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Determination of Serum Cholesterol Levels as Indicator of Preterm Delivery

Krishna Sinha[1], Anjoo Anupama[2]

[1]Assistant Professor, Department of Obs & Gynae, Jawaharlal Nehru medical College, Bhagalpur.
[2]Tutor, Department of Microbiology, Jawaharlal Nehru Medical College, Bhagalpur.

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ABSTRACT

Background: Preterm delivery is one of the main causes of perinatal morbidity and mortality. Many studies have investigated associations between maternal lipid levels during pregnancy and risk for preterm birth. Hence; the present study was undertaken for determining the efficacy of serum cholesterol levels as indicator of preterm delivery. **Methods:** A total of 100 pregnant subjects within the age group of 20 to 35 years were enrolled in the present study. Complete clinical and past medical history was also recorded separately. All antenatal mothers were subjected for serum cholesterol estimation from the overnight fasting blood samples. Estimation of total serum cholesterol was done by automated enzymatic method. Follow-up records were maintained and subjects were divided on the basis of time of delivery; Pre-term delivery and term delivery. **Results:** Among 10 patients with high serum cholesterol levels, 6 patients had pre-term delivery while the remaining 4 patients had term delivery. Among 74patients with normal serum cholesterol levels, 3 patients had pre-term delivery while the remaining 71 patients had term delivery. Among 16 patients with low serum cholesterol levels, 3 patients had pre-term delivery while the remaining 13 patients had term delivery. Significantly higher incidence of pre-term delivery was observed among subjects with high levels of serum cholesterol levels. **Conclusion:** High maternal serum cholesterol is significantly associated with increased risk of occurrence of preterm birth.

Keywords: Delivery, Preterm, Serum cholesterol.

INTRODUCTION

In the era of modern obstetrics where there has been a rapid advancement in all specialties, preterm labor remains an enigma for the obstetricians today. Preterm delivery is one of the main causes of pre- and postnatal morbidity and mortality. Preterm delivery accounts for 75-90% of neonatal and prenatal mortalities and serves as the main cause of short- and long-term neonatal defects. About 13 million spontaneous preterm deliveries occur around the world each year. Normal human pregnancy results in a pronounced physiological hypertriglyceridemia involving a gestational rise in blood triglycerides (TGL) and cholesterol.[4-6] Many studies have investigated associations between maternal lipid levels during pregnancy and risk for preterm birth, although the lipid components and magnitude of associations have been inconsistent across studies. One previous study investigated the association between dyslipidemia, as defined by lipid levels in prenatal screening, and found increased risks for preterm birth with mid-trimester hyperlipidemia in combination with elevated levels of tumor necrosis alpha.[7-9]

Hence; under the light of above mentioned data, the present study was undertaken for determining the efficacy of serum cholesterol levels as indicator of preterm delivery.

Name & Address of Corresponding Author
Dr. Anjoo Anupama
Tutor,
Department of Microbiology,
Jawaharlal Nehru Medical College,
Bhagalpur. 812001.

MATERIALS & METHODS

The present study was conducted in the department of obstetrics and gynaecology of Jawaharlal Nehru Medical College and Hospital, Bhagalpur. It included determination of the efficacy of serum cholesterol levels as indicator of preterm delivery. Ethical approval was obtained from institutional ethical committee and written consent from all the patients after explaining in detail the entire research protocol. A total of 100 pregnant subjects within the age group of 20 to 35 years were enrolled in the present study. Exclusion criteria for the present study included:

- Hypertensive subjects,
- Diabetic subjects,
- Subjects with positive previous preterm delivery history,
- Subjects with presence of any other systemic illness

Complete demographic details of all the patients were obtained. Complete clinical and past medical history was also recorded separately. All antenatal mothers were subjected for serum cholesterol estimation from the overnight fasting blood samples. Estimation of total serum cholesterol was done by automated enzymatic method. Follow-up records were maintained and subjects were divided on the basis of time of delivery; Pre-term delivery and term delivery. All the results were recorded and Chi-square test was used for assessment of level of significance. P- value of less than 0.05 was taken as significant.

RESULTS

Table 1: Demographic and clinical profile

Parameter		Number
Age group (years)	Less than 25	28
	25 to 30	46
	More than 30	26
Gravida	Primigravida	23
	Multigravida	77
Mean BMI (Kg/m2)		26.8
Mode of delivery	Vaginal	39
	Cesarean	61

In the present study, a total of 100 subjects were analyzed. Among these 100 subjects, 28 subjects belonged to the age group of less than 25 years. 46 subjects belonged to the age group of 25 to 30 years. 26 subjects were of more than 30 years of age. 77 subjects were of multigravida, while the remaining 23 patients were of primigravida. Mean BMI of the patients of the present study was 26.8 Kg/m2. Mode of delivery in 61 percent of the cases was cesarean while mode of delivery in 39 percent of the cases was vaginal.

In the present study, among 10 patients with high serum cholesterol levels, 7 patients had pre-term delivery while the remaining 4 patients had term delivery. Among 71 patients with normal serum cholesterol levels, 3 patients had pre-term delivery while the remaining 71 patients had term delivery. Among 16 patients with low serum cholesterol levels, 3 patients had pre-term delivery while the remaining 13 patients had term delivery. Therefore; significantly higher incidence of pre-term delivery was observed among subjects with high levels of serum cholesterol levels.

Table 2: Association of serum cholesterol levels with occurrence of pre-term delivery

Serum cholesterol levels	Delivery		Total	p- value
	Pre-term (Less than 37 weeks gestational age)	Term (More than 37 weeks gestational age)		
High	6	4	10	0.001 (Significant)
Normal	3	71	74	
Low	3	13	16	
Total	12	88	100	

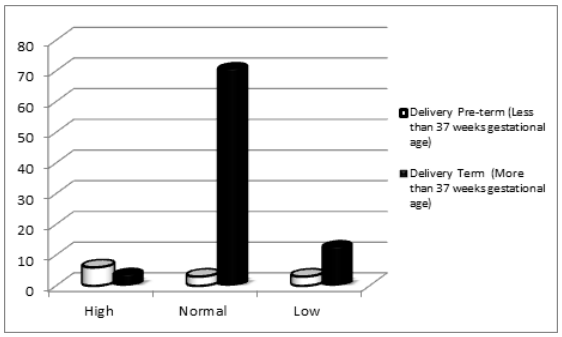

Figure 1: Association of serum cholesterol levels with occurrence of pre-term delivery

DISCUSSION

Preterm birth (PTB) is the most common perinatal complication. PTB is the leading cause of perinatal morbidity and mortality, and rates have increased for 2 decades. There is intriguing epidemiological evidence that women who deliver preterm infants are at increased risk later in life for cardiovascular disease (CVD). Large registry-based observational studies have reported that women who delivered a preterm infant after pregnancies with or without preeclampsia had a 2- to 11-fold higher risk for cardiovascular death compared with those who delivered at term.[7-9]

In the present study, a total of 100 subjects were analyzed. Among these 100 subjects, 28 subjects belonged to the age group of less than 25 years. 46 subjects belonged to the age group of 25 to 30 years. 26 subjects were of more than 30 years of age. 77 subjects were of multigravida, while the remaining 23 patients were of primigravida. Mean BMI of the patients of the present study was 26.8 Kg/m2. Mode of delivery in 61 percent of the cases was cesarean while mode of delivery in 39 percent of the cases was vaginal. Oluwole AA et al assessed whether low maternal serum cholesterol during early pregnancy is associated with preterm delivery. It was a prospective observational cohort study involving pregnant women at gestational age of 14-20 weeks over a period of 12 months. Blood samples were obtained to measure total serum cholesterol concentrations and the sera were then analysed enzymatically by the cholesterol oxidase: paminophenazone (CHOD PAP) method. The study showed an incidence of 5.0% for preterm delivery in the low risk study patients. Preterm birth was 4.83times more common with low total maternal cholesterol than with midrange total cholesterol.

Low maternal serum cholesterol (hypocholesterolaemia) is associated with preterm delivery.[10]

Maternal cholesterol is essential for both the hormonal and physical changes of early pregnancy. Circulating low-density lipoprotein cholesterol is the chief substrate for placental progesterone biosynthesis. Even though some longitudinal studies have documented that total cholesterol increases substantially during the second and third trimesters of pregnancy, it is still presently not known whether optimal levels of maternal serum cholesterol during pregnancy can be defined. This physiologic hypercholesterolemia of later pregnancy suggests an adaptive function for pregnancy maintenance or fetal growth.[8-10]

In the present study, among 10 patients with high serum cholesterol levels, 7 patients had pre-term delivery while the remaining 4 patients had term delivery. Among 71 patients with normal serum cholesterol levels, 3 patients had pre-term delivery while the remaining 71 patients had term delivery. Among 16 patients with low serum cholesterol levels, 3 patients had pre-term delivery while the remaining 13 patients had term delivery. Therefore; significantly higher incidence of pre-term delivery was observed among subjects with high levels of serum cholesterol levels. Maymunah AO et al determined the association between elevated maternal serum cholesterol level in pregnancy and adverse pregnancy outcome. It was a prospective observational cohort study in which eligible participants were enrolled at gestational age of 14 to 20 weeks. The incidences of the two adverse pregnancy outcomes examined in the study (preterm births and low birth weight (LBW) in term neonates) were 8.0% and 14.4% respectively. Preterm birth was 6.89-times more common in mothers with high cholesterol than in control mothers with normal total cholesterol level (38.5% versus 5.4%, P=0.029) while LBW was 7.99-times more common in mothers with high total maternal cholesterol than in mothers with normal cholesterol (87.5% versus 10.5%, P=0.019). They inferred that the high maternal serum cholesterol (hypercholesterolaemia) is associated with preterm delivery/ low birth weight (LBW) in term infants.[11] Finding by Catov and coworkers showed that an elevation in maternal cholesterol level early in gestation was associated with an increased risk of preterm delivery.[12] LBW was reported to occur in 14.4% of the term born infants in a study conducted by Maymunah AO et al.[11] This prevalence is slightly higher than the estimate of 10.0% reported by UNICEF among full term new born infants in developing countries but it's within the incidence of 6–21% reported by Lawoyin et al.[13,14]

CONCLUSION

Under the light of above obtained results, the authors conclude that high maternal serum cholesterol is significantly associated with increased risk of occurrence of preterm birth. However; further studies are recommended.

REFERENCES

1. Henson MC, Shi W, Greene SJ, Reggio BC. Effects of pregnant human, non-pregnant human and fetal bovine sera on human chorionic gonadotropin, estradiol, and progesterone release by cultured human trophoblast cells. Endocrinology. 1996;13:2067–74.
2. Sen A, Ghosh PK, Mukherjea M. Changes in lipid composition and fluidity of human placental basal membrane and modulation of bilayer protein functions with progress of gestation. Mol Cell Biochem. 1998;187:183–90.
3. Chatzi L, Plana E, Daraki V, Karakosta P, Alegkakis D, Tsatsanis C, et al. Metabolic syndrome in early pregnancy and risk of preterm birth. American journal of epidemiology. 2009;170(7):829–36.
4. Niromanesh S, Shirazi Mahboobeh, Dastgerdy E, Sharbaf FR, Shirazi M, Khazaeipour Z. Association of hypertriglyceridaemia with pre-eclampsia, preterm birth, gestational diabetes and uterine artery pulsatility index. Natl Med J India. 2012; 25 : 265-267 .
5. Alleman Brandon W, Smith Amanda R, Byers Heather M, Bedell Bruce, Ryckman Kelli K, Murray Jeffrey C, Borowski Kristi S. A proposed method to predict preterm birth using clinical data, standard maternal serum screening, and cholesterol. American journal of obstetrics and gynecology. 2013; 208 : 472. e1-472. e11 .
6. Knopp RH, Warth MR, Charles D, Childs M, Li JR, Mabuchi H, et al. Lipoprotein metabolism in pregnancy, fat transport to the fetus, and the effects of diabetes. Biol Neonate. 1986;50:297–317.
7. Woollett LA. Maternal cholesterol in fetal development: Transport of cholesterol from the maternal to the fetal circulation. Am J Clin Nutr. 2005;82:1155–61.
8. Emet T, Ustuner I, Guven SG, Balik G, Ural UM, Tekin YB, et al. Plasma lipids and lipoproteins during pregnancy and related pregnancy outcomes. Archives of gynecology and obstetrics. 2013;288(1):49–55. pmid:23400357
9. Jelliffe-Pawlowski LL, Ryckman KK, Bedell B, O'Brodovich HM, Gould JB, Lyell DJ, et al. Combined elevated midpregnancy tumor necrosis factor alpha and hyperlipidemia in pregnancies resulting in early preterm birth. American journal of obstetrics and gynecology. 2014;211(2):141.e1–9.
10. Oluwole AA, Adegbesan-Omilabu MA, Okunade KS. Preterm delivery and low maternal serum cholesterol level: Any correlation?. Niger Med J. 2014;55(5):406–410.
11. Maymunah AO1, Kehinde O1, Abidoye G2, Oluwatosin A3. Hypercholesterolaemia in pregnancy as a predictor of adverse pregnancy outcome. Afr Health Sci. 2014 Dec;14(4):967-73.
12. Catov JM, Newman AB, Kelsey SF, Suton-Tyrell K, Harris TB, et al. Preterm delivery and later maternal cardiovascular disease risk. Epidemiol. 2007;18:733–739.
13. UNICEF, author. The State of the World's Children. United Nations Children's Fund; 2000.
14. Lawoyin TO, Oyediran ABO. A Prospective Study on some Factors which Influence the Delivery of Low Birth Weight Babies in a Developing Country. Afr J Med Sci. 1992;21(1):33–39.

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