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# Evaluation of Umbilical Cord Abnormalities and Its Association with Perinatal Outcome

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**Abstract:** ***Background: Umbilical cord abnormalities (UCA) can compromise fetal blood flow and are associated with adverse maternal and perinatal outcomes. Early antenatal detection may help reduce perinatal morbidity and mortality. Methods: This prospective observational study was conducted in the Department of Obstetrics and Gynecology, Saraswathi Institute of Medical Sciences, Hapur, from April 2024 to October 2024. A total of 30 antenatal women between 20–28 weeks of gestation meeting inclusion criteria were enrolled. Umbilical cord abnormalities were assessed sonographically using the umbilical coiling index and confirmed postnatally. Maternal complications, fetal outcomes, mode of delivery, Apgar score, and NICU admissions were recorded. Results: Umbilical cord abnormalities were detected in 32% of cases. These abnormalities were associated with an increased incidence of lower segment caesarean section, low Apgar scores at 1 minute, and higher NICU admissions. Conclusion: Umbilical cord abnormalities are significantly associated with adverse perinatal outcomes. Antenatal detection and vigilant intrapartum monitoring can help improve maternal and neonatal outcomes.***

**Keywords:** Umbilical cord abnormalities; Umbilical coiling index; Perinatal outcome; Low Apgar score; NICU admission; Lower segment caesarean section

## 1. Introduction

The umbilical cord is a vital structure for fetal growth and wellbeing. At term gestation, it measures approximately 50–60 cm in length and contains two arteries and one vein embedded in Wharton's jelly, arranged in a helical fashion. Normally, the cord completes about 10–11 coils between the fetal and placental insertion sites.

Umbilical cord abnormalities refer to structural or functional alterations that may compromise fetal blood flow. These abnormalities have been associated with adverse pregnancy outcomes such as stillbirth, birth asphyxia, emergency caesarean section, and neonatal morbidity. While some abnormalities like nuchal cord are common, others such as true knots, cord prolapse, and abnormal coiling are rare but clinically significant.

## 2. Aims and Objectives

### Aim

To evaluate umbilical cord abnormalities and their association with perinatal outcome.

### Objectives

- To study umbilical cord abnormalities detected on antenatal ultrasound between 20–28 weeks of gestation.
- To study maternal complications associated with umbilical cord abnormalities.
- To study fetal complications in pregnancies with umbilical cord abnormalities.
- To confirm sonographically detected umbilical cord abnormalities after delivery.
- To study neonatal outcomes associated with umbilical cord abnormalities.

## 3. Materials and Methods

**Study Design:** Prospective observational study

**Study Period:** April 2024 to October 2024

**Study Setting:** Department of Obstetrics and Gynecology, Saraswathi Institute of Medical Sciences, Hapur

**Sample Size:** 30 antenatal women

### Inclusion Criteria

- Gestational age between 20–28 weeks
- Singleton pregnancy
- Willingness for institutional delivery

### Exclusion Criteria

- Multiple pregnancy
- Fetal anomalies
- Malpresentations
- Inadequate visualization of umbilical cord
- Known medical disorders such as hypertension, diabetes mellitus, heart disease, or hypothyroidism

## 4. Methodology

The umbilical coiling index (UCI) was calculated sonographically using a 3.5 MHz transabdominal transducer. The index was calculated using the formula proposed by Degani et al.:
UCI = 1 / distance between two successive coils (cm)

Follow-up ultrasound was performed at 34–36 weeks. Postnatally, the umbilical cord length and number of coils were recorded, and UCI was calculated. Maternal complications, mode of delivery, Apgar score, and NICU admissions were documented.

## 5. Results

Out of 30 cases studied, umbilical cord abnormalities were detected in 32% of patients, while 68% had normal umbilical

cords. The maximum number of cases belonged to the age group of 26–30 years.

Umbilical cord abnormalities showed a significant association with increased rates of lower segment caesarean section, low Apgar score at 1 minute, and higher NICU admissions.

## 6. Discussion

The present study demonstrates a significant association between umbilical cord abnormalities and adverse perinatal outcomes. The findings are consistent with previous studies that reported increased operative delivery, low Apgar scores, and neonatal morbidity in the presence of abnormal umbilical cords.

The average umbilical cord length in this study was comparable with earlier studies by Blanc WA, Malpas P, and Nilesh UB et al. Hypocoiling was notably associated with preeclampsia, supporting the hypothesis that reduced coiling decreases the elastic property of the cord, making it more vulnerable to vascular compromise.

## 7. Conclusion

Umbilical cord abnormalities are significantly associated with adverse maternal and perinatal outcomes, including increased caesarean section rates, low Apgar scores, and NICU admissions. Antenatal detection of cord abnormalities can aid in risk stratification and improved intrapartum management. Further research is required to develop better antenatal diagnostic tools to reduce perinatal morbidity and mortality.

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