterol, and HDL) had considerably higher means in SGA babies compared to AGA babies. It may have a great impact on the future life of these newborns which needs long term to follow up.

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