Correlation between Cord Length, Birth Weight and Length of Neonates Following Delivery at a Tertiary Centre, Southern Nigeria

Dennis O. Allagoa[1], Kotingo E. L[2]
[1]*BMedsc (Pharm), MBBS, FWACS, FMAS, DMAS, CERT ART, Dip HSM, FICS,* [2]*MBBS, DMAS, FMAS, FWACS., Consultant Obstetrician /Gynaecologist, Department of Obstetrics and Gynaecology, Federal Medical Centre, Yenagoa, Bayelsa state, Nigeria*

Abstract

BACKGROUND: *The baby's life hangs by a cord, making the umbilical cord the lifeline of the fetus. However, there is a major setback in this part of the world due to sociocultural practices of handing over the placenta and umbilical cord to family relatives for disposal, hence limiting anthropometric or biomedical studies.*

OBJECTIVES: *This study aims to identify the relationship between the umbilical cord length, birth weight and new born length.*

METHODS: *This is a prospective observational study including 486 pregnant women who presented with labour pain and were enrolled on admission to labour ward. Paturients who met the inclusion criteria were recruited consecutively and labour was then monitored partographically. Examination of umbilical cord post delivery was done, weight and length of the newborn measured. A structured self-administered questionnaire was designed and used to collect information from the paturients. The data was processed using SPSS windows version 22.*

RESULTS: *The average umbilical cord length was 55.6 ± 7.6 cm and average baby's length was 48.9 ± 3.0 cm. The mean birth weight was 3.1 ± 0.6 kg. There was a positive correlation of 0.00 between cord length, birth weight and new born length.*

CONCLUSION: *There was positive relationship between the umbilical cord length, new born weight and length albeit negligible in this study. However, health education on the importance of detailed examination of the umbilical cord and placenta by skilled birth attendants is advised.*

Keywords: Umbilical cord length, Birth weight, Birth length

I. INTRODUCTION

Ian Donald aptly describes the importance of the umbilical cord by saying "The baby's life hangs by a cord" [1]. The umbilical cord is thus the lifeline of the fetus. In other words, the umbilical cord is one of the most important parts of the fetoplacental unit. Different authors correlate umbilical cord length with fetal activity and movement even though it is not completely understood what controls cord length, Nevertheless, it is believed that sufficient space in the amniotic cavity for movement and the tensile force applied to the umbilical cord during fetal movements are two main factors that determine cord length [2].

There is appreciable variation in the length of the umbilical cord with extremes varying from no cord (achordia) to 300 cm, with diameters up to 3 cm [3]. About 5% of cords are shorter than 35 cm, and another 5% are longer than 80 cm [3]. At term the typical umbilical cord is 55 to 60 cm in length with a diameter of 2.0 to 2.5 cm [4].

Lengthy umbilical cords, defined as total length over 70 cm are associated with complications that can impact fetal life [5]. Long cords have both maternal and fetal associations. Maternal factors include systemic disease, delivery complications and increased maternal age. Fetal factors include fetal anomalies, increased birth weight and respiratory distress [5]. Infants with excessively long umbilical cords are found to be at significantly increased risk of brain imaging abnormalities and/or abnormal neurological follow-up [5]. In investigating the clinical significance of umbilical cord length in human pregnancies, a previous study found out that cord length was significantly related to birth weight [6].

Short umbilical cord, defined as total length less than 40 cm, are relatively uncommon. They occur in approximately 6% of pregnancies [7]. It suffices that shortness can be apparent (due to cord loops or entanglement) or real. The pathogenesis of short umbilical cords remains unclear. One major hypothesis to explain the ontogeny of the umbilical cord is the 'stretch hypothesis' which attributes the development of a short umbilical cord to intrauterine constraint [5]. The presence of a short umbilical cord

has been associated with antepartum abnormalities and risk factors for complications of labour and delivery [8].

Often no explanation for intrapartum complications is apparent. However suspected fetal distress or a failure of the fetus to descend properly during labour is not uncommon. Complications associated with long or short umbilical cord may explain this enigma. Excessively short cords have been associated with a delay in second stage of labour, irregular fetal heart rate, placental abruption, rupture of umbilical cord, inversion of uterus, birth asphyxia, and cord herniation. Excessively long umbilical cords are associated with cord prolapse, torsion, true knot entanglement around the fetus, and delivery complications. There are more cases of fetal distress, fetal anomalies, and respiratory distress [9].

Undisputedly, the umbilical cord and placental have been considered to significantly contribute to the perinatal outcome. In our environment on the contrary, several attempts at exploring its use has been limited due to paucity of information on the value of the umbilical cord and placenta during pregnancy. As though that was not enough, the situation is further worsened by the prevailing sociocultural believe which ensures that the placenta and umbilical cord is handed over to the relatives following delivery for disposal. This is a major setback in this part of the world in view of the prevailing challenges of new born and infant morbidity and mortality resulting from failed attempts at using the placental and umbilical cord for anthropometric or biomedical studies [10].

This study aims to identify the relationship between the umbilical cord length, birth weight, and new born length with the aim of contributing to improve new born and child health.

II. METHODLOGY

A. Study design

This is a prospective observational study of parturients in the Obstetrics and Gynaecology Department of Federal Medical Centre, Yenagoa, Nigeria, conducted from 1st of April 2017 to the 1st of August 2017.

B. Study area

Bayelsa state is a Southern state of Nigeria in the core of the Niger Delta, between Rivers state and Delta state.

C. Study population

This consisted of women in labour.

D. Eligibility criteria

Study population included 486 pregnant women who presented with labour pain and were enrolled on admission to labour ward.

Inclusion criteria:

- Gestational age ≥ 37 weeks.
- Spontaneous onset of labour.
- Singleton vertex presentation.
- In active phase of labour (Cervical os dilatation of 4 cm).

Exclusion criteria:

- Gestational age < 37 weeks.
- Induction of labour.
- Non vertex presentation.
- Multiple pregnancy
- Pregnancy with medical or obstetric complications.
- Those with Intrauterine fetal death or fetal anomalies.
- Elective Caesarean Section cases.

E. Sampling method

Paturients who met the inclusion criteria were recruited consecutively.

Labour was then monitored partographically, artificial rupture of membrane (ARM) done in active phase labour and oxytocin augmentation was used in cases with slow progress and inadequate uterine contractions.

Vaginal delivery or Emergency Caesarean Section for poor progress in labour due to Cephalopelvic Disproportion was recorded as mode of delivery.

Examination of umbilical cord: Post delivery, cord was double clamped and cut in between. The cut end of the cord up to fetal umbilicus and placental attachment were measured individually and the length summed up.

Weight and Length of the newborn: newborn was measured after cutting the cord within half an hour of delivery.

F. Study instrument

A structured self-administered questionnaire was designed and used to collect information from the paturients.

G. Data analysis

The data was processed using SPSS windows version 22. Two methods were used for analysis of data, descriptive and analytic. The descriptive statistics were done by examining the distribution of variables, while in the analytical statistics; t-test was performed for continuous variables, (Chi) square test used for categorical variables and the P value < 0.05 was considered statistically significant.

III. RESULTS

The age group 25 - 29 years constituted the modal age group with 189 (38.9%) of mothers. The mean age of

respondents was 28.6± 5 years with standard deviation of 4.9 years. The age of respondents ranged from 17 – 42 years. The mean birth weight was 3.1 ± with standard deviation of 0.6 kg.

Majority 335 (68.9%) of mothers were educated to secondary school level, while 112 (23.0%) of the mothers had tertiary education; 36 (7.4%) had primary education; and only 3 (0.6%) had no education. Majority 482 (99.2%) of the respondents were Christians. Most 324 (66.7) of the respondents were from the Ijaw ethnic group; followed by the Igbo ethnic group 115 (23.7%). The mode of delivery by mothers were mostly 386 (79.4%) by spontaneous vaginal delivery (SVD).

Table 1: Mean Cord length

	Mean	SD	Range
Cord length (cm)	55.6	7.6	53 (32 – 85)

The table above shows the mean cord length to be 55.6, Standard deviation 7.6 and the range of the cord length to be 32 – 85 cm.

Table 2: Prevalence of Cord length

Cord length (cm)	Frequency	Percent
Normal Cord length(40-70)	449	92.4
Short cord length	21	4.3
Long cord length	16	3.3
Total	486	100

The table above shows the prevalence of short cord to be 4.3% and long cord to be 3.3%.

Table 3: Correlation between cord length and baby weight.

	Birth weight	Test statistics
Cord length	**0.00**	**Pearson's (r)**

The table above shows a positive correlation of 0.00 between birth weight and cord length.

Table 4: Baby length

	Mean	SD	Range
Baby length (cm)	48.9	3.0	26 (33 – 59)

The table above shows the mean baby length to be 48.9, Standard deviation 3.0 and the range of the cord length to be 33 – 59 cm.

Table 5: Correlation between baby length and birth weight.

	Birth weight	Test statistics
Baby length	**0.00**	**Pearson's (r)**

The table above shows a positive correlation of 0.00 between birth weight and baby length.

IV. DISCUSSION

This is a hospital based study to determine the correlation between umbilical cord length, birth weight and length in an urban population of pregnant women with the aim of contributing to improve new born and child health.

The minimum umbilical cord length in this study was 32 cm and maximum 85 cm with a mean of 55.6 ± 7.6 cm. Similar findings were obtained in previous studies [4, 10, 11]. This was also supported by the fact that there is appreciable variation in the length of the umbilical cord with extremes varying from no cord (achordia) to 300 cm [3]. However, being a pilot study in our facility and state, a marker to differentiate between short cords and long cords was taken from a mean cord length as reported in the literature [12]. It was observed in this study that 92.4% of the umbilical cord length was within the normal limit (40 to 70 cm), giving a prevalence of short cords to be 4.3%, while that of long was 3.3%. This was also similar with findings from Federal Medical Centre, Owo which is a tertiary health centre in Ondo State, South Western Nigeria [10]. There was no relationship of umbilical cord length with ethnicity, parity and maternal age.

An Eastern Nigerian study of 1000 umbilical cords observed a mean length of 51.5 cm [13] with significant correlation with both infant and placental weight as well as continued increase in the mean until 42 weeks of gestation. An earlier South Western Nigerian study of 602 umbilical cord lengths measured at term following delivery had found a mean length of 57.5 cm with a significant positive correlation between cord length and birth weight ($r = 0.2177$, $p < 0.001$). [14] 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 al [10] with similar findings in the study by Suzuki and Fuse [15]. In our study, just as the above, there was a positive correlation of 0.00 between birth weight and cord length, however, according to the rule of thumb, this correlation was negligible. In addition, there was also a positive correlation of 0.00 between baby length and cord length, however, according to the rule of thumb, this correlation was also negligible.

In our environment, several attempts at exploring the use of umbilical cords has been limited due to paucity of information on the value of the umbilical cord and placenta during pregnancy. As though that was not enough, the situation is further worsened by the prevailing sociocultural believe which ensures that the placenta and umbilical cord is handed over to the relatives following delivery for disposal. This is a major setback in this part of the world in view of the prevailing challenges of new born and infant morbidity and mortality resulting from failed attempts at using the placental and umbilical cord for anthropometric or biomedical studies [10].

V. CONCLUSION

There is positive relationship between the umbilical cord length and new born weight and length albeit negligible in this study. However, health education on the importance of detailed examination of the umbilical cord and placenta by skilled birth attendants is advised.

REFERENCES

[1] Ian Donald. Practical Obstetric Problems. 1994; 417.
[2] Benirschke K. The Umbilical Cord. Neo Reviews. 2004; 5(4):34
[3] Berg TG, Rayburn WF. Umbilical Cord Length and Acid-Base Balance at Delivery. J Reprod Med 1995; 40: 9-12.75
[4] Yetter JF. Examination of the Placenta. Am Academy Fam Physician 1998;57(5):1045-1054.
[5] Baergen RN, Malicki D, Behling C, Benirschke K. Morbidity, mortality and placental pathology in excessively long umbilical cords: retrospective study. Paediatr Dev Pathol 2001; 4(2):144-153.
[6] Wu JF, Chang SY, Hsu TY, Kung FT, Chan TC, Hsieh CH. Multivariate analyses of the relationship between umbilical cord length and obstetric outcome. Changgeng Yi Xue Za Zhi 1996; 19(3):247-252
[7] Van den Broek N, Ntonya C, Kayira E, White S, Neilson J P. Preterm birth in rural Malawi: high incidence in ultrasound-dated population. Hum Reprod 2005; 20: 3235-3237
[8] Krakowiak P, Smith EN, de Bruyn G, Lydon- Rochelle MT. Risk factors and outcomes associated with a short umbilical cord. Obstet Gynaecol 2004; 103: 1119-1127
[9] Nilesh Unmesh Balkawade and Mangala Ashok Shinde. Study of Length of Umbilical Cord and Fetal Outcome: A Study of 1,000 Deliveries. J Obstet Gynaecol India. 2012 Oct; 62(5): 520-525.
[10] Ogunlaja OA, Ogunlaja IP. Correlation between umbilical cord length, birth weight and length of singleton deliveries at term in a Nigerian population. RMJ Vol.72 (3); September 2015.
[11] Mutihir JT. Annals Of African Medicine, 2006.Vol 5, No.4 pp 192-196.
[12] Gupta S, Faridi MMA, Krishnan J. Umbilical Coiling Index. J Obstet Gynaecol India 2006; 56(4):315-319.
[13] Adinma JI. The umbilical cord: a study of 1,000 consecutive deliveries. Int J Fertil Menopausal Stud 1993;38(3):175-9.
[14] Agboola A. Correlates of human umbilical cord length. Int J Gynaecol Obstet. 1978;16(3):238-239.
[15] Suzuki S, Fuse Y. Length of the umbilical cords and perinatal outcomes in Japanese Singleton Pregnancies Delivered at Greater Than or Equal to 34 Weeks ' Gestation. J Clin Gynecol Obstet .2012;l (4-5) : 57 -62.