Section: OBG

Original Research Article

EVALUATION OF PRESENCE OF NUCHAL CORD AT ONSET OF LABOUR AND ITS EFFECT ON MODE OF DELIVERY AND PERINATAL OUTCOME – A PROSPECTIVE STUDY

Vandana Jha[1], Rajni Kumari[2], Mir Sundus Firdous[3], Renu Jha[4]

[1]Associate Professor, Department of OBG, Madhubani medical college, Bihar, India
[2]Senior Resident, Department of OBG, Madhubani medical college, Bihar, India
[3]Junior Resident, Department of OBG, Madhubani medical college, Bihar, India
[4]Professor, Department of OBG, Madhubani medical college, Bihar, India

Received : 10/04/2026
Received in revised form : 01/06/2026
Accepted : 14/06/2026

Keywords:
Nuchal Cord, Labour, Mode of Delivery, Perinatal Outcome.

Corresponding Author:
Dr. Rajni Kumari,
Email: doctorrajnisingh@gmail.com

DOI: 10.47009/jamp.2026.8.4.307

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2026; 8 (4); 1810-1813

ABSTRACT

Background: The World Health Organization (WHO) published a document on antenatal care in order to achieve more positive perinatal and maternal outcomes following an increasing maternal mortality rate all over the world. The aim of this study was to evaluate whether the presence and characteristics of an NC negatively impact perinatal outcomes at the time of delivery. **Materials and Methods:** The current study was carried out by the Department of Obstetrics and Gynaecology, Madhubani Medical College & Hospital, Bihar over a period of 1 year by collecting data during the or assistance of pregnant women, from October 2024 to September 2025. The participants were divided into two groups according to the presence or absence of a nuchal cord. All singleton pregnancies with a gestational age ≥ 37 weeks undergoing vaginal, instrumental, or cesarean section were included in the study. An NC was considered to be the presence of at least one loop of cord wrapped 360° around the fetal neck at the time of cephalic pole extraction by vaginal delivery or cesarean section. Multiple NCs were defined as the presence of two or more loops. The institutional protocol does not include routine ultrasound screening for an NC at any time during prenatal care. **Result:** A total of 150 cases were included in the study after considering all the inclusion and exclusion criteria. Among the included cases, 112 (74.7%) had no NC at delivery and 38 (25.3%) had an NC. Among the cases with an NC, 36 (94.7%) had only one cord loop and 2 (5.3%) had more than one loop. Among all the cases, 31 (81.6%) had a loose NC and 07 (18.4%) had a tight NC. **Conclusion:** The presence of a tight NC at delivery is significantly associated with an increased risk of an Apgar score < 7 at the 1st minute. An Apgar score < 7 at the 1st minute is generally associated with intrapartum asphyxia and, when persisting at the 5th minute, with neonatal neurological sequelae. This finding is consistent with the literature, which suggests umbilical cord compression as a cause of temporary decreased fetal oxygenation, resulting in lower Apgar scores immediately after birth.

INTRODUCTION

The World Health Organization (WHO) published a document on antenatal care in order to achieve more positive perinatal and maternal outcomes following an increasing maternal mortality rate all over the world.[1,2] To this end, recommendations were made for the prevention and early detection of specific conditions related to pregnancy. A secondary analysis of the WHO antenatal care guidelines suggested that the increase in perinatal mortality was likely due to an increase in the number of stillbirths.[2-4] Therefore, quality medical care during the perinatal period can provide better maternal–fetal outcomes and thereby reduce morbidity and mortality in this group.

The term 'nuchal cord' refers to the umbilical cord wrapped 360° around the fetal neck.[5] There may be one 360° turn or more than one, characterizing two or more cord loops. It is classified as either a loose NC that can be manually disengaged before the fetal head is detached during delivery, or a tight NC if it cannot be manually disengaged, requiring the umbilical cord to be clamped and cut.[6] The presence of an NC may be noted during prenatal ultrasound or even during delivery. The prevalence of a tight NC is observed in

ISSN (O): 2687-5365; ISSN (P): 2753-6556

6.6% of live births, while a loose NC is observed in 21.6%.[7] Therefore, it is necessary to determine whether or not the presence of an NC adversely affects perinatal outcomes to guide clinical decision-making and prevent possible complications.

Although the presence of an NC is frequently observed during delivery, the establishment of a clear cause-and-effect relationship between the cord around the fetal neck and adverse perinatal outcomes remains a subject of debate. Studies suggest that an NC is not significantly associated with increased perinatal mortality—with similar outcomes observed in births with and without an NC.[8] However, studies report associations between a tight NC and complications such as non-reassuring fetal heart rate patterns, increased rates of operative delivery, and neonatal intensive care unit (NICU) admissions.[7] Nevertheless, association does not imply causation. Confounding variables, including labor duration, fetal positioning, and obstetric interventions, may influence these outcomes. Additionally, no significant link has been found between NC presence and long-term cardiovascular or respiratory morbidity in offspring.[8] However, an NC can be associated with adverse outcomes during delivery, including higher rates of emergency cesarean sections, preterm births, and consequently, increased risk of intraventricular hemorrhage and retinopathy of prematurity.[7]

Multiple NC loops, particularly three or more, have been linked to more severe complications such as intrauterine fetal death, growth restriction, and low Apgar scores.[8,9] While an NC can cause abnormalities in umbilical cord gases,[10,11] and lead to complications during labor,[4] most fetuses can compensate for transient reductions in umbilical blood flow, resulting in successful deliveries.[12] Additionally, multiple umbilical cord loops, compared with single loops or no loops, are associated with an increased risk of adverse neonatal outcomes, such as low Apgar scores and fetal acidosis.[13]

The aim of this study was to evaluate whether the presence and characteristics of an NC negatively impact perinatal outcomes at the time of delivery.

MATERIALS AND METHODS

The current study was carried out by the Department of Obstetrics and Gynaecology, Madhubani Medical College & Hospital, Bihar over a period of 1 year by collecting data during the or assistance of pregnant women, from October 2024 to September 2025. The participants were divided into two groups according to the presence or absence of a nuchal cord. All singleton pregnancies with a gestational age ≥ 37 weeks undergoing vaginal, instrumental, or cesarean section were included in the study. The gestational age was confirmed by a first-trimester ultrasound. Exclusion criteria were (1) fetal malformations and chromosomal abnormalities diagnosed by ultrasound or clinically after delivery; (2) the absence of documentation on the presence or absence of an NC at the time of delivery; and (3) the absence of umbilical cord blood gas analysis in the medical records, which precluded the evaluation of acid–base status regardless of NC status.

An NC was considered to be the presence of at least one loop of cord wrapped 360° around the fetal neck at the time of cephalic pole extraction by vaginal delivery or cesarean section. Multiple NCs were defined as the presence of two or more loops. The institutional protocol does not include routine ultrasound screening for an NC at any time during prenatal care. In addition, no specific management is planned if an NC is diagnosed before delivery. Epidural analgesia for pain relief or cesarean section is indicated whenever clinically necessary.

The following variables were assessed: age, ethnicity, body mass index (BMI), number of pregnancies, number of previous deliveries, pre-existing medical conditions (high-risk pregnancy), gestational age at delivery, type of delivery, birthweight, duration of labor, Apgar score at the 1st minute, Apgar score at the 5th minute, presence of an NC, number of loops, and the presence of a loose or tight NC.

The following were considered adverse perinatal outcomes: Apgar score < 7 at the 1st minute, Apgar score < 7 at the 5th minute, meconium-stained amniotic fluid, need for oxygen therapy immediately after birth, neonatal intensive care unit admission, neonatal death within 48 h, and fetal death at delivery. The presence of at least one adverse perinatal outcome was considered a composite adverse outcome.

RESULTS

A total of 150 cases were included in the study after considering all the inclusion and exclusion criteria. Among the included cases, 112 (74.7%) had no NC at delivery and 38 (25.3%) had an NC. Among the cases with an NC, 36 (94.7%) had only one cord loop and 2 (5.3%) had more than one loop. Among all the cases, 31 (81.6%) had a loose NC and 07 (18.4%) had a tight NC. Pregnant women with an NC at delivery had fewer previous deliveries, a higher gestational age at delivery, and a lower Apgar score at the 1st minute. The presence of an NC had no effect on maternal age, BMI, the number of deliveries, birthweight, duration of labor, or Apgar score at the 5th minute. The presence of an NC was significantly associated with the mode of delivery. [Table 1]

The presence of an NC was not a significant predictor of an Apgar score < 7 at the 1st minute, an Apgar score < 7 at the 5th minute, meconium at birth, acidemia at birth, oxygen therapy, neonatal intensive care unit admission, neonatal death within 48 h, or composite adverse outcomes. There were no cases of fetal death at delivery. [Table 2]

ISSN (O): 2687-5365; ISSN (P): 2753-6556

Table 1: Table showing the presence of a nuchal cord according to maternal characteristics and the effect of a nuchal cord on perinatal outcomes

Patient characteristic	Nuchal cord around neck at the time of birth		P value <0.05 – Sig >0.05 – Non-sig
	Present 112/150	Absent 38/150	
Mean age (Years)	27.5 (17-36)	26.8 (18-37)	> 0.05
Mean BMI (kg/m2)	29.5 (19.8 – 39.6)	27.6 (20.4 – 33.9)	> 0.05
Mean gravida	3.5 (1-5)	3.4(1-4)	<0.05
High risk pregnancy	37.8%	40.8%	> 0.05
Mean gestational age (weeks)	39.8 (36.3-40.1)	38.7 (37.1-39.9)	<0.05
Normal vaginal delivery	62.6%	76.5%	> 0.05
Mean birth weight (gm)	2989.3	3176.4	> 0.05
Mean labor duration (minutes)	29.8	65.8	> 0.05
Mean Apgar score at 1st minute	8 (2-10)	9 (1-10)	<0.05
Mean Apgar score at 5th minute	9 (6-10)	9 (7-10)	> 0.05

Table 2: Risk of adverse perinatal outcomes according to the presence of a nuchal cord during delivery

Perinatal outcome	Nuchal cord around neck at the time of birth		Odd's ratio (95%CI)	P value <0.05 – Sig >0.05 – Non-sig
	Present 112/150	Absent 38/150		
Mean Apgar score at 1st minute	6.5%	4.3%	1.42 (0.51-3.21)	>0.05
Mean Apgar score at 5th minute	1.7%	0.1%	17.5 (0.8-343.1)	>0.05
Meconium stained liquor	12.1%	6.7%	3.2 (0.6 – 4.2)	>0.05
Oxygen therapy required	3.2%	3.1%	0.65 (0.1 – 2.1)	>0.05
NICU admission required	2.1%	2.5%	0.5 (0.2-3.8)	>0.05
Neonatal death within 48 hours	0.1%	Nil	-	>0.05
Fetal death	Nil	Nil	-	>0.05

DISCUSSION

The presence of a tight NC at delivery is significantly associated with an increased risk of an Apgar score < 7 at the 1st minute. An Apgar score < 7 at the 1st minute is generally associated with intrapartum asphyxia and, when persisting at the 5th minute, with neonatal neurological sequelae. This finding is consistent with the literature, which suggests umbilical cord compression as a cause of temporary decreased fetal oxygenation, resulting in lower Apgar scores immediately after birth.[11]

Pergialiotis et al,[13] in their systematic review, demonstrated a change in clinical outcome in the presence of an NC, highlighting the need for early ultrasound diagnosis aimed at planning appropriate perinatal management to minimize adverse outcomes. Zahedi-Spung et al,[14] analyzed 8580 cases and found an increased prevalence of an Apgar score < 7 at the 1st minute, associated with hypercapnia on cord blood gases in fetuses with an NC. The authors concluded that, despite these adverse outcomes, the presence of an NC did not alter perinatal morbidity and mortality. In our study, even in the absence of antenatal ultrasound screening, we did not observe an increased risk of adverse perinatal outcomes associated with the presence of an NC at delivery.

The effect of an NC on maternal and neonatal outcomes has been previously studied, but conclusions remain inconsistent. Maternal age does not seem to be significantly associated with the presence of an NC, although one study reported a slightly higher maternal BMI in cases involving vacuum-assisted deliveries.[15] Regarding parity, NCs have been linked to lower rates of nulliparity, suggesting that women with an NC may have had more previous deliveries.[15] Some studies have also associated NCs with lower birthweights, although this finding is not universally consistent across all research.[15-17] Hypotheses for these associations include the possibility that heavier or more multiparous women may experience altered intrauterine dynamics, potentially facilitating cord entanglement, and that lower birthweights might reflect subtle chronic hypoxia caused by intermittent cord compression. However, the absence of consistent findings suggests that NC formation is likely a random event related more to fetal mobility and cord length than to maternal characteristics or fetal growth. Consistent with the findings of previous researchers, our analysis showed no significant association between the presence of an NC and maternal age, BMI, parity, birthweight, the duration of labor, or the Apgar score at the 5th minute, reinforcing the hypothesis that an NC, in most cases, represents a benign finding without major clinical repercussions when appropriately managed during labor and delivery.

Schäffer et al,[16] conducted a retrospective cohort study involving 11,748 pregnant women with planned vaginal deliveries, including 9574 term and 2174 post-term deliveries. The incidence of an NC in term and post-term deliveries was 33.7% and 35.1%, respectively. Multiple NC loops were present in 5.8% of term and 5.5% of post-term deliveries. Meconium at birth was significantly increased only in cases of multiple NC loops in post-term deliveries. Apgar scores < 7 at the 5th minute and neonatal intensive care unit admission did not differ significantly between groups. An NC was associated with increased risks of fetal distress, meconium at birth, an Apgar score < 7 at the 5th minute and assisted ventilation < 30 min. In our study, however, the presence of an NC was not associated with adverse perinatal outcomes.

ISSN (O): 2687-5365; ISSN (P): 2753-6556

In our study, we did not evaluate other umbilical cord variables such as the umbilical cord coiling index (UCI). The current medical literature does not establish a clear association between umbilical cord coiling and fetal acidemia at birth. Atalla et al,[18] investigated the relationship between the morphological characteristics of the umbilical cord and the acid–base status of newborns and found correlations between umbilical venous pH and characteristics such as cord length and the number of vascular coils, but did not identify a direct relationship between cord coiling indexes and fetal acidemia. In a meta-analysis, Pergialiotis et al,[19] evaluated the UCI and its association with adverse pregnancy outcomes, including fetal acidemia. Although hypercoiled cords have been associated with fetal acidemia, the analysis suggests that further studies are needed to determine whether antenatal assessment of the UCI can be used routinely in clinical practice. The variability in the results regarding the presence of umbilical cord coiling and its morphology may be attributed to additional factors such as placental morphology and placental blood flow, which affect maternal–fetal gas exchange.[17]

The current medical literature provides evidence for the association between tight cord entanglement and low Apgar scores at the 1st minute. Zabit et al,[20] demonstrated that umbilical cord entanglement is significantly associated with Apgar scores < 7 at the 1st minute, with an OR of 1.21. This finding is supported by the meta-analysis by Pergialiotis et al,[19] who found an increased risk of low Apgar scores at the 1st minute in cases of cord entanglement, with a relative risk (RR) of 1.75. In addition, Schreiber et al,[9] reported that multiple NC entanglements, especially three loops, are associated with a higher incidence of Apgar scores < 7 at the 1st minute. These studies suggest that tight cord ties may lead to transient cord compression, resulting in temporary fetal hypoxia, which may negatively impact the initial Apgar score.

CONCLUSION

The presence of a tight NC at delivery is significantly associated with an increased risk of an Apgar score < 7 at the 1st minute. An Apgar score < 7 at the 1st minute is generally associated with intrapartum asphyxia and, when persisting at the 5th minute, with neonatal neurological sequelae. This finding is consistent with the literature, which suggests umbilical cord compression as a cause of temporary decreased fetal oxygenation, resulting in lower Apgar scores immediately after birth.

REFERENCES

1. Alkema L., Chou D., Hogan D., Zhang S., Moller A.B., Gemmill A., Fat D.M., Boerma T., Temmerman M., Mathers C., et al. Global, regional, and national levels and trends in maternal mortality between 1990 and 2015, with scenario-based projections to 2030: A systematic analysis by the UN Maternal Mortality Estimation Inter-Agency Group. Lancet. 2016;387:462–474.
2. Dowswell T., Carroli G., Duley L., Gates S., Gülmezoglu A.M., Khan-Neelofur D., Piaggio G. Alternative versus standard packages of antenatal care for low-risk pregnancy. Cochrane Database Syst. Rev. 2015;2015:CD000934.
3. Murlewska J., Sylwestrzak O., Poszwa P., Respondek-Liberska M. The effect of nuchal umbilical cord on fetal cardiac and cerebral circulation-cross-sectional study. J. Perinat. Med. 2021;49:590–595.
4. Abdallah A., Eldorf A., Sallam S., Ahmed S., Shawky M., Nawara M., El-Sayed M., Islam B., Abdelrahman R., Sabaa H., et al. Nuchal cord: Impact of umbilical artery Doppler indices on intrapartum and neonatal outcomes: A prospective cohort study. J. Matern. Fetal Neonatal Med. 2019;32:3367–3378.
5. Collins J.H., Geddes D., Collins C.L., De Angelis L. Nuchal cord: A definition and a study associating placental location and nuchal cord incidence. J. La. State Med. Soc. 1991;143:18–23.
6. Collins J.H., editor. Silent Risk: Issues About the Human Umbilical Cord. 2nd ed. Xlibris LLC; Bloomington, IN, USA: 2014.
7. Henry E., Andres R.L., Christensen R.D. Neonatal outcomes following a tight nuchal cord. J. Perinatol. 2013;33:231–234.
8. Masad R., Gutvirtz G., Wainstock T., Sheiner E. The effect of nuchal cord on perinatal mortality and long-term offspring morbidity. J. Perinatol. 2020;40:439–444.
9. Schreiber H., Daykan Y., Arbib N., Markovitch O., Berkovitz A., Biron-Shental T. Adverse pregnancy outcomes and multiple nuchal cord loops. Arch. Gynecol. Obstet. 2019;300:279–283.
10. 10.Jauniaux E., Ramsay B., Peellaerts C., Scholler Y. Perinatal features of pregnancies complicated by nuchal cord. Am. J. Perinatol. 1995;12:255–258.
11. Onderoğlu L.S., Dursun P., Durukan T. Perinatal features and umbilical cord blood gases in newborns complicated with nuchal cord. Turk. J. Pediatr. 2008;50:466–470.
12. Narang Y., Vaid N.B., Jain S., Suneja A., Guleria K., Faridi M.M., Gupta B. Is nuchal cord justified as a cause of obstetrician anxiety? Arch. Gynecol. Obstet. 2014;289:795–801.
13. Pergialiotis V., Fanaki M., Bellos I., Tzortzis A., Loutradis D., Daskalakis G. Evaluation of umbilical cord entanglement as a predictive factor of adverse pregnancy outcomes: A meta-analysis. Eur. J. Obstet. Gynecol. Reprod. Biol. 2019;243:150–157.
14. Zahedi-Spung L.D., Raghuraman N., Carter E.B., Cahill A.G., Rosenbloom J.I. Umbilical Artery Cord Gas Abnormalities in the Presence of a Nuchal Cord in Term Singleton Pregnancies: A Cohort Study. Am. J. Perinatol. 2024;41:853–858.
15. Schreiber H., Cohen G., Mevorach N., Shavit M., Kovo M., Biron-Shental T., Markovitch O. Is There an Added Neonatal Risk in Vacuum-Assisted Deliveries with Nuchal Cord? J. Clin. Med. 2022;11:6970.
16. Schäffer L., Burkhardt T., Zimmermann R., Kurmanavicius J. Nuchal cords in term and postterm deliveries—Do we need to know? Obstet. Gynecol. 2005;106:23–28.
17. Mastrobattista J.M., Hollier L.M., Yeomans E.R., Ramin S.M., Day M.C., Sosa A., Gilstrap L.C., 3rd Effects of nuchal cord on birthweight and immediate neonatal outcomes. Am. J. Perinatol. 2005;22:83–85.
18. Atalla R.K., Abrams K., Bell S.C., Taylor D.J. Newborn acid-base status and umbilical cord morphology. Obstet. Gynecol. 1998;92:865–868.
19. Pergialiotis V., Kotrogianni P., Koutaki D., Christopoulos-Timogiannakis E., Papantoniou N., Daskalakis G. Umbilical cord coiling index for the prediction of adverse pregnancy outcomes: A meta-analysis and sequential analysis. J. Matern. Fetal Neonatal Med. 2020;33:4022–4029.
20. Zabit R., Tirosh D., Benshalom-Tirosh N., Baumfeld Y., Hershkovitz R., Baron J. Impact of cord entanglement on perinatal outcome. Eur. J. Obstet. Gynecol. Reprod. Biol. 2024;299:163–166.

ISSN (O): 2687-5365; ISSN (P): 2753-6556