

# LENGTH OF UMBILICAL CORD AND PERINATAL OUTCOME

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## ABSTRACT

**Objective:** To find out association between umbilical cord length and perinatal outcome.

**Methodology:** This cross sectional study was conducted on 3,300 women with singleton live fetus of 37-42 weeks of gestation, in spontaneous labour, admitted in Obstetrics and Gynaecology department of Lady Reading Hospital (LRH) Peshawar. Convenient sampling technique was used. Women with multiple pregnancy, preterm labour, induced labour and fetus with congenital anomalies were excluded. Length of umbilical cord was measured with flexible measuring tape. After delivery Apgar score of baby was noted at 1 and 5 minutes. Number of stillbirths, neonatal intensive care unit (NICU) admission and early neonatal deaths were noted to calculate perinatal outcome. Data analysis was done using SPSS version 22.

**Results:** The cord length varied from 40 -100 cm. Maximum cases had cord length between 51-60 cm (53.45 %). Both short and long cords were associated with increased incidence of fetal distress. Changes in fetal heart rate were 48 % in short cord group and 47 % in long cord group ( $p < 0.001$ ). Number of still births was high in short (11.29%) and long cord group (12.57%). Birth asphyxia with low Apgar score was significantly high in short (30.64%) and long cords (23.89%) compared to cords with normal length ( $p < 0.001$ ).

**Conclusion:** Extremes of cord lengths are associated with fetal heart rate abnormalities, birth asphyxia and poor perinatal outcome.

**Key Words:** Apgar score, Perinatal outcome, Umbilical cord

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## INTRODUCTION

Umbilical cord is the life line that attaches placenta to the fetus. Umbilical cord is made up of three blood vessels; two small arteries which carry blood to the placenta and a larger vein which returns blood to the fetus. It can grow from 40 to 300 cm long, allowing the baby to have enough cord to move safely without causing damage to the cord or the placenta. Umbilical cord has an important role in intra uterine life as a pathway between mother, placenta and fetus<sup>1</sup>. Though it is not fully understood what controls cord length, various authors correlate cord length with fetal activity and movements. It is suggested that space in the amniotic cavity for movement and tensile force applied to umbilical cord are the two main factors that determine cord length<sup>2</sup>. An umbilical cord length less than 40 cm is termed short. Short umbilical cords are uncommon. They occur in approximately 6% of pregnancies. The presence of short umbilical cord has been associated with antepartum fetal heart rate abnormalities and complications of labour and delivery<sup>3</sup>. Long cord, defined as cord length

of more than 70 cm is associated with nuchal cords, cord entanglement, true knot and cord prolapse. Antenatal diagnosis of umbilical cord abnormalities and nuchal cord is possible by color Doppler ultrasound. Three Dimensional ultrasound is also used to see cord entanglement and cord around the neck<sup>4</sup>. Comparison of three dimensional ultrasound and color Doppler ultrasound has shown that color Doppler sonography is more specific and sensitive in diagnosing nuchal cord in utero<sup>5</sup>. Doppler ultrasound can diagnose nuchal cord but length of umbilical cord can only be measured at the time of delivery. The objective of this study was to observe association of cord length with perinatal outcome in our setup as no such study has been conducted so far in Pakistan.

## METHODOLOGY

This study was conducted in Obstetrics and Gynaecology department of Lady Reading Hospital (LRH) Peshawar from January 2017 to December 2018. It was a cross sectional study which included 3,300 pregnant women between 37-42 weeks gestation. All of them

had singleton fetus, presented in spontaneous labour and delivered in our labour room. Women were enrolled with convenient sampling. Cases excluded from the study were preterm labour, multiple gestation, induced labour, pregnancy induced hypertension, diabetes mellitus and other maternal medical disorders. Fetuses with major congenital anomalies were also excluded. Labour progress was monitored on partogram. Fetal monitoring was done by intermittent auscultation during labour. All those women who showed abnormalities of fetal heart rate (FHR) were subjected to CTG to detect any pathological changes. Decreased baseline variability, persistent tachycardia, variable deceleration and late decelerations were taken as fetal distress and subjected to early intervention for delivery. Fetal blood sampling was not done due to lack of facility. Umbilical cord was thoroughly examined at the time of delivery for presence of loop around the neck (loose or tight), knots in the cord (true or false), cord insertion in the placenta whether central, eccentric, marginal or velamentous. Number of umbilical vessels was also documented. After the delivery of fetus, cord was clamped at two places and cut in the middle. Length was measured from the cut end up to fetal umbilicus and from the placental attachment to the cut end. These two measurements were added. Cord length was measured with a flexible tape in centimeters. Number of cases was divided into three groups. Short cord group included cases with length between 31- 40 cm , normal length from 41- 70 cm and long cord with length between 71-100 cm At the time of delivery, sex and weight of newborn baby was noted. Apgar score was taken at 1 and 5 min for fetal outcome. Perinatal outcome was found out by number of stillbirths and early neonatal deaths. Number of babies admitted to NICU were also documented.

Statistical analysis was done using SPSS Version 22. Chi square test was applied between short and long cord groups to find out p-value for significance. A p value of  $\leq 0.05$  was considered significant.

**RESULTS**

In our study, length of the cord varied between 40 –100 cm with mean length of  $56 \pm 9.01$ . Maximum cases ,1764 (53.45 %), were seen in the cord length between 51-60 cm, followed by 41-50 cm in 739 (22.39 %). cases Normal cord length included all the three groups from 41-70 cm, which counted for 3079 (93.30 %) cases. Three main groups are given in table 1 and 2. Nuchal cords were commonly seen in long cord group 351 (69.50 %). Number of Nuchal cord ranged between 1-3 as given in table 3. Nuchal cords resulted in fetal distress and increased operative deliveries. Cord prolapse occurred in 28 (0.9%) in normal cord length and 6 (3.7%) cases in long cord group.

Both short and long cords were associated with changes in fetal heart rate with frequency of 48 % and 47% with p value  $<0.001$  as shown in Table 4. Number of still births was high in short (11.29) and long cord (12.57%) groups. Birth asphyxia (Apgar score  $< 6$  or equal to 6 at 1 minute), was 30.64 % in short cord compared to long cord which was 23.89 %. Normal cord group showed birth asphyxia in only 68 (2.20 %) cases. Newborn babies with Apgar score  $<6$  were resuscitated in labour room and admitted in NICU if needed. Perinatal outcome is given in Table 5 and 6.

**DISCUSSION**

Mean cord length in our study was  $56 \pm 9.01$ cm which is similar to studies by Georgiadis L and Elarbah

**Table 1: No. of cases in three main groups of umbilical cord length**

	No.	%age
Short cord	62	1.9
Normal cord	3079	93.3
Long cord	159	4.80
Total	3300	100

**Table 2: Umbilical cord length in different groups**

	Cord length (cm)	%age	%age
Short cord	31-40 cm	62	1.9
	41-50 cm	739	22.39
Normal length	51-60 cm	1764	53.45
	61-70 cm	576	17.45
	71-80 cm	125	3.78
Long cord	81-90 cm	26	0.78
	91-100	08	0.24

**Table 3: No. of nuchal cords and length of umbilical cord**

Cord length	No of Loops						Total	%age	P-value
	1		2		3				
	No	%age	No	%age	No	%age			
Long Cord	270	53.46	76	15.04	5	0.9	351	69.50	.474
Short	5	0.9	0	0.0	0	0.0	5	0.9	
Normal	108	21.38	21	4.15	20	3.96	149	29.50	

**Table 4: Fetal heart rate abnormalities in three groups**

Umbilical cord length	Normal		Brady cardia FHR < 110		Tachy cardia FHR > 160		P-value
	No.	%age	No.	%age	No.	%age	
Short <40 cm	32	51.61	21	33.87	09	14.51	<.001
Normal 41-70 cm	2555	82.98	309	10.03	215	6.98	
Long > 70 cm	83	52.20	63	39.62	13	8.17	
Total	2670		393		237		

**Table 5: Neonatal outcome**

Cord length	APGAR score < 6		Still Births		APGAR Score >6		P-value
	No	%age	No	%age	No	%age	
Normal	68	2.20%	67	2.17%	2944	95.61%	<.001
Short	19	30.64%	7	11.29%	36	58.06%	
Long	38	23.89%	20	12.57%	101	63.52%	
Total	125	3.78%	94	2.84%	3081	93.36%	

**Table 6: NICU admissions and early neonatal deaths**

Cord length	APGAR Score <6		NICU Admissions		Early Neonatal Deaths		P-value
	No	%age	No	%age	N	%age	
Normal	<b>68</b>	<b>2.20</b>	<b>38</b>	<b>1.23</b>	<b>12</b>	<b>0.38</b>	.94
Short	19	30.64	13	20.96	05	8.06	
Long	38	23.89	25	15.72	09	5.66	

et al.<sup>67</sup>. Largest group included 3079 cases in which cord length was between 41-70 cm. This was taken as normal length of umbilical cord. The incidence of cord prolapse varied between 0.2 - 0.6 % of births. Suzuki S showed that risk of complications increased as length of cord increased<sup>8</sup>. In our study, cord prolapse occurred in 6 (3.7%) cases of long cord group which is significant. It happened in cord length of 80-100 cm. In our study, frequency of nuchal cord was 15 % in long cord group which was higher than given in other studies<sup>9,10</sup>, but is less than that when compared to a study by Shiva Kumar which showed nuchal cord in 21 % cases in long cord group<sup>11</sup>. Number of nuchal cord cases also increased with length of cord. More number of nuchal cords were found in cord length of 80 cm (6.1%). Nuchal coiling was high in long cord group with 351 (69.50 %) cases out of 505 cases of total nuchal cords. Single loop of cord was seen in 53.46 % cases of long cord group

which is same as observed in other studies<sup>12</sup>. True knots in cord were found in 4 (0.79%) cases in this group. Fetal heart rate abnormalities were higher in both long and short cord group; 47 and 48 % respectively, as compared to 16.98% in normal cord length. Our results are comparable to study by Algreisi<sup>13</sup>. This shows that extremes of cord length had higher incidence of fetal heart rate abnormalities (P-value <.001) which was statistically significant<sup>14</sup>. In this study, total cases of birth asphyxia, i.e. Apgar score less than 6 at 1 minute, were seen in 125 cases. Out of these 15.20% cases were in short cord group and 30.64 % cases were in long cord group. These results are comparable to Indian study by Balk wade which showed birth asphyxia in 56.6% cases at extremes of cord lengths<sup>15</sup>.

Number of still births in normal length of cord was only 2.1%, compared to 11.29% in short cord and

12.57% in long cord group which is comparable to study by Soliriya and Tapasvi<sup>16,17</sup>. Extremes of cord lengths are associated with poor perinatal outcome compared to normal length<sup>18</sup>. The same results were observed in studies by Khadim et al. and Yamamoto et al.<sup>19</sup>.

## CONCLUSION

Foetal heart rate abnormalities, birth asphyxia and poor perinatal outcome are associated with extremes of cord lengths.

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## CONTRIBUTORS

TS conceived the idea, defined plan of project and drafted the manuscript. SSH did data collection, data entry and helped in writing up the study. TS also did statistical analysis of the study. RR critically revised the manuscript and supervised the study. All authors contributed significantly to the submitted manuscript.