

Correlation of Cord Blood Lipid Profile with Neonatal Gender and Mode of Delivery

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Abstract

Background: Several studies have suggested that both genetic and environmental factors influence the composition of cord blood lipids. As dyslipidemia is associated with increased predisposition to atherosclerotic diseases, we planned to study effect of gender and mode of delivery on cord blood lipid profile. **Subjects and Methods:** We carried out a hospital based cross sectional study including 200 normal healthy neonates and compared cord blood lipid profiles (Total cholesterol (TC), Triacylglycerol (TAG), High Density Lipoprotein Cholesterol (HDL), Low Density Lipoprotein Cholesterol (LDL) and Very Low Density Lipoprotein Cholesterol (VLDL) between male and female neonates as well as neonates delivered by normal vaginal delivery and caesarean section. **Results:** No statistically significant (p values > 0.05) difference was observed between cord blood lipid profiles of groups of neonates based on both gender (p value of 0.654 for TC, 0.541 for TAG, 0.457 for HDL, 0.647 for LDL and 0.541 for VLDL) and mode of delivery (p values of 0.904, 0.907, 0.830, 0.910 and 0.907 for TC, TAG, HDL, LDL and VLDL respectively). **Conclusion:** The study indicates that cord blood lipid profile is not significantly affected by gender and mode of delivery of neonates.

Keywords: Neonatal Gender, Mode of Delivery, Cord Blood Lipid Profile.

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Introduction

The role of dyslipidemia in origin and progression of atherosclerosis is well established.^[1] Studies have shown that it is an excellent marker of the cardiovascular status.^[2]

The lipid profile includes measurement of Total Cholesterol (TC), Triacylglycerol (TAG), High Density Lipoprotein (HDL) Cholesterol, Low Density Lipoprotein (LDL) Cholesterol and Very Low Density Lipoprotein (VLDL) Cholesterol.

Several studies have demonstrated that the adverse intrauterine environment is associated with altered cord blood lipid profile predisposing to adulthood dyslipidemia and thus cardiovascular disease in later life.^[3] Studies have demonstrated effect of fetal developmental factors on cord blood lipid profile. The available data suggests that fetal factors like prematurity and low birth weight are associated with fetal programming and thus predisposes to adult hood diseases.^[4]

Although differences in hormonal mechanisms in adulthood is proposed to explain gender based difference in prevalence of cardiovascular diseases,^[5] the study of correlation of gender on cord blood lipid may not only provide an opportunity to validate this theorem but also give an idea about status of lipids prior to the hormone changes

that occurs in adulthood. Fetal sex steroid and glucocorticoid levels increase as a result of stress induced during labour and theoretically are supposed to affect cord blood lipids.^[6-7] The derangement in fetal lipid profile either due to fetal programming and/or prepartum and/or intrapartum stress is supposed to predispose to adulthood cardiovascular diseases.^[8] However data regarding actual effect of labour induced stress on cord blood lipid profile is very limited.

The study of comparison of cord blood lipids between groups of neonates based on gender and mode of delivery may add to our knowledge about the effect of these factors on cord blood lipid. This study may also indicate the role of these fetal factors in predisposition to adulthood diseases associated with dyslipidemia if any. Taking all this into consideration, we planned this study to compare cord blood lipid profile between male and female neonates and also neonates delivered by normal vaginal delivery and caesarean section.

Subjects and Methods

A hospital based cross sectional study was carried out at Kasturba Hospital, Mahatma Gandhi Institute of Medical Sciences, Sewagram, Wardha, Maharashtra from 1st July

2012 to 31st June 2013 after obtaining permission from institutional research committee. The study included 200 normal healthy neonates defined as term neonates (neonates with 37 to 40 completed weeks of gestation) with normal birth weight (neonates with birth weight of 2.5 to 4 Kilo Grams) after obtaining informed consent from parents.^[9]

Inclusion criteria

Neonates both males and females, delivered between 37 to 40 completed weeks of gestation with birth weight between 2.5 to 4 Kilo Grams, delivered with singleton pregnancy either by normal vaginal birth or caesarean section

Exclusion criteria

Neonates with gestational age either <37 or > 40 completed weeks of gestation or birth weight either <2.4 or > 4 Kilo Grams or one minute APGAR score < 7 and/or congenital anomalies and/or maternal conditions like addictions, medical or obstetric diseases.^[10,11]

Umbilical cord blood sample of neonates were collected immediately after delivery and analysed for lipid profile at our Clinical Biochemistry Laboratory. Lipid profile estimation was done on ERBA EM360 Random Access fully automated analyzer using compatible reagent kits and protocols by ERBA Diagnostics Mannheim GmbH, Germany following the standard operating procedure of our laboratory.

Estimation of lipid profile of umbilical cord blood samples was done by following methods:

- TC by CHOD-PAP method.^[12]
- TAG by GPO-Trinder method.^[13]
- HDL by Modified PVS and PGME coupled method.^[14]
- LDL and VLDL levels were calculated using Friedwald equation.^[15]

The cord blood lipid profiles of male and female neonates as well as neonates delivered by normal vaginal delivery and caesarean section were compared. The statistical analysis was done by SPSS 23.0 using student unpaired t test for the difference between two means and p<0.05 was considered as level of significance.

Results & Discussion

Figure 1 and 2 show distribution of neonates according to their gender and mode of delivery respectively.

As per Table 1, the difference between cord blood lipid profiles of male and female neonates was not statistically significant (p value > 0.05). Male neonates had slightly (but statistically insignificant) higher levels of serum TC (P value of 0.654), TAG (P value of 0.541), LDL (P value of 0.674) and VLDL (P value of 0.541) while slightly but statistically lower levels of serum HDL (P value of 0.457) as compared to female neonates. Conciliating observations have been reported by many authors but conflicting results were also reported by few.^[16-20-22]

As per Table 2, the difference between cord blood lipid

profile of neonates delivered by normal vaginal delivery and caesarean section was negligible (statistically insignificant with p value > 0.05). Male neonates had slightly higher levels of serum TC, TAG, HDL, LDL and VLDL (P value of 0.904, 0.907, 0.830, 0.910 and 0.907 respectively). Some authors have reported similar findings.^[23] Fetuses undergoing vaginal delivery are exposed to more stress as compared to cesarean section delivery. Theoretically, prepartum and/or intrapartum stress is supposed to affect cord blood lipid profile.^[24] Few studies reported higher levels of cord blood lipids in neonates with vaginal delivery as compared to caesarean section.^[23] However, the results of our study suggest that cord blood lipid profile is not significantly affected by mode of delivery.

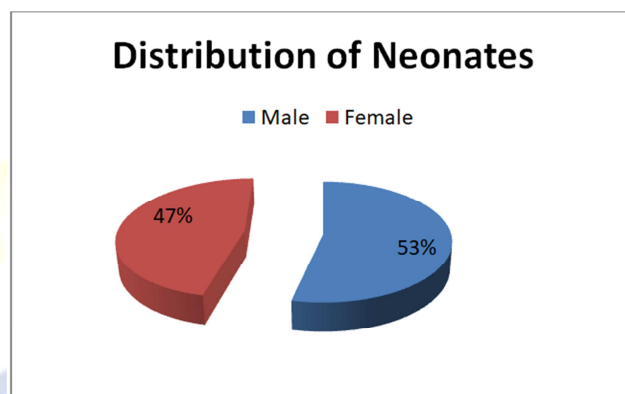


Figure 1: Distribution of neonates according to their gender

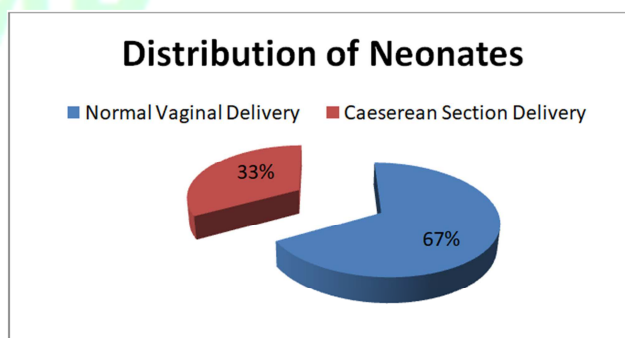


Figure 2: Distribution of neonates according to their mode of delivery

Table 1: Comparison of umbilical cord blood lipid profile between male and female neonates.

Lipid Profile*	Male Neonates	Female Neonates	t-Value	p-Value**
TC	84.03±13.63	79.15±10.98	0.483	0.654
TAG	76.03±11.38	69.72±11.76	0.667	0.541
HDL	28.19±6.47	32.12±5.15	-0.822	0.457
LDL	40.63±22.21	33.08±18.49	0.453	0.674
VLDL	15.20±2.27	13.94±2.35	0.667	0.541

* Values expressed as Mean±SD in mg/dL
 ** P value (p<0.05) was considered as level of significance

Table 2: Comparison of umbilical cord blood lipid profile between neonates delivered by normal vaginal delivery and caesarean section

Lipid Profile*	Neonates with Normal Vaginal Delivery	Neonates Caesarean Section	t-Value	p-Value**
TC	80.64±14.51	79.09±15.04	0.129	0.904
TAG	72.60±13.19	71.27±13.11	0.124	0.907
HDL	31.74±4.62	30.83±5.05	0.229	0.830
LDL	35.29±22.20	33.09±22.28	0.121	0.910
VLDL	14.52±2.63	14.25±2.62	0.124	0.907

* Values expressed as Mean±SD in mg/dL

** P value (p<0.05) was considered as level of significance

Conclusion

From the results of this study we propose that neonatal gender and mode of delivery does not significantly affect umbilical cord blood lipids. These observations suggest that these factors are not associated with dyslipidemia by virtue of either gender based fetal programming or prepartum and/or intrapartum stress associated with normal vaginal delivery. Neither gender nor mode of delivery was found to be associated with dyslipidemia and hypothetically is not supposed to be associated with predisposition to adulthood CVDs associated with dyslipidemia. However these findings need to be validated by further studies.

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