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Maternal and Fetal Correlates of Umbilical Cord Length in a Sample of Deliveries at a Tertiary Care Hospital

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ABSTRACT
The umbilical cord serves as a vital connection between the foetus and the placenta, ensuring the flow of essential nutrients and oxygen. The placenta and umbilical cord serve as a reflection of the fetus's condition while in the womb. The length of the umbilical cord can vary greatly, ranging from very short to as long as 300 cm. Our study aims to investigate the potential correlations between umbilical cord length at birth and various factors such as maternal parity, maternal age, sex of the baby, birth weight, birth length and placenta weight. 200 cases were randomly selected from a group of patients admitted to the labour room with a gestation period of over 34 weeks. Data on all included deliveries during the study period was collected in real time using a pre-designed proforma. After each delivery, the umbilical cord was clamped and cut between the clamps. The baby underwent an evaluation to determine their Apgar score before being entrusted to a midwife or paediatrician. The weight of the placenta was also measured without trimming. Out of the 200 women who gave birth during the study period, the largest percentage (45%) fell into the age range of 30-34 years. The average birth weight, length at birth and placenta weight were 3.22±0.54kg, 49.15±3.22 cm and 0.60±0.10kg, respectively. The average cord length for male and female babies was 57.16±7.21 cm and 56.67±8.12 cm, respectively. The umbilical cord serves as both the entry and exit point for the vital life force of a human being, acting as a conduit that connects us to the world around us. There is a slight increase in length as the gestation age progresses. The umbilical cord serves as both the entry and exit point for the vital life force in humans, connecting them to the world around them.

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Key Words
Birth weight, foetus, placenta, umbilical cord

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INTRODUCTION

The umbilical cord, also known as the birth cord, serves as the vital connection between the foetus and the placenta. It is essential for the development of the foetus. The placenta and umbilical cord play a crucial role in supporting the growth of the foetus and facilitating communication between the mother and the developing baby[1]. The placenta and umbilical cord serve as a reflection of the fetus's condition while in the womb. The umbilical cord plays a crucial role in facilitating the seamless flow of blood between the placenta and the foetus. There are various abnormalities that can occur with the umbilical cord, including issues with its length, thickness, coiling, placenta insertion site, number of vessels, in-utero distortion and primary tumours[2,3]. On average, the umbilical cord measures 55 cm in length and has a diameter of 1-2 cm at birth[4]. It is worth noting that a small percentage of umbilical cords measure less than 35cm, while another small percentage exceed 80 cm in length. There can be significant differences in the length of the umbilical cord, ranging from no cord at all to an extraordinary length of 300 cm[5,6]. The length of the umbilical cord is considered long if it measures >70 cm and short if it measures <40 cm[7].

Both long cords and short cords have been linked to negative perinatal outcomes. The cause of variation in umbilical cord length is still unclear. However, it has been observed that the length of the foetus can be influenced by factors such as foetal movement[4]. Two main factors that determine cord length are believed to be ample space in the amniotic cavity for foetal movement and the tensile force on the umbilical cord during such movements[4,8]. In addition, there have been suggestions of variations in protein expression patterns related to cell proliferation that are influenced by specific genes. It has also been documented that there are differences in umbilical cord length between male and female babies[9]. Understanding foetal sex involves delving into the intricate dynamics between the mother, the placenta, and the foetus, going beyond mere chance. There are various factors that can increase the risk of certain complications during pregnancy and childbirth. Some of these include prolonged pregnancy, preterm labour, labour dystocia, true umbilical cord knots, cord prolapse, nuchal cord, abnormal foetal heart rate patterns and the possibility of a caesarean section. It's important to be aware of these potential risks and consult with a healthcare professional for guidance. In the same vein, a female foetus can have an impact on foetal cardiac haemodynamics and increase the risk of hypertensive diseases during pregnancy, among other factors[10]. It remains uncertain what exactly causes variations in cord length. However, it is widely believed that the length of the cord is indicative of foetal movement inside the womb. Protein expression patterns of numerous genes associated with cell proliferation may also contribute to abnormalities in cord length. Measuring and documenting cord length after birth is crucial in cases of placental abruption, oligohydramnios, or breech presentation, as it can have a significant impact on long-term foetal health[5]. Our study aims to investigate the potential correlations between umbilical cord length at birth and various factors such as maternal parity, maternal age, sex of the baby, birth weight, birth length and placenta weight.

MATERIAL AND METHODS

The study was conducted in the Gynecology department of the medical college and hospital. The study was reported to the ethical committee and a certificate was obtained before the study began. 200 cases were randomly selected from a group of patients admitted to the labour room with a gestation period of over 34 weeks. Women with a low risk of complications who were at least 34 weeks pregnant, whether it was their first pregnancy or not and who were willing to take part in the study, were eligible for inclusion. They had the option of delivering either vaginally or abdominally. Excluded from the study were women who gave birth before 34 weeks of gestation, women with high-risk factors that could affect the outcome of childbirth, cases of preterm labour, pregnancies complicated by intrauterine foetal death (MSB), malpresentations and multiple gestations, significant foetal congenital malformations and women who underwent elective caesarean section for other obstetric reasons.

Mothers have granted permission for the collection of data regarding their babies for research purposes. Data on all included deliveries during the study period was collected in real time using a pre-designed proforma. The study collected various variables of interest, such as the patient's age, parity, sex of the baby, birth weight, umbilical cord length, birth length and placenta weight. After each delivery, the umbilical cord was promptly clamped and cut between the clamps. The baby underwent an evaluation to determine their Apgar score before being entrusted to a midwife or paediatrician. After the placenta was delivered, the length of both the umbilical cord attached to the baby and the one attached to the placenta were measured using a measuring tape and the values were added together. A measuring tape was used to determine the crown-heel length of the baby. The weight of the baby was measured using a digital tabletop baby weighing scale, right after the umbilical cord was clamped close to the baby's body with a baby cord clamp. The weight of the placenta was also measured without trimming.

Statistical Analysis: The data was compiled and entered into a spreadsheet computer programme (Microsoft Excel 2007) and then exported to the data editor page of SPSS version 15 (SPSS Inc., Chicago, Illinois, USA). The quantitative variables were reported using either means and standard deviations or median and interquartile range, depending on their distribution. The data on qualitative variables were displayed as counts and percentages. The confidence level and level of significance for all tests were set at 95 and 5% respectively. An investigation was conducted to examine the correlation between different categories of cord length and foetal sex. The Chi-square test of proportion was utilized for this purpose. The study examined the disparity in cord length between foetal sexes by utilizing a student's t-test.

RESULTS AND DISCUSSIONS

A significant portion (45%) of the 200 women who gave birth during the study period were in the age range of 30-34 years. The average age of the women was 31.5 years, with a standard deviation of 4.2 years. A total of 150 individuals (75.0%) scheduled appointments for antenatal care. (Table 1) show that half of the women had given birth to multiple children. Most of the babies were male, accounting for 56% of the total. The average birth weight, length at birth and placenta weight were 3.22±0.54kg, 49.15±3.22 cm, and 0.60±0.10kg, respectively. The length of the umbilical cord varied from 33-80 cm. The average cord length measured 56.80±7.25 cm. The majority of the babies, about 95%, had a normal cord length ranging from 40-70cm. A small percentage, around 4%, had short umbilical cords, while only 1% had long cords. According to (Table 2), the average cord length for male babies was 57.16±7.21 cm, while for female babies it was 56.67±8.12 cm. There was no statistically significant difference found in the cord length between male and female babies. The p-value is greater than 0.05. There was a notable connection and a favorable correlation between umbilical cord length at birth, parity and the length of the baby at birth.

In the current research, the length of the umbilical cord shows significant variation, ranging from 38-74 cm. In this study, the researchers found that the average length of the umbilical cord was 56.80±7.25 cm, with a range of 33-80 cm. These results align closely with a previous study conducted at the same research centre[11]. In addition, findings from a prior study conducted at the centre by Allagoa and Kotingo show a similar correlation to those obtained in this study[11]. In this study, the occurrences of normal umbilical cord length, short umbilical cord and long umbilical cord were 95, 4 and 1%, respectively. In the previous study, the percentages were 94.7, 4.3 and 3.3%, respectively. In this study, the average birth weight was 3.22±0.54kg and the average length at birth was 49.15±3.22cm. comparatively, the previous study reported an average birth weight of 3.1±0.6kg and an average length at birth of 48.9±3cm. In a study conducted in On do State, west of Nigeria, Ogunlaja *et al* found similar values to those observed in this study. The mean umbilical cord length was recorded as 51.50±6.67cm, the mean length at birth was 49.75±2.40cm and the mean birth weight was 3.23±0.50kg[12]. in a study conducted by Agboola A, the cord lengths of 602 fetuses in Nigeria were examined. The findings revealed that the mean length was 57.5 cm. additionally, a correlation was observed between the length of the cord and the weight of both the infant and the placenta[13]. in a study conducted by Adinma JI. (1993), 1000 umbilical cords were examined, revealing an average length of 51.5 cm. There was a noteworthy connection between infant and placental weight and cord length[14]. in a study conducted by Baergen *et al*. a notable association was discovered between longer umbilical cords and increased birth outcomes[15].

No significant differences in umbilical cord length at birth were found in this study. According to a study conducted by WU *et al*. it was found that male foetuses tend to have greater length compared to female foetuses[16]. Yadav B.B. also found no correlation between cord length and the gender of the baby[17]. There was a strong link observed between umbilical cord length and length at birth, while no notable connection was discovered between umbilical cord length, birth weight and placenta weight. When comparing our findings with previous studies that examined the connection between umbilical cord length and birth weight, placenta weight and length at birth, we observed some differences. In the study conducted by Balkawade and Shinde in Maharashtra, India, it was observed that umbilical cord length did not show any variation based on birth weight, which is different from our study. Interestingly, their findings also revealed that umbilical cord length did not have any association with birth length, contradicting our own findings[18]. According to this study, researchers discovered a noteworthy connection between umbilical cord length and parity. Specifically, they Found that as parity increases, the risk of having a long umbilical cord also increases. According to a study conducted by Linde *et al*. it has been found that parity is a significant risk factor for long umbilical cord[6]. Several other studies have also documented comparable results[19,20]. It's worth noting that the connection between cord length and birth length could potentially be influenced by parity. Further research is needed to establish a solid understanding of the connection between umbilical cord length, parity,

Table 1: Maternal characteristics of parturient, (n=200)

Variables	Number	Percentage
Age (Years)		
20-24	26	13
25-29	52	26
30-34	90	45
>34	32	16
Parity		
Nulliparous	40	20
Primiparous	60	30
Multiparous	100	50

Table 2: Relationship between umbilical cord length at birth and fetal sex

		Fetal sex		
Variables	**Total, n = 200 (%)**	**Male, n = 112 (%)**	**Female, n = 88 (%)**	**p-value**
		Cord length pattern		
Short umbilical cord (	8 (4)	3 (2.67)	5 (5.68)	
				0.1
Normal umbilical cord length (40-70 cm)	190 (95)	108 (96.4)	82 (93.18)	
Long umbilical cord (>70 cm)	2 (1)	1 (0.89)	1 (1.13)	
Mean cord length	56.80±7.25	57.16±7.21	56.67±8.12	0.40

foetal sex, birth weight, placenta weight and length at birth.

CONCLUSION

The umbilical cord is a vital link between a human and the outside world, serving as both an entry and exit point for life-sustaining energy. There is a slight increase in length as the gestation age increases. The umbilical cord is a vital link between a human and the world, serving as both an entry and exit point for life's energy. There is a slight increase in length as the gestation age progresses. There may be a correlation between cord length and birth length, which could vary depending on the mother's parity. We need studies that examine the relationship between birth length and parity in determining umbilical cord length.

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