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Original Research Article

UMBILICAL CORD LENGTH WITH RELATION TO BIRTH WEIGHT

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ABSTRACT

Background: The Umbilical cord is the fetal lifeline and it is a structure that connects the foetus to the placenta. Placenta and umbilical cord acts as a mirror which reflects intrauterine status of foetus. The length of the umbilical cord varies from achordia to 300 cm. This study aims to identify the relationship between the umbilical cord length and birth weight and other parameter such as maternal age, gestational age and gender. More recent research suggests that the length of the cord at birth is influenced by intrauterine fetal activity & therefore correlate with fetal well being.

Materials and Methods: This cross sectional study was conducted in Anatomy department in collaboration with gynecology department of our hospital on 100 freshly delivered samples of placenta with cord which are obtained from labour room of our Government Hospital.

Conclusion: The range of cord length was 28- 106 cm .However maximum were between 40cm to 60 cm in length. The mean length was 53.18 cm. Cord length varies with birth weight and conclude that as cord length shows positive correlation with birth weight (r=0.40).

KEY WORD: Umbilical Cord length, Birth Weight, Sex, Gestational age.

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INTRODUCTION

The Umbilical cord (Funiculus umbilicus or birth cord) is the fetal lifeline and it is a structure that connects the foetus to the placenta. It plays crucial role for fetal development. Placenta and umbilical cord is essentially a fetal organ functioning to support growth of foetus and interacts with individual's mother and foetus. Placenta and umbilical cord acts as a mirror which reflects intrauterine status of foetus. The umbilical cord provides the pathway for unhindered blood transport from the placenta to the foetus and vice versa.

Aristotle (384–322 BC) originally identified the umbilical cord as the connection between the mother and unborn child [1,2]. The length of the

umbilical cord varies from achordia to 300 cm. At term the typical umbilical cord is 55 to 60 cm length [3]. About 5% of cords are shorter than 35 cm and another 5% are longer than 80 cm. Umbilical cord length was first studied by Leonardo Da Vinci.He concluded that its length equal to the length of foetus throughout gestation [4]. Abnormal cord length (either excessive or shorted) is known risk factor for adverse perinatal outcome. Long cord have been associated with cord prolapse, entanglement, torsion and thrombosis whereas short cords are associated with rupture of cord, failure of foetus to descend in labour and also associated with some congenital anomalies and malpresentation [5].

This study aims to identify the relationship between the umbilical cord length and birth weight and other parameter such as maternal age, gestational age and gender. Development of cord length is depends upon the space available for the movement in amniotic cavity and tensile force applied to umbilical cord during movement [6].

The result of this study would help improve baby's birth weight and child health. The data would also guide any further studies of umbilical cord. The human umbilical cord can be totally absent or can reach a length of 300 cm. At term normal length of umbilical cord is about 55-60cm in length with diameter 2.0 -2.5 cm which normally insert centrally or eccentrically on the fetal side of the placenta [3]. Due to its peculiar role of being the link between the placenta & fetus abnormality any in the length, may lead to abnormal fetal outcome. Cord length appears to be largely determined by genetic factor & forceful stretching by developing fetus; the more tension the longer the cord & vice versa. The relative amount of amniotic fluid at any given gestation age that would promote or hamper fetal movement & relative weight of the fetus that would exert tension on the lengthening cord would be accepted to be important factors in the determining of ultimate cord length. Leonardo da Vinci observed in 15 th century that the length of the cord is equal to the length of child in every stage of its age. More recent research suggests that the length of the cord at birth is influenced by intrauterine fetal activity & therefore correlate with fetal well being.

Slow growth of cord length during the last trimester is due to reduced intra uterine space available for fetal movement. Cord length cannot accurately be assessed by routine prenatal ultra sonography [3]. Therefore obstetrician would be well advised to measure & record the length of all cord at delivery, including any segment removed for blood gas analysis, especially because a reliable cord length is very rarely obtainable in the pathology laboratory.

If embryo/fetal movements are impeded, the tensile stretch placed on the cord will be less and the eventual cord length will be shorter.[7] For example, the umbilical cord length in twins is generally shorter than for singletons.

AIM AND OBJECTIVES

1. To assess any association between umbilical cord length with birth weight.

2. To assess any association between umbilical cord length and gestational age and sex of the baby..

To compare the finding of the present study with similar project.

MATERIALS AND METHODS

The present cross sectional study was carried out with permission of institutional ethics committee in the department of Anatomy with collaboration with gynecology department from January 2012 to February 2013.Normally 100 freshly delivered placenta with cord were obtained from labour room of our hospital. Material used for the study Scalpel with blade, Scissor, Forceps, Measuring tape, Gloves, Cotton gauze Thread ,Weighing machine.

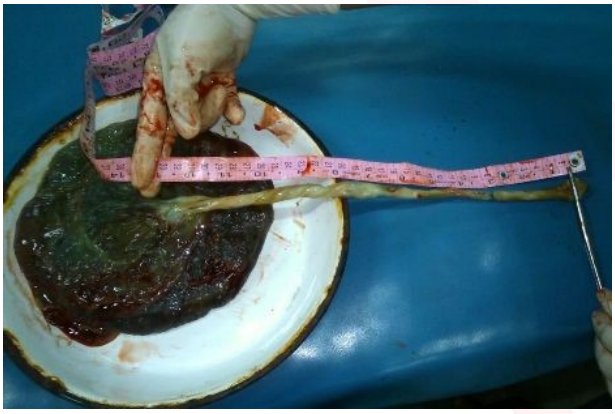
Inclusion Criteria: The subject selected had completed 37 weeks of gestation. Normal deliveries with singleton pregnancy.

Exclusion criteria: Cases of preterm labour (< 37 weeks), Cases of elective c- section deliveries. Placenta previa and high risk complicated pregnancies. CPD, cord prolapsed, Multiple pregnancies

Method: This cross sectional study was conducted in Anatomy department in collaboration with gynecology department of our hospital.100

freshly delivered samples of placenta with cord obtained from labour room of our Government Hospital. Healthy women with term gestation with normal singleton pregnancy, irrespective of their parity, who were in active labour and were admitted to the labour room, were taken for the study. The women having age group between 18 -35 years of age. Patients were asked relevant antenatal obstetric history and maternal risk factors were assessed (eg. preeclampsia, diabetes) as these cases were not included in the study. Each patient was observed in 2nd and 3rd stage of labour. Intrapartum fetal monitoring was done. History of IUGR was noted. After birth the umbilical cord was clamped and cut on fetal side by keeping 5 cm cord on fetal side. The tag details of name of mother, age, gestational week was attached to the cord with thread. The umbilical cord was measured in its entirety, including the length of placental end of the cord and the umbilical stump of the baby with measuring tape. Birth weight was noted after delivery. Data was tabulated & Statistical test was applied.

Fig. 1: Measurement of length of umbilical cord.



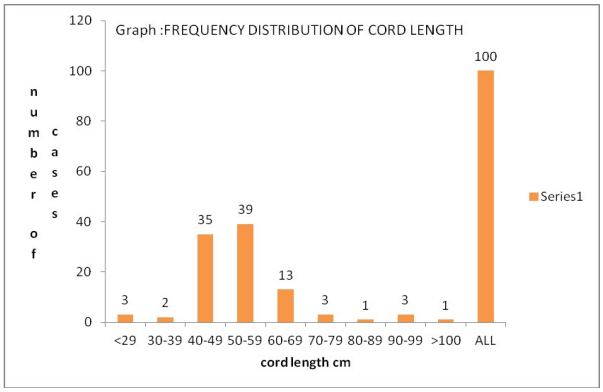
OBSERVATIONS AND RESULTS

In this study we had found cord length between 29-106 CM. mean cord length (cm) 53.18 cm & SD of cord length 12.18.

Table 1: Frequency Distribution Of Mean Umbilical Cord Length With Gestation.

Gestational Age (Weeks)	N	Mean Cord Length (Cm)	+SD	Pearson's correlation coefficient (r)
37	26	52.75	13.86	
38	43	51.2	8.22	
39	17	51.76	12.95	(r= 0.16)
40+	14	62	16.27	
ALL	100	53.18	12.82	

Graph 1: Showing frequency distribution of cord length.



Cord length and gestation: In order to assess the relationship between gestational age and cord length within the categories are arranged in the table no 1. Although, no obvious difference could be determined between the mean cord length and gestational age of 37, 38 and 39 weeks but mean cord length increased significantly at gestational age 40 and above.

To test the association between cord length and gestational age, the Pearson's correlation coefficient (r) was calculated. There is no correlation found between cord length and gestational weeks (r= 0.16).

Birth weight in relation to cord length: We found maximum birth weight was 3800 GM and minimum was 1500 GM. Mean birth weight was 2664.2.So SD of weight was 438.09 and SE was 4.38.

In order to asses relationship between birth weight and cord length, mean birth weight within 10 cm categories was tabulated. It is observed that as cord length increases there is increase in mean birth weight. To test the association between cord length and birth weight, the Pearson's correlation coefficient (r) was calculated. There is positive correlation find between cord length and birth weight(r= 0.40)

Graph 2: Scattered diagram showing relation between cord length and birth weight Cord length & sex.

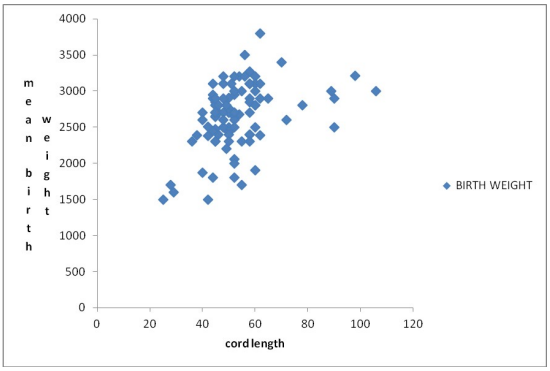


Table 2: Comparison of cord length between male and female foetuses.

	Cord length		
	Mean	SD	P value =0.85 Non significant
Male (53)	53.39	14.16	
Female(47)	52.89	11.28	

DISCUSSION

Table 3: Similar finding by other authors showing relation between cord length and getational age

Author	Year	Number	Gestation	Mean Cord Length
Malpas et al [11]	1964	538	Term	61 cm
Abgoola et al [12]	1978	602	Term	57.4 cm
Adinma et al [13]	1993	1000	Preterm-term	51.5cm
Rayburn et al [14]	1981	536	Term	55.0 cm
Naeye et al [5]	1985	24,000	38-42	57.4-59.6 cm
T.Chitra et al [15]	2012	100	Term	52.87 cm
Balkawade N. et al [16]	2012	1000	Term	63.86 cm
Gupta S.et al [17]	2006	107	Term	44.3 cm
Present study		100	Term	53.18 cm

This is a cross sectional study conducted in Department of Anatomy collaborated with Obstetrics and Gynaecology from 2012 to 2013 at our hospital. The clinical relationship is present between the birth weight and the umbilical cord length.

100 women who fulfilled the selection criteria were taken for the study. After delivery of placenta measure the length of umbilical cord and noted the various parameters correlates birth weight and sex of baby.

Age and gestational age: The women included in present study were in the age group ranging from 18-35 years. Majority of women were in age group 20-30 years. Minimum age for the woman was 18 years and maximum was 35 years**.** Maternal age does not show any correlation with cord length. There is no correlation found between cord length and gestational age (r= 0.16).Same finding was also found by Adinma [13]. The study done by Wu et al in Taiwan on 1067 pregancies had shown that there was no significant correlation [21]. Naeye had shown similar finding from 28-42 weeks gestation, there was no statistical significance increase in length beyond 28 week to term [5]. Mills had also shown that in the third trimester cord length slows down.[10] Umbilical cord length

This study shows some variation in cord length. The range was 28- 106 cm .However maximum were between 40cm to 60 cm in length. The mean length was 53.18 cm and this observation correlate with various studies. (Frequency distribution of cord length shown in graph no1)

Birth weight: Cord length varies with birth weight, the relationship of cord length with birth weight is compared (graph no 2) and conclude that as cord length shows positive correlation with birth weight (r=0.40).

Agboola A. studied cord lengths in 602 fetuses in Nigeria ,concluded that mean length was 57.5 cm, and they had found a correlation of length with infant and placental weight [12]. Adinma JI. (1993) studied 1000 umbilical cords, found a mean length of 51.5 cm. There was a significant correlation with both infant and placental weight with cord length [13].

Baergen *et al.* found a significant correlation of long cord with higher birth [18]. OA. Ogunlaja found relationship between cord length and weight (r= 0.145, p= 0.001) [19]. Isha tapaswi et al found a significant difference in cord length and birth weight with p value of 0.034 [20].

Gender: The cord length compared between male and female fetuses, but there is no statistically significant difference in cord length with gender (p=0.85). (table 2). WU J et al were shown that male fetuses had higher length than female foetuses [21]. Yadav B. B. also concluded that there was no relation between cord length and gender of baby [22].

CONCLUSION

Umbilical cord represents life source entry and exit point of human will and source of energy that makes connection to the surrounding world**.** There is small increase in length with increase in gestation age. But Length of the umbilical cord is not depends on the gravida and maternal age. Cord length is showing does not show correlation with gestational age. The umbilical cord length has positive correlation with birth weight, as cord length increase there is increase in birth weight.

Conflicts of Interests: None

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