Original Research Article

EFFICACY EVALUATION OF SERUM CHOLESTEROL LEVELS AS INDICATOR OF PRETERM DELIVERY AT A TERTIARY CARE HOSPITAL

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A B S T R A C T

Aim: Preterm delivery is a significant contributor to perinatal morbidity and mortality, prompting numerous studies to explore the associations between maternal lipid levels during pregnancy and the risk of preterm birth. Consequently, the present study aims to evaluate the potential of serum cholesterol levels as an indicator of preterm delivery.

Materials & Methods: A total of 100 subjects were enrolled. Complete demographic and clinical details of all the subjects was obtained. Only those subjects were included which had gestational age of between 14 weeks to 20 weeks. All the results were analyzed using SPSS software. Univariate analysis was done using SPSS software.

Results: A total of 100 subjects were enrolled. Among these 100 subjects, preterm delivery was seen in 21 percent of the patients while in term delivery was seen in 79 percent of the patients. Mean serum cholesterol levels among preterm and term delivery was 298 mg/dl and 214.9 mg/dl respectively. Mean serum cholesterol levels were significantly higher among patients with preterm delivery.

Conclusion: Preterm delivery is linked to higher levels of cholesterol in the maternal serum.

Keywords: Cholesterol, Labor, Pregnancy.

INTRODUCTION

Preterm birth presents a significant challenge in perinatal healthcare, accounting for a substantial percentage of deliveries and perinatal mortality worldwide. Preterm babies make up a significant portion of perinatal deaths highlighting the pressing issue. Additionally, preterm birth poses a risk for neurological impairment and disability, imposing emotional and social costs on families. Furthermore, providing care for preterm infants, who may require lengthy hospital stays, has considerable financial implications for healthcare services.[1,2]

The exact cause of preterm labor and delivery is complex and multifactorial, with some identifiable risk factors including premature rupture of membrane, multiple pregnancy, hypertensive disorders, infections, and lifestyle factors.[3] Effective screening and prevention of preterm birth is a crucial goal of antenatal care, as early identification of high-risk women allows for more intensive surveillance and interventions. However, understanding the mechanisms behind preterm delivery remains limited, hampering the development of effective predictive tests and preventive treatments. Notably, there is a need to investigate the association between preterm labor and basic biochemical functions of the body, such as cholesterol biosynthesis.[4,5]

Maternal cholesterol plays a critical role in the hormonal and physical changes of early pregnancy, influencing placental progesterone biosynthesis and transport functions, thereby impacting pregnancy maintenance.[6,7] Preterm delivery is a significant

contributor to perinatal morbidity and mortality, prompting numerous studies to explore the associations between maternal lipid levels during pregnancy and the risk of preterm birth. Consequently, the present study aims to evaluate the potential of serum cholesterol levels as an indicator of preterm delivery.

MATERIAL AND METHODS

The present study was conducted for evaluating the efficacy of serum cholesterol levels as indicator of preterm delivery. A total of 100 subjects were enrolled. Complete demographic and clinical details of all the subjects was obtained. Only those subjects were included which had gestational age of between 14 weeks to 20 weeks. All the subjects belonged to the age group of 20 to 34 years. Data collection was conducted using a structured interviewer-administered questionnaire. Fasting patients provided venous blood samples in the morning between 14- and 20-weeks' gestation for the measurement of total serum cholesterol concentrations. The samples were collected in lithium heparin specimen bottles and total cholesterol in serum was subsequently analyzed enzymatically. All the results were analyzed using SPSS software. Univariate analysis was done using SPSS software.

RESULTS

A total of 100 subjects were enrolled. Among these 100 subjects, preterm delivery was seen in 21 percent of the patients while in term delivery was seen in 79 percent of the patients. Mean serum cholesterol levels among preterm and term delivery were 298 mg/dl and 214.9 mg/dl respectively. Mean serum cholesterol levels were significantly higher among patients with preterm delivery.
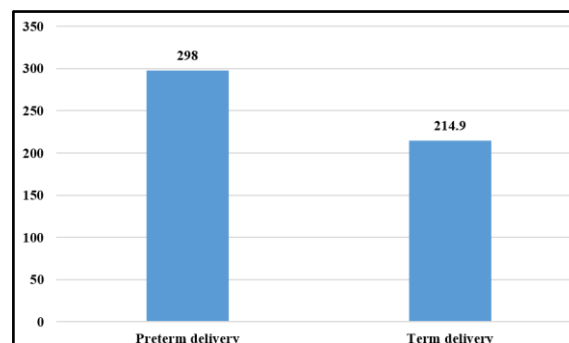

Figure 1: Comparison of serum cholesterol between preterm and term delivery

Table 1: Relationship of maternal serum cholesterol and preterm delivery

Serum cholesterol	Studied patients		p-value
	Preterm delivery	Term delivery	
Mean	298	214.9	0.001 (Significant)
SD	10.3	12.8	

Table 2: Incidence of high maternal serum cholesterol and preterm delivery

Serum cholesterol	Preterm delivery		Term delivery		p-value
	n	%	n	%	
High	15	71.4	29	36.7	
Mid-range	6	29.09	50	63.29	0.000 (Significant)
Total	21	100.00	79	100.00	

DISCUSSION

Preterm delivery, defined as birth occurring before 37 completed weeks of gestation, is a critical issue in perinatal healthcare due to its association with increased risks of perinatal morbidity and mortality.[8] Identifying reliable biomarkers that can predict preterm birth is essential for effective early intervention and improved outcomes for both the mother and the infant. Maternal lipid levels have emerged as a promising area of investigation in understanding the pathophysiology of preterm delivery. In particular, serum cholesterol levels during pregnancy have garnered attention for their potential role as indicators of preterm delivery risk. Cholesterol plays crucial roles in hormonal regulation, placental function, and fetal development, making it a plausible candidate for predicting adverse pregnancy outcomes.[9,10] Maternal cholesterol plays a vital role in facilitating the hormonal and physical changes that occur in early pregnancy. Low-density lipoprotein cholesterol, found in circulation, serves as the primary substrate for placental progesterone biosynthesis. While longitudinal studies have observed substantial increases in total cholesterol levels during the second and third trimesters of pregnancy, the definition of optimal maternal serum cholesterol levels during pregnancy remains unidentified. [11,12]

In our study a total of 100 subjects were enrolled. Among these 100 subjects, preterm delivery was seen in 21 percent of the patients while in term delivery was seen in 79 percent of the patients. Mean serum cholesterol levels among preterm and term delivery were 298 mg/dl and 214.9 mg/dl respectively. Mean serum cholesterol levels were significantly higher among patients with preterm delivery. Preterm delivery was associated with significantly higher incidence of hypercholesterolemia.

Catov and colleagues[13] demonstrated that an early elevation in maternal cholesterol levels during gestation correlated with an elevated risk of preterm delivery. Furthermore, a study by Maymunah AO et al[14] indicated that low birth weight (LBW) was observed in 14.4% of term-born infants. This prevalence slightly exceeds the 10.0% estimate reported by UNICEF [15] for full-term newborns in developing countries but falls within the reported incidence range of 6–21% as documented by Lawoyin et al. [16]

Potential mechanism of maternal hypercholesterolemia contributing to preterm birth. Excessive cholesterol from mother with hypercholesterolemia will be transported into placenta and accumulates in macrophages, which will increase inflammation response and consequently trigger preterm birth.[17]

CONCLUSION

Preterm delivery is linked to elevated levels of cholesterol in the maternal serum.

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