



Length of the umbilical cord among Sudanese neonates

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General Note



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ABSTRACT

Objective: Study the human umbilical cord before and after the delivery is importance, because it is plays an essential role in the fetal development. The aim of this work is to measure the umbilical cord length in term Sudanese neonates and to study the differences in cord length, between singleton to twin birth and between neonatal genders. **Materials and methods:** length of 721 umbilical cords of singleton and twin neonates was measured, in first 2 to 3 minutes after delivery, in Omdurman Maternity Hospital, Sudan, 2019. **Inclusion criteria:** full term single and twins birth cases, of normal vaginal delivery, looked health neonates. **Exclusion criteria:** preterm labor, triplets, quadruplets, caesarean sections deliveries and cord with true knot. The data was analyzed by using SPSS statistical software version 20. **Results and conclusion:** the average length of the umbilical cord was about 68 cm in singleton and 47 cm in the twin, being longer in males of single birth and in females of twin birth cases. Maximum length of the umbilical cord in singleton neonates were 112 cm in male, 91cm in female, and in twin were 62 cm in male and 78 cm in female neonates. About 1.5% of cords were shorter than 30 cm, 3.5% were longer than 90 cm and 95.0% were of normal length. 20 cm of the cord length is suitable for fetus to be delivered vaginally.

Keyword: Umbilical cord length, in singleton and twin, Sudanese neonates

1. INTRODUCTION

Study the morphological features of the human umbilical cord are important, because it plays an essential role in the fetal development. The umbilical cord begins to form between four and six weeks of the development, as the embryonic disc at the lower third of the embryo. It is fetal portion form a sac (physiological umbilical hernia), which houses the guts until the tenth week of gestation, at this time it usually short and has large diameter (Keith, 2011). Then the cord begins to elongate after the tenth weeks, when the guts return to the abdominal cavity (Keith, 2011; Torpin, 2002). Rare instances exist in which no cord develops at all, the fetus being attached directly to the placenta at the umbilicus (Lockwood et al., 1986; Giacoia, 1992).

The length of the umbilical cord varies from no cord (achordia) to 300 cm; an average length is 50 cm, about 5% of cords are shorter than 35 cm, and about 5% are longer than 80 cm (Heifetz, 1996; Marie & Michael, 2009; Stefos et al., 2003). The causes of the differences in cord length are unknown. Cord length plays a role in how; a fetus develops, labor is tolerated, and delivery occurs. However the cord length is thought to reflect movement of the fetus in utero, correlates to several outcomes and may also influence fetal position (Collins, 2012). Male cords are longer than female and the first pregnancy having a shorter cord than the third, single birth having long cord than twin (Collins, 2012; Charles, 2019). Excessively long umbilical cords, longer than 70 cm, are associated with a number of circumstances include entanglement, true knots, and thrombi, which can impact fetal life (Stefos et al., 2003; Collins, 2012). Approximately 6% of babies are born with a short cord (Collins, 2012). Very short umbilical cords, less than 25 cm, have been associated, fetal movement disorders, intrauterine constraint, as well as placental abruption, inversion of the uterus, cord rupture, vessels tears and increase risk of stillbirth (Keith, 2011; Marie & Michael, 2009; Grange et al., 1987; Krakowiak et al., 2004; Sherer et al., 2010). Short umbilical cord associated with; prolonged labor, experiencing fetal distress, inability of some fetuses to be delivered vaginally and being smaller than the average for their gestational age (Balkawade & Shinde, 2012).

Many studies were done to assess the umbilical cord length, but their studies were mainly based on prenatal sonographic examination of the cord morphological features (Cromi et al., 2005; Axt-Fliedner et al., 2006; Sebire, 2007; Sepulveda et al., 2009; Hasegawa et al., 2009; Peres & Taylor, 2012; Wiedaseck & Monchek, 2014). The sonographic assessment of cord length prenatal is technically difficult and takes time, because whole cord length is not routinely seen visible within uterus during the sonographic scanning. The accurate measurement of cord length requires visible cord from end to end. The aim of this work is to measure the umbilical cord length in term single and twin Sudanese neonates after the delivery, and to study the differences in cord length, between singleton to twin birth and between neonatal genders. This may give good results than sonographic assessment, because after delivery whole cord is visible and the measurement is easy.

2. MATERIALS AND METHODS

This is a descriptive prospective cross sectional hospital-based study, carried out in Omdurman Maternity Hospitals, Sudan, between May to October 2019. The study was performed on 721 umbilical cords specimens of singleton and twins birth neonates. *Simple:* random sampling was used to select participants for the study. *Inclusion criteria:* full term single and twins birth cases, of normal vaginal delivery, looked health neonates, at the period of the study. *Exclusion criteria:* preterm labor, triplets, quadruplets, caesarean sections deliveries and cord with true knot. Immediately after delivery, the umbilical cord was clamped and cut about 5 centimeters from the baby abdominal wall (fetal part) using scissor. The rest of the cord from the cut end to the placental insertion (placental part) was measured in centimeters, using flexible plastic meter. The five centimeters was added to the rest of the cord. For the accurate measurement of length, cord has not been tractioned or pulled ant to avoid the change in the cord length within the labor room temperature, the measurement was immediately taken in first 2 to 3 minutes after delivery. *Informed consent:* Written & Oral informed consent was obtained from all pregnant mothers and their husbands, of neonates who included in the study. Additional informed consent was obtained from all the authorities of the Maternity hospital. The data was analyzed by using SPSS statistical software version 20, frequencies; percentage, mean, standard deviation was taken.

3. RESULTS

Out of 721 umbilical cords specimens, 685 (95%) were of single birth cases and 36 (5%) were of twin birth cases, (figure 1). Out of all cases 379 (52.7%) were males of single birth, 306 (42.4%) were females of single birth, 14 (1.9%) were males of twin birth and, 22 (3.0%) were females of twin birth, (figure 2). The cord length ranged from 38 to 112 cm. with mean (62.1147 ± 6.40731 std-deviation) in males of single birth, and from 34 to 91 cm. with mean (44.4510 ± 11.04670 std-deviation) in females of single birth. The cord length ranged from 20 to 62 cm. with mean (37.7237 ± 4.22347 std-deviation) in males of twin birth, and from 29 to 78 cm. with mean (46.6467 ± 7.78120 std-deviation) in females of twin birth, (Table 1). Maximum umbilical cord length was 112 cm. in males of single birth and 91cm. in females of single birth. Maximum umbilical cord length was 62 cm. in males of twin birth and 78 cm. in females of twin birth (Table 1). The umbilical cord is being longer in males than female of single birth cases and in females than male

of twin birth cases, (table 2). About 1.5% of umbilical cords were shorter than 30 cm. and 3.5% were longer than 90 cm. and 95.0% were of normal length, (Table 3).

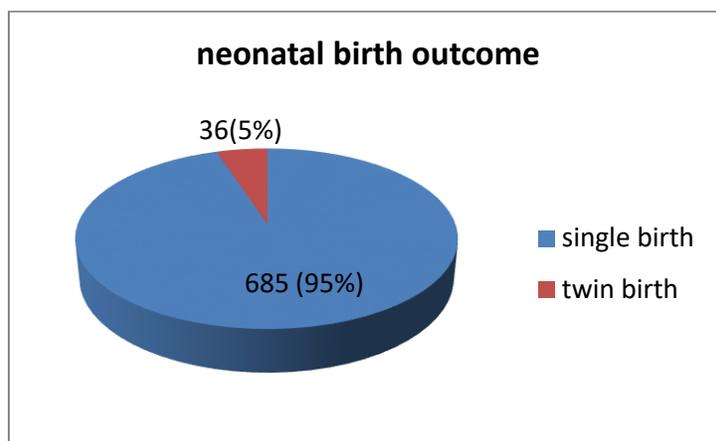


Figure 1 shows neonates birth outcome

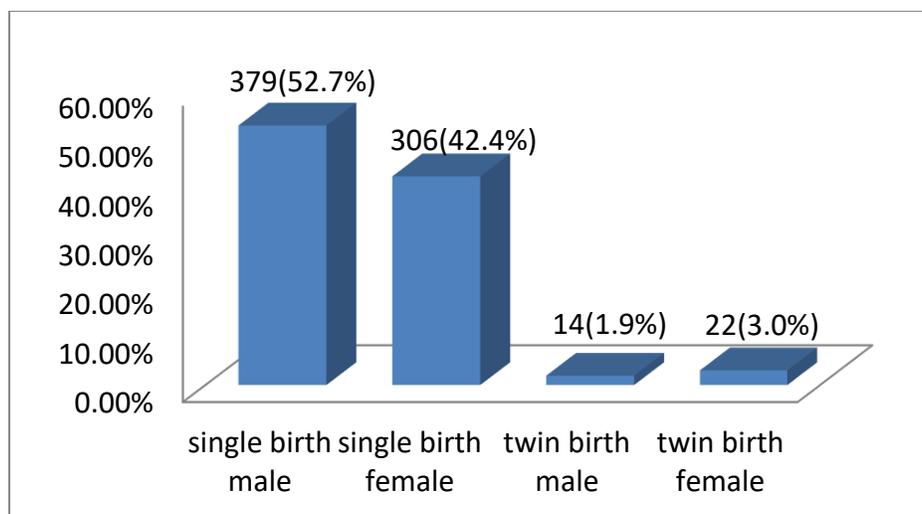


Figure 2 shows singleton and twin neonatal genders outcome

Table 1 shows umbilical cord length in (cm), of singleton and twin birth neonates

Birth outcome	Neonatal gender	Cord length in centimeters	Maximum	Mean	Std-deviation
Single	Male	38	112	62.1147	6.40731
	Female	34	91	44.4510	11.04670
Twin	Male	20	62	37.7237	4.22347
	Female	29	78	46.6467	7.78120
Total (721) umbilical cords					

Table 2 shows number of ceases and percentage of the umbilical cord length in singleton and birth neonates

Birth outcome	Neonatal gender	Cord length in centimeters	No of cases	Percentage (%)
	Male	>30	0	0.00 %
		30-59	112	15.5%
		60-89	246	34.1%
		<90	21	2.9%

Single	Female	>30	0	0.00%
		30-59	206	28.6%
		60-89	96	13.3%
		<90	4	0.6%
Twin	Male	>30	7	1.0%
		30-59	6	0.8%
		60-89	1	0.1%
		<90	0	0.0%
	Female	>30	4	0.6%
		30-59	6	0.8%
		60-89	12	1.7%
		<90	0	0.0%
Total			721	100%

Table 3 shows the cord length in groups, in singleton and twin birth neonates

Cord length in groups	Cord length in centimeters	No of cases	Percentage (%)
Short cord	>30	11	1.5%
Normal cord	30-89	685	95.0%
Long cord	<90	25	3.5%
Total		721	100%

4. DISCUSSION

The method of the human umbilical cord length measurement before and after the delivery is quite different. There are several reports about the correlations of the cord length with various factors. Javert, (1958) reported that the length of the umbilical cord was usually the same as the standing height of the fetus at all stages of pregnancy. While the report of Malpas & Symonds (1964) found that the average length of the umbilical cord is about 61 cm. Marie *et al.*, (2009); Balkawade & Shinde, (2012), their studies showed that the average human umbilical cord length arranged from 50 to 60 cm. Shiva *et al.*, (2017), described that the cord length varied from 22 to 126 cm. with mean 66 cm. The average length of umbilical cord in the present study was 68 cm. in singleton and 47 cm. in twin neonates, with minimum difference between males to females and between single to twin birth neonates. The result of this study was confirmed to those of the previous studies; there is no big difference in the cord length when measure before or after the delivery. Heifetz, (1996), reported that in Chinese and Japanese populations, a cord length reaching 300 cm length. Maximum length of the umbilical cord in the present study was 112 cm in single and 78 cm in twin. However of the results of most of previous studies and this study were did not found cord length, reaching the length which mention by Heifetz, (1996).

The study of Walker & Pye, (1960) in non-African populations concluded that cord length was related to the neonatal sex, this finding was confirmed by Collins, (2002) who reported that cord length had a positive correlation with male gender. While Balkawade & Shinde, (2012), reported that cord length did not relate to sex. The result of this study showed that the umbilical cord was longer in males than females of singleton and in females than males of twin. Soernes & Bakke, (1986) reported that umbilical cord in twin shorter than in single birth. They suggested that this difference may be caused by restriction fetal movement and the weak tensile force of the cord in twin pregnancy. This theory was originally proposed by Moessinger *et al.*, (1982) from experiments on pregnant rats in which artificial restriction of fetal movement resulting in shortening of the cord in rats was done. The present study found the same results; umbilical cord in single longer than in twin birth, this is confirming the results of Soernes & Bakke, (1986) and Moessinger *et al.*, (1982). The differences in the cord length between single to twin neonates and between the fetal genders may refer to; fetal weight, height, subsequent of the pregnancies and intrauterine fetal activities, because most of long cords in this work was seen in multi-parity. Intrauterine fetal activities may have a more important influence to increase cord tensile force, by which the cord elongates.

Cord length plays roles in how a fetal develops, labor toleration, and correlates to several outcomes (Shaker *et al.* 2020; Niroomanesh *et al.* 2020). Collins, (2002) described that, according to the American Academy of family Physicians, approximately 6% of babies were born with a short umbilical cord. Moreover, Stefos *et al.*, (2003) also reported that about 5% of cords are shorter than

35 cm, and about 5% of cords are longer than 80 cm. The results of this study showed that 1.5% of cords were shorter than 30 cm, 3.5% cords were longer than 90 cm, and 95.0% were of normal length. The differences in the results may refer to techniques used in the cord length measurements; between previous studies which were prenatal and the present study was postnatal. However measurement of cord length after birth may gives good results than postnatal. Very short or very long cords are predisposes to fetometernal intrauterine problems. Short cord less than 32 cm, was described by Joseph, (1910) who reported that a 32 cm was the minimal length for a term fetus to vaginal delivery. While the LaMonica *et al.*, (2008), reported that the vaginal delivery can take place with cords as short as 13 cm. The present study showed a normal delivery with cord length of about 20 cm, anyway 20 cm of the cord length is suitable for fetus to be delivered vaginally, less than that may increase risk of pregnancy and the delivery.

5. CONCLUSION

It is concluded that the average umbilical cord length in Sudanese was 68 cm in singleton and 47 cm in the twin. Maximum length of the umbilical cord was 112 cm in single and 78 cm in twin birth, being longer in males of single birth cases, and in females of twin birth cases. Most of the umbilical cords are within normal length. 20 cm of the cord length is suitable for fetus to be delivered vaginally.

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Conflict of Interest

No conflict of interests is this study.

Ethical approval

The study was approved by the Medical Ethics Committee of Omdurman Maternity Hospital, Sudan, (ethical approval code: S.E.741Y).

Data availability

All data associated with this study are present in the paper.

Peer-review

External peer-review was done through double-blind method.

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