

Original article:

To identify the relationship between Umbilical cord length and Birth weight , Amniotic fluid Index ,Perinatal outcome in term pregnancies- Study in a tertiary care Hospital of North India

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ABSTRACT

INTRODUCTION- The current study was planned to assess the relationship and effect of umbilical cord length with perinatal outcome, amniotic fluid volume, and see for any effect on the mode of delivery.

MATERIALS AND METHODS- The prospective consisted of 100 pregnant women who came to the Obstetrics and Gynaecology Department at the Guru Gobind Singh Medical College and Hospital, Faridkot from January 2017 to July 2017. Detailed clinical assessment of these patients was done along with USG and routine obstetric lab tests followed by thorough examination of Umbilical cord, placenta and fetal weight after delivery and assessment of neonatal APGAR score.

RESULTS- The mean and Standard Deviation (SD) of Umbilical Cord Length were 49.1 ± 10.21 cm (range 30-83 cm). There was significant difference in Umbilical cord length in normal babies and those with low APGAR score. Association of cord length with AFI, Birth weight and gender of baby were also seen with p values of less than .05.

CONCLUSION- In this study, we have found significant correlation of umbilical cord length with perinatal outcome, amniotic fluid volume and fetal birth weight. No significant association between umbilical cord length and mode of delivery was established.

Keywords- Umbilical cord, AFI, APGAR

INTRODUCTION

The umbilical cord connects the developing fetus with placenta in mammals and transfers the vital nutrients to the fetus through oxygenated blood via the umbilical vein and conducts the deoxygenated blood back from the fetus via the two umbilical arteries. There can be variations in the anatomy ,morphology of the umbilical cord which can in turn cause alterations in the fetal physiology and thus for the need of continuing further research in this subject to improve our understanding of the various complexities. Among the various morphological features of cord, the length of cord is an important aspect which plays a major role in defining perinatal outcome. Limited research has been done on this subject in India particularly in the western region of Punjab .Cord length increases with advancing gestational age¹. An average umbilical cord is 55 cm in length with a diameter of 1-2 cm² . A short cord <35 cm and a long cord >80 cm have been reported³.About 5% of cords are shorter than 35 cm and another 5 % are longer than 80 cm ⁴ . Many incidences of short and long umbilical cord have been noticed even though may not have been reported. Infants with excessively long umbilical cords are at risk of abnormal neurological follow-up¹.Although it is not fully understood what controls the cord length, various authors correlate cord length with fetal activity and movement. It is suggested that sufficient space in the amniotic cavity for the movement and the tensile force applied to the umbilical cord during movements are two main factors that determine the cord length^{3,4} .The current study was planned to assess the relationship and effect of umbilical cord length

with perinatal outcome ,amniotic fluid volume ,and to look for any effect on the mode of delivery.

MATERIALS AND METHODS

The prospective consisted of 100 pregnant women who came to the Obstetrics and Gynaecology Department at the Guru Gobind Singh Medical College and Hospital, Faridkot from January 2017 to July 2017. Recruitment for the study was done after informed consent. All eligible women were informed about the study using the patient information sheet after proper counseling in their own language .Detailed clinical assessment of these patients was done along with USG and routine obstetric lab tests followed by thorough examination of Umbilical cord ,placenta and fetal weight after delivery . Materials like measuring tapes, weighing scale and gloves were provided for the study. Umbilical cord was clamped about 5cms from the fetal attachment and immediately after removal of placenta, placental side of cord was measured and this was added to the fetal side cord length . In vaginal/caesarian deliveries ,the weight of baby was assessed by the weighing scale .Amniotic fluid was assessed by USG at term. Polyhydramnios⁵ was defined as amniotic fluid index value >24 at term pregnancy while Oligohydramnios⁶ was defined as an amniotic fluid index value < 5.APGAR SCORE <7 at 1 min were considered low ⁷ . Neonatal outcome was analyzed by Apgar score at 1 and 5 min and the need for neonatal unit admission. Result analysis was done using Pearson Correlation coefficient .

Inclusion Criteria

1.Term Gestation(37-42wks)

2. Singleton deliveries
3. Both caesarean and vaginal deliveries
4. Both normal and High Risk pregnancies

Exclusion Criteria

1. Preterm deliveries (<37 wks gestation) or prolonged pregnancies (>42 wks gestation)
2. Multifetal gestation
3. Intrauterine fetal deaths already diagnosed
4. Manual removal of placenta
5. Instrumental deliveries

RESULTS

A total of 100 cases were included in this study. Out of these, 39 cases were primigravida, 61 were multigravida. 9 had pre-eclampsia, 2 had heart disease, 2 had anaemia, 4 were in obstructed labour out of which 1 was forceps delivery. 2 cases had breech presentation. One case was of true knot in which cord length was maximum i.e. 83 cm. The mean and Standard Deviation (SD) of length of Umbilical Cord was 49.1 ± 10.21 cm (range 30-83 cm). In this study long umbilical cord was defined as umbilical cord measuring approx +1 SD above mean i.e. ≥ 59 cm in length (No. of Cases=15) while short umbilical cord was defined as measuring approx -1 SD below mean which is <38 cm (No. of Cases =16). Normal Range of cord length (39 -58 cm. No. of Cases=69).

The Mean & SD of Cord length in APGAR Score >7 (No. of Cases=56) was 51.25 cm and 8.15 cm respectively and in APGAR Score <7 (No. of Cases= 44) was 46.1 and 11.2 cm. There was significant difference in Umbilical cord length in normal babies and those with low APGAR score with p value of 0.012 (Table 1, Figure 1).

In this study the Mean and SD of umbilical cord length in normal amniotic fluid was 49.28 ± 9.5 cm (No. of Cases=61); in oligohydramnios was 44.88 ± 8.6 cm (No. of Cases =27) and in polyhydramnios was 56.75 ± 10.11 cm. Hence, there was significant difference in mean cord length of normal, oligohydramnios and polyhydramnios cases with p value of 0.002 (Table 1, Figure 2).

We divided the babies in three categories according to the birth weight which are as follows-Category 1: Birth weight 1.01-2 kg, Category 2: Birth weight 2.01-3 kg, Category 3: Birth weight 3.01-4 kg. We found out a significant difference ($p=0.038$) in Mean Cord Length of Categories 1, 2, 3. The Pearson Correlation coefficient of Birth weight & cord length was 0.298 with p value of 0.003, hence significant correlation (Table 1, Figure 3).

The Mean & SD of Cord Length of Male babies was 51 ± 9.6 cm and that of Female babies was 47.1 ± 9.7 cm. Hence, there was a significant difference ($p=0.023$) between Mean Cord Length of Male & Female babies (Table 1, Figure 4).

Few other observations were also made. The Mean & SD of cord length in Lower segment Caesarean Section (LSCS) cases (No. of Cases=44) is 49.6 ± 3.6 cm whereas in vaginal delivery (No. of Cases =56) is 48.5 ± 9.5 cm. There was no significant difference in Umbilical cord length with LSCS and normal vaginal deliveries as p value was > 0.05 (Table 1, Figure 5).

Figure 1-Relationship of cord length with APGAR Score

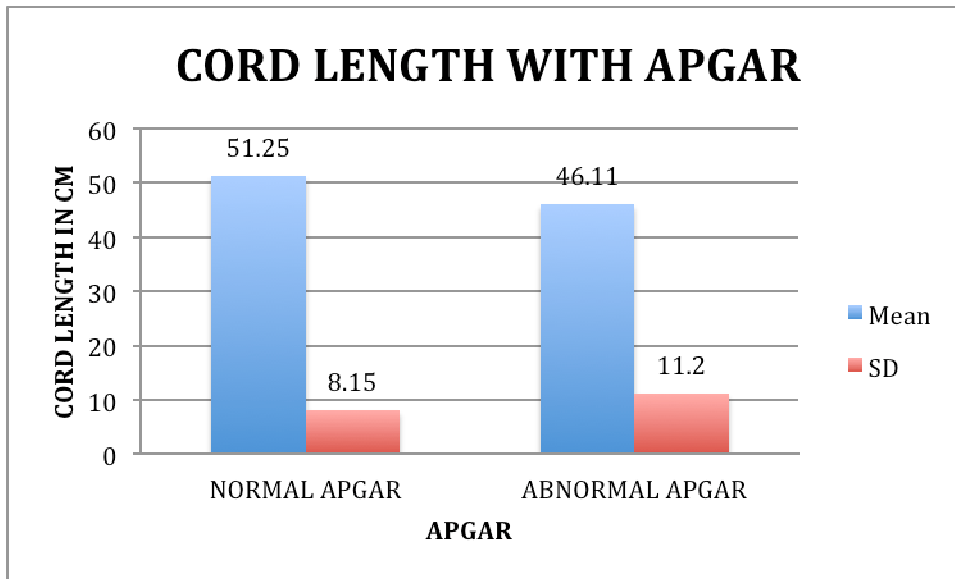


Figure 2-Relationship of cord length with AFI

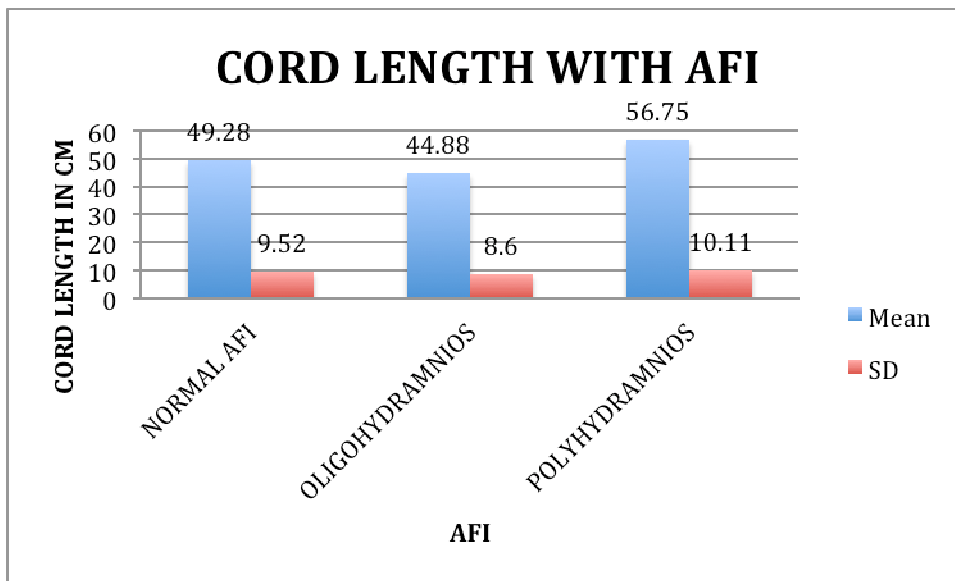


Figure 3-Relationship of cord length with Birth Weight

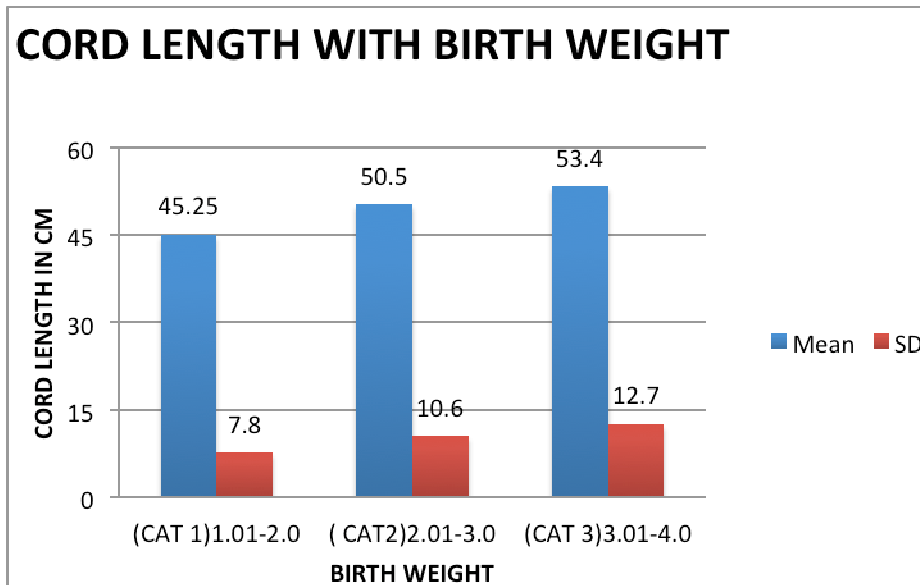


Figure 4-Relationship of cord length with gender of baby

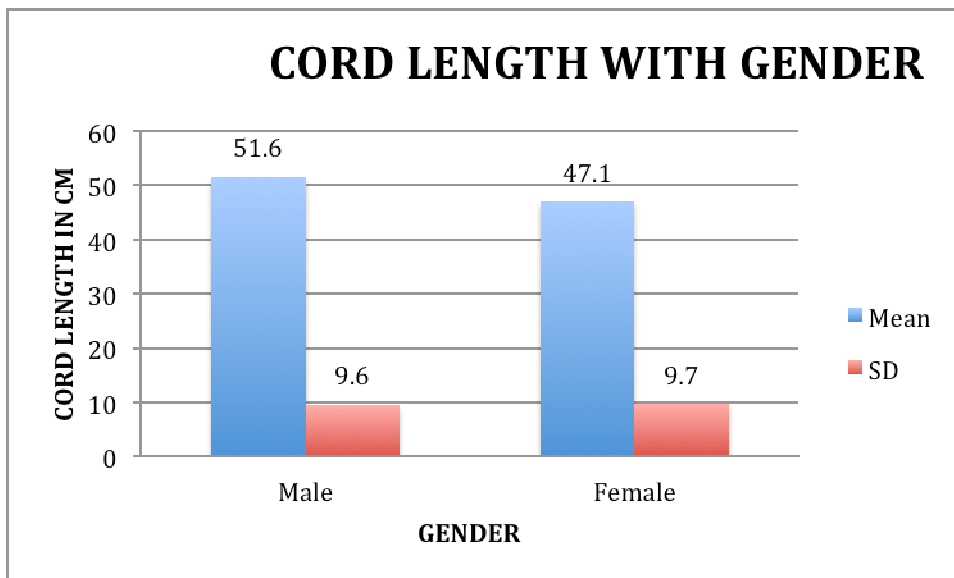


Figure 5 –Relationship of cord length with mode of delivery

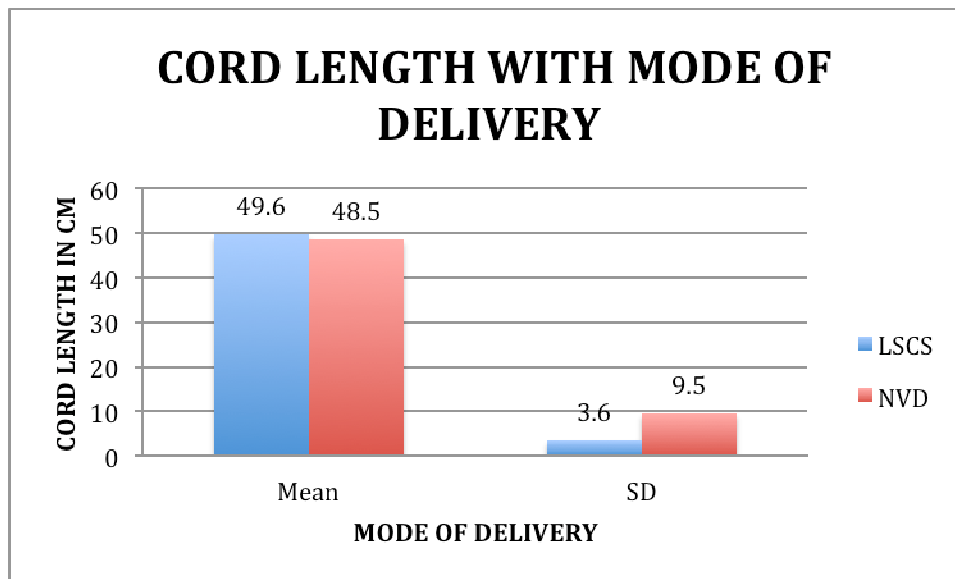


TABLE 1-Relationship of Umbilical Cord Length with APGAR score,Amount of Liquor,Birth Weight,Gender of Baby and Mode of Delivery

S.No	Parameter	No. of cases	Cord Length(cm)		P VALUE
			MEAN	SD	
1	APGAR >7	56	51.25	8.1	.012
	APGAR <7	44	46.1	11.2	
2	NORMAL AF	61	49.3	9.5	.002
	OLIGOHYDRAMNIOS	27	44.9	8.6	
	POLYHYDRAMNIOS	12	56.75	10.1	
3	BIRTH WEIGHT				.034
	CATEGORY 1	34	45.25	7.8	
	CATEGORY 2	57	50.5	10.6	
	CATEGORY 3	9	53.4	12.7	
4	GENDER				.023
	MALE	42	51.6	9.6	
	FEMALE	58	47.1	9.7	
5	LSCS	44	49.6	10.3	.589
	NVD	56	48.5	9.5	

DISCUSSION

There is a wide variation in the umbilical cord length reported in various previous studies. Suzuki S, Fuse Y⁵ have mentioned the average cord length between 60 and 70 cm, Birla et al¹⁰ have found the average umbilical cord length between 45 and 79 cm whereas in the study by Shiva Kumar HC et al⁹ average length of cord was between 61 and 70 cm. In our study, average length of cord was between 39 and 58 cm.

In various previous research studies correlation of long and short umbilical cords with poor fetal outcome has been established. Some other studies in literature did not establish any relation of umbilical cord length & fetal distress with low Apgar scores⁵. In a study by Balkawade NV et al¹¹, incidences of severe birth asphyxia was maximum in long-cord groups (56.6 %). In a study by Shrestha et al¹³, Apgar <7 at 1min 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). The results are similar to our study where there is significant difference in normal babies and those with APGAR score <7 group with p value of 0.012.

In a study by Ogunlaja et al¹⁵, 270 cases had ultrasound scan done at term in which single largest pocket of amniotic fluid was checked and it was noticed that this had a weak positive correlation to the umbilical cord length although the overall association was not statistically significant. (r = 0.084, p = 0.167). This is in contradiction to our study in which we have found a significant difference in mean cord length of babies with normal AFI and those with

oligohydramnios, polyhydramnios with p value of 0.002.

A Nigerian study of more than 600 cord lengths measured in labor and delivery had found a mean length of 57.5 cm with a significant correlation of length of cord with infant and placental weight¹³. There was also a positive correlation between the umbilical cord length and the weight of the baby at birth (r=0.145, p=0.011) in the study by Ogunlaja et al¹⁵ with similar conclusion in the study by Suzuki and Fuse⁵. In our study there is a significant difference in mean cord length of various categories of birth weight with p value of 0.034.

Algresi F¹⁶ found a significant difference between genders, with male babies having longer cords and females having shorter cords. Cord length did not vary according to the weight, length, and sex of baby in a study by Balkawade NU¹¹. In our study, there is significant difference between mean cord length of male and female child with p value of 0.023.

In a study by Atalla et al.¹² there was no relation between umbilical cord indices and intrapartum FHR decelerations, meconium staining of the amniotic fluid, or mode of delivery. In the study by Suzuki S⁵, although the short umbilical cords seemed to contribute to the increased rate of emergent Cesarean delivery, they were not associated with adverse perinatal outcomes. In our study, there is no significant difference between cord length variations in LSCS and Vaginal delivery cases (p value-0.589).

The differences between our findings and those of other authors in certain parameters may be

due to variation in sample size and period of gestation. Socio-ethnic variability cannot be excluded.

□

LIMITATIONS

The limitation of this study is the small sample size. A larger sample and a long term follow-up is needed for more accurate results. Secondly, ours is a referral tertiary care hospital catering to high risk pregnancy cases which may affect the management decisions regarding caesarean vs vaginal deliveries.

CONCLUSION

In this study ,we have found significant

correlation of umbilical cord length with perinatal outcome, amniotic fluid volume and fetal birth weight .No significant association between umbilical cord length and mode of delivery was established.

Variations in Umbilical Cord length can explain abnormal perinatal outcome in absence of obvious cause of the unexpected outcome and emphasis on neonatal follow up is essential in presence of cord length abnormalities.

There is a need of multicenter population- based studies in India to prepare reference standard guidelines in this subject.

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