

CORRELATION OF UMBILICAL CORD LENGTH WITH FETAL OUTCOME; A STUDY OF 400 DELIVERIES.

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ABSTRACT

Background :

The umbilical cord is the lifeline of the fetus and one of the most important parts of the fetoplacental unit. Short cord length has been associated with delivery complications and adverse fetal outcomes.

Aims and objectives: To find out the correlation between umbilical cord length and fetal outcome.

Methodology :

This is a prospective study conducted in the Department of Obstetrics and Gynaecology of Government Medical College, Srikakulam from November 2022 to January 2023. All cases admitted in the labour room and fulfilling the inclusion and exclusion criterias were taken into the study. The length of umbilical cord was measured after delivery along with other parameters like sex, weight and length of new born, Apgar score and postnatal follow up. Statistical analysis was done using chi-square test and a value of $p < 0.05$ was considered statistically significant.

Results:

Short cord length was associated with low Apgar at 1 min and 5 min(p value 0.03) and lower birth weight of the new born(p value 0.03). Adverse perinatal outcomes like stillbirth and NICU admissions were more common in the short cord group (p value 0.02).

Conclusion :

The present study showed that there is a positive correlation between cord length and birth weight of the babies, the Apgar score at 1 and 5min, NICU admission and perinatal outcome.

Measurement of umbilical cord length offers an explanation when no apparent intrapartum complication is found for adverse perinatal outcome.

Keywords : Umbilical cord length, fetal outcome, Apgar score

Introduction:

The umbilical cord is considered as the lifeline of the fetus: “The baby’s life hangs by a cord”, as quoted by Ian Donald [1] tells us the importance of the umbilical cord. One of the most essential parts of the fetoplacental unit is the umbilical cord. Complete cord occlusion might lead to fetal demise while intermittent obstruction has been associated with brain damage in utero. Intrauterine compression effect and vasospasm are important factors in fetal distress.[2]

Suspected fetal distress or a failure of descent during labor is not uncommon. Often no valid explanation for such intrapartum complications is apparent. Certain complications associated with short or long umbilical cord may explain this enigma. Excessive short cords have been associated with a delay in second stage of labor, irregular fetal heart rate, placental abruption, rupture of cord, inversion of uterus, birth asphyxia, and cord herniation.[2] Likewise excessively long umbilical cords are associated with cord prolapse, torsion, true knot and delivery complications.[2]

Cord length at term has appreciable variability ranging from no cord (achordia) to lengths up to 300 cm. At birth, the mature cord is about 50–60 cm in length and 12 mm in diameter. A long cord is defined as more than 100 cm and a short cord less than 30 cm. There may be as many as 40 spiral twists in the cord, as well as false knots and true knots.[3] Short umbilical cords may be associated with adverse perinatal outcomes such as fetal growth restriction, congenital malformations, intrapartum distress, and a twofold risk of death.[2]

The intrapartum complications have been ascribed to variability in cord length, such as failure of descent of presenting part, prolonged labor, uterine inertia, placental abruption, fetal distress, and fetal death. There is usually no explanation for such intrapartum complications. Obstetricians often remain unaware of many fetal deaths and labor outcome, which eventually may be pinpointed to cord failure and its anomalies.[4]

Aims and objectives:

To find out the correlation between umbilical cord length and fetal outcome. To study the correlation of umbilical cord length with APGAR score, birth weight, length, NICU admission and mode of delivery.

Material and methods:

This prospective study was conducted in the Department of Obstetrics and Gynaecology of Government Medical College, Srikakulam from November 2022 till January 2023. The present study included 400 cases at random, admitted to labour room with period of gestation >37 weeks. The sample size is calculated using the formula $N = Z^2 p(1-p)/m^2$. N is the sample size, p is the population proportion, Z is the z-score and m is the margin of error.

Inclusion criterias :

- * 37 weeks - 41 weeks
- * Singleton pregnancy
- * Cephalic presentation
- * No medical disorders

Exclusion criterias :

- * Preterm labour
- * Multiple gestation
- * Malpresentation
- * Medical disorders like preeclampsia, GDM and anaemia.
- * Obstetric complications like APH, malpresentation
- * IUD

Methodology :

All cases admitted in the labour room and fulfilling the inclusion and exclusion criterias were taken into the study. Written and well informed consents were taken from the participants.

Length of umbilical cord was measured after delivery in two parts, from fetal end and placental end separately.

Following parameters were noted after the time of delivery.

1. Sex of the newborn.
2. Weight of the newborn
3. Length of newborn
4. Apgar score at 1 min and 5 min.
5. Need for NICU referral and admission.
6. Perinatal follow up.

Statistical analysis :

Data entry was done by using Microsoft Excel 2011 sheet and the statistical analysis performed. Analysis of the relationships between categorical data and groups was done using chi-square test. Correlations between variables were assessed using Spearman's correlation coefficient. A value of $p < 0.05$ was considered statistically significant.

Ethics:

The Institutional Ethics Committee of Government Medical College, Srikakulam approved the study. Well informed and written consents were obtained from all the participants.

Results:

This is a prospective study conducted in the Department of Obstetrics and Gynaecology, Government Medical College, Srikakulam from November 2022 to January 2023. In our study, the cord length varied from 20cm to 84 cm. The mean cord length was 51.5cm (+/- 11.66cm). Short cord (less than 30cm) was present in 22(5.5%) cases. (Table- 1)

Table- 1

	Frequency	Percent	Valid Percent	Cumulative Percent
Short cord	22	5.5	5.5	5.5

Normal cord	378	94.5	94.5	100.0
Total	400	100.0	100.0	

The incidence of short cord is 5.5% in this study. In the short-cord group of 22, 9 cases underwent LSCS(40.9%). In the normal cord group of 378 cases, 176 underwent LSCS(46.56%). Normal-cord group had more number of vaginal deliveries (53.54%) similar to the short-cord group (59.1%). There is no significant difference in the mode of delivery between the two groups. (Table- 2)

Table-2

Delivery mode	Frequency	Percent	Valid Percent	Cumulative Percent
LSCS in short cord cases	9	2.25	2.25	2.25
LSCS in normal cord cases	176	44	44	46.25
NvD in short cord cases	13	3.25	3.25	49.5
NVD in normal cord cases	202	50.5	50.5	100.0
Total	400	100.0	100.0	

Out of the 22 newborns in the short cord group, five were low birth weight babies (22.72%) whereas in the normal cord group, 59 out of 378 babies (15.6%) had low birth weight. (Table- 3) This is found to be statistically significant (P=0.003)

Table- 3

		length of cord		
		below normal	NORMAL	Total
Birth weight	LBW	5	59	64
	NORMAL	17	319	336
Total		22	378	400

Seventeen cases had normal APGAR at 1min and 5min even with short cord in comparison with 365 cases with normal cord length.

NICU admissions were seen in four out of 22 cases (18.18%) with short umbilical cord whereas 11 out of 378 (2.91%) babies were admitted in NICU with normal cord length. (Table- 4) This correlation was found to be statistically significant ($P=0.006$).

Table-4

		SHORT CORD		
			NORMAL CORD	Total
NICU	NO	18	367	385
	YES	4	11	15
Total		22	378	400

Out of 22 deliveries with short cord, one was stillborn and 4 were admitted in NICU. One baby out of the 4 died in the neonatal period. Out of 378 deliveries with normal cord length, 11 babies were admitted in NICU, all were stable in the post natal period. There were 4 stillbirths in the normal cord length group. The perinatal prognosis was poor in the short cord group with a statistically significant P value of 0.02.

DISCUSSION:

Mean umbilical cord length in the present study is comparable to mean umbilical cord length of other similar studies. The length of the umbilical cord has wide variation. Cord length varies between 0 [5] to 300 cm [6]. The average length of the cord is usually between 50 and 60 cm.[7] This study is comparable with the findings of Mishra et al,[8] where the average cord length was 50–60 cm, of Malpas[6] where cord length varied between 46 and 79cm.

In the present study, the relationship between umbilical cord and mother's age was not found to be statistically significant ($P>0.05$). Walker and Pye,[9] Adnima [10] and Wu et al [11] also did not find any correlation between maternal age and umbilical cord length. Thus the findings of the present study were similar to other authors' results.

In the study of Mishra et al. [8] criteria for short cord was <20 cm, long cord >100 cm, and control group between 50 and 60 cm. They also included the similar set of patients, i.e., full term from 38 to 40 weeks of gestation, and cases with maternal and fetal complications were excluded from the study. In present study, normal-cord group includes 31–84 cm, and hence both the studies are comparable.

Lamonica et al. [12] in their study of “minimum cord length to allow spontaneous vaginal delivery” mentioned that the uterine axis and birth canal are not so long as to impede spontaneous vaginal delivery when there is a short umbilical cord. They also stated that placental location has no difference except perhaps when the cord is excessively short.

In the present series, there is increased incidence of LSCS in short-cord group which is not statistically significant. There is an increased incidence of normal delivery in normal-cord group compared with short cord group. Similar results were found in the study by Algreisi F et al, where LSCS rate was higher in short cord group ($P<0.001$) than normal cord group.[13] Weiner et al reported that the rate of CS was higher among neonates with short cords.[14]

The present study has a positive correlation with umbilical cord length and birth weight ($P=0.003$). A Nigerian study of 1000 umbilical cords measured with both foetal and placental portions found a mean length of 51.5 cm. [10] There was a significant correlation with both infant and placental weight as well as continued increase in the mean until 42 weeks of gestation. [10] Kankhare et al in their study stated that cord length varies with birth weight, the relationship of cord length with birth weight is compared and concluded that cord length shows positive correlation with birth weight ($r=0.40$). [15]

The present study found positive correlation between umbilical cord length and APGAR score at 1 and 5min ($P=0.003$) and the need for NICU admission ($P=0.06$). Shrestha [16] studied Nuchal cord and perinatal outcome. Neonatal outcome was analyzed by Apgar score at 1 and 5 min and the need for neonatal unit admission. Apgar score <7 at 1 min was present in 24.78 % ($n = 29$) of newborns in study group and 14.68 % ($n = 58$) of newborns in control group, which was statistically significant ($P = 0.01$). On the other hand, Atalla et al. [17] found no relation between umbilical cord indices and intrapartum FHR decelerations, meconium staining of the amniotic fluid, or mode of delivery.

CONCLUSION:

The present study showed that the length of umbilical cord is variable; however, maximum number of cases had normal cord length. Cases which had short cord had more babies with low birth weight. The mode of delivery also varied. The cases which had short cord had increased operative interference and higher rate of Caesarean section than those with normal cord length.

There is a significant positive correlation between cord length and birth weight of the babies, the Apgar score at 1 and 5min, NICU admission and perinatal outcome than that of normal cord group. Thus the presence of short umbilical cord has a significant prognostic value in terms of delivery and perinatal outcomes.

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