# Effect of Mode of Delivery on Maternal and Umbilical Cord Serum Lipid Profile

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## ABSTRACT:

**BACKGROUND:**

Limited data are available with regard to the relation between maternal and fetal serum lipid and lipoprotein levels and the mode of delivery.The aim of this study is to evaluate the effect of mode of delivery on the levels of serum lipid and lipoprotein of mothers and their umbilical cords.

**METHOD:**

This study is consisted of fourty-nine pregnant women delivered by elective caesarean(CS)and seventy-five age-and gestational age-matched pregnant women who delivered by normal vaginal delivery(NVD).Serum lipid profile parameters including; total cholesterol(Tch),triglyceride(TG),high density lipoprotein-cholesterol(HDL-C) and low density lipoprotein-cholesterol(LDL-C)were measured in the serum of these two groups of pregnant women as well as in the serum of their umbilical cords.

**RESULTS:**

The mean(±SEM) values of serum Tch,TG,and LDL-C were significantly higher in pregnant women who delivered by NVD when compared with those of pregnant women delivered by CS(all $P< 0.001$).With regard to serum HDL-C mean value there was no significant difference between these two groups.Similarily,the mean (±SEM) values of serum Tch,TG,LDL-C were significantly increased in umbilical cord of NVD mothers in comparison with values obtained in umbilical cord of CS mothers( all $P< 0.001$).

There was also a significant positive relationship between mothers and umbilical cord serum Tch levels in NVD group($r=0.339$, $P< 0.001$).

**CONCLUSION:**

This study revealed that the mode of delivery ,in particular, NVD changes significantly the concentrations of lipid parameters mainly Tch,TG,and LDL-C.Such changes require an important attention postpartumly for such mothers with respect to biochemical investigation,particularly lipid parameters.


***KEY WORD:*** Mode of delivery, Lipid Profile,Umbilical Cord.

## INTRODUCTION:

Serum lipoprotein profiles in children are predictive of those in adulthood [(1)]and there is evidence that this association with adult levels may originate at birth [(2).] The currently available evidence suggests that several factors influence the composition of cord blood lipoproteins like Placental insufficiency and other conditions affecting fetal growth and the mode of delivery may also influence cord lipoprotein concentrations [(3).]

If factors that increase fetal stress also elevate lipids it is possible that fetal serum lipid levels during vaginal delivery is higher than that of caesarean section [(4)].

In this study, we set out to determine the effect of mode of delivery on the mothers and their umbilical cord serum lipid and lipoprotein levels.

## MATERIALS AND METHODS:

**subjects and study design:**

Pregnant women admitted to a delivery room at Al-Alwayia Hospital,Baghdad were randomly selected for inclusion in the present study.

All women were healthy, nonsmokers, and were taking no medications (except iron supplements). Women with pregnancy complications (e.g., gestational diabetes, hypertension) or intrapartum complications (eg, fever, non reassuring fetal heart rate, and meconium) were excluded. The study groups consisted of 49 pregnant women who delivered by elective caesarean delivery(CS) and 75

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age- and gestational age-matched pregnant women who delivered by normal vaginal delivery NVD . The last menstrual period, early clinical examination, and confirming ultrasound were used to establish gestational age.

The parity of the two groups was also similar. None of the women had clinical evidence of chorioamnionitis, as reflected by normal body temperature, absence of uterine tenderness, and absence of fetal tachycardia

**Blood samples** were obtained within 48 hours of birth from the arm veins of both the CS and NVD mothers. At delivery, blood was also collected from the umbilical cord of the two mother groups after its clamping. Blood was obtained in dry tubes for lipid and lipoprotein analysis. After clotting, serum samples were separated by centrifugation at 4°C and 600*g*. Serum was stored frozen at –20°C until assay.

**Laboratory Methods:**

Total cholesterol(Tch),triglyceride(TG),high density lipoprotein cholesterol(HDL-C) and low density lipoprotein-cholesterol(LDL-C) levels were evaluated in serum samples of both the umbilical cord and mothers of both types of delivery;CS and NVD.Serum Tch was measured by enzymatic colorimetric method of Allain et al,1974[5].Serum TG was determined according to the enzymatic method of Bucolo and David,1973[6].Serum HDL-C was assayed using the enzymatic method of Demacker and associates,1980[7].Serum LDL-C was estimated by using Friedwald et al formula[8].

**RESULTS:**

Table 1 shows that the two groups of this study (CS and NVD)were similar (no significant difference) with respect to both the maternal and gestational age as well as with respect to both body weight.All infants were born at term.

**Table 1.Maternal obstetric parameters(Mean± SEM)**

| | NVD (n = 75) | Elective CS (n = 49) | *P* |
|---|---|---|---|
| Age (y) | 30.6 ± 4 | 31.9 ± 1.1 | NS |
| Gestational maturity (wk) | 39.8 ± 0.4 | 39.3 ± 0.3 | NS |
| Birth weight (g) | 3155.1 ± 79.1 | 3117.6 ± 77.4 | NS |

NS: not significant.

Table 2 shows that the serum levels of Tch, TG, and LDL-C were significantly higher in NVD women than in CS women{for all P <0.001}.No significant difference in serum HDL-C level was detected between mothers with NVD and CS.

Table 2 also reveals that the umbilical cord serum values for mothers with NVD were significantly increased when compared with those of CS group with regard to Tch, TG,and LDL-C levels{for all P< 0.001}.But these differences were not statistically significant with regard to HDL-C concentration.

A significant positive correlation was found between maternal and newborn serum total cholesterol levels in the NVD group (r = 0.339; *P* <0 .001).

**Table 2:Mean(±SEM)Serum Values of Total cholesterol,Triglyceride,HDL-cholesterol and LDL-cholesterol in Umbilical Cord and in Mothers of both NVD and CS Groups.**

| | NVD (n = 75) | | CS (n = 49) | | |
|---|---|---|---|---|---|
| | Cord serum | Maternal serum | Cord serum | Maternal serum | P-value |
| Tch (mg/dL) | 212.1 ± 51.1 | 274.2 ± 23.87 | 101.8 ± 16.2 | 164.8 ± 9.94 | <0.001 |
| TG (mg/dL) | 105.6 ± 18.39 | 241.2 ± 67.62 | 46.2 ± 6.8 | 121.4 ± 40.6 | <0.001 |
| HDL-cholesterol (mg/dL) | 30.9 ± 2.52 | 36.3 ± 2.70 | 31.1 ± 2.05 | 35.1 ± 1.95 | Not-signif. |
| LDL-cholesterol (mg/dL) | 100.6 ± 12.28 | 141.4 ± 20.32 | 80.4 ± 6.8 | 101.9 ± 2.63 | <0.001 |

P -value of a 2-tailed *t* test comparing umbilical cord serum values a well as maternal serum values between the different modes of delivery (NVD and CS); *Tch*, total cholesterol; *TG*, triglycerides; *HDL*-C, high-density lipoprotein-cholesterol and *LDL-C*, low-density lipoprotein- cholesterol (P< 0.05 value was considered significant).

As predicted, in the sera of newborn infants delivered by both modes, the pH and base excess values of the arterial sera were lower than that of the venous sera. Newborn infants delivered vaginally had lower arterial pH values than those delivered by CS. Interestingly; PO2 and PCO2 levels were similar in the arteries of both groups.

Lipid concentrations in the serum prepared from umbilical venous and arterial blood were similar in both of these vessels, irrespective of the mode of delivery. Notably, the triglyceride levels were significantly lower in the CS than in the NVD group, in apparent contradiction to the expectation based on weight difference of mothers between the two groups.

## DISCUSSION:

The results of the present study showed significant elevation of Tch,TG, and LDL-C levels in serum of NVD mothers and in their serum umbilical cords than in serum of those mothers who delivered by CS and their serum umbilical cord.

Lipids are transferred to the fetus along maternal–fetal concentration gradients mediated by specific placental fatty acid carriers, so the hyperlipidaemic state of late pregnancy significantly increases the maternal–fetal concentration gradient across the placenta.An increased surface area for exchange, an increased concentration gradient, and a decreased diffusing distance enhances transfer across the placenta(9).

It has been suggested that maternal free fatty acids crossing the placenta contribute to fetal lipids in early gestation, whereas in advanced gestation there is a gradual shift to de-novo synthesis in fetal tissue(10).

Maternal lipoproteins are taken up by the placenta where they are broken down and their products used for energy/steroid hormone production or released to the fetus(9).

Our observation of significant correlation between maternal and umbilical cord for serum Tch level is in consistent with that reported by other authors who have reported no association between maternal and newborn cholesterol levels[11,12,13].

Factors that increase fetal stress also elevate lipids thought to be due to increased mobilization of fatty acids from fat stores and increased hepatic synthesis of triglycerides (14).Vaginal delivery is thought to increase fetal stress and has been associated with higher triglycerides and fatty acids levels compared with caesarean section [4].

The mechanism of significant elevation of Tch and LDL-C in the serum of maternal with NVD and in their umbilical cord of the present study is unknown to us and may need for future investigation.

## CONCLUSION:

The results of this study confirmed that the mode of delivery,particularly normal vaginal delivery(NVD),has a significant effect on biochemical parameters of pregnant women postpartumly,mainly those related to lipid profile.Such alteration makes the need for attention and carefully care of those mothers with NVD and their neoborns after delivery necessary.

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