CORRELATION OF UMBILICAL CORD THICKNESS WITH FETAL BIRTH WEIGHT- A PROSPECTIVE STUDY IN RURAL BENGAL

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ABSTRACT: AIMS: Aim of our study in this area of Bengal to assess the correlation of ultrasonic measurements of umbilical cord thickness in between 20–30 weeks with low birth weight babies. Materials and methods: The prospective study was done from March 2014 to December 2014 among 150 pregnant women who were referred for routine USG after 20 weeks of gestation. 139 met the criteria fixed by us. In these patients the diameter of cord were measured in a free loop of umbilical cord. The pregnancies were followed till delivery when birth weights of the babies were recorded. **RESULTS:** Correlation between lean umbilical cord and low birth weight were statistically observed with sensitivity of 55.5%, specificity of 94.3%, and positive predictive value of 68.18% and negative predictive value of 90% and were significant. Correlation also noted lean umbilical cord with low birth weight (P 0.01). CONCLUSION: Umbilical cord thickness by USG after 20 weeks are helpful to asses low birth weight and thus the important denominator for adverse pregnancy results.

KEYWORDS: Correlation, Umbilical cord thickness, Fetal birth weight.

INTRODUCTION: Evaluation of Umbilical Cord structure in post-partum period by pathologist showed that thin cord corroborated with poor pregnancy outcome.^{1,2} A thin cord was reported to be correlated with small for gestational age by Raio et al.³ A few observer found significant differences in mean gestational age, mode of delivery, birth weight and poor perinatal outcome between fetuses with thin umbilical cord and non-thin umbilical cord in the first and 2nd trimester of gestation.4,5,6

This study examines the value of umbilical cord thickness in predicting fetal birth weight in remote areas of Bengal where low birth weight and infant mortality rate are still high.

MATERIALS AND METHODS: This prospective study involved 150 pregnant women undergoing routine USG evaluation between March 2014 to December 2014.

Following Patients are selected:

- 1. Single fetus.
- 2. Reliable gestational age (>20 weeks gestation)
- 3. Normal amniotic fluid volume.
- 4. Presence of three vessel umbilical cord.
- 5. Educated mother.

Patients were excluded whose have any fetal congenital defects or any maternal disorder (i.e. Diabetes Hypertension, PET, chronic liver disease) that may influence with fetal growth or if the patient could not be followed till delivery.

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Gestational age was calculated on LMP (as stated by mother) or USG examination before 20 weeks of gestation. Routine obstetrics USG was performed in all the cases and normal amniotic fluid volume (AFI) was confirmed. Gross congenital fetal abnormalities were ruled out. The umbilical cord thickness was then measured in a free floating loop of umbilical cord using USG machine software. Examinations were performed using standard USG scanners using 3.5/5MHZ convex transducer.

Measurements were performed by making the outer edges of the umbilical cord for thickness in transverse diameter. Patients were followed till delivery. All deliveries are done in hospital setups with most of the deliveries were done by caesarean section and weights of the babies were recorded by standard weighing machine along gestational age.

The newborns were considered low birth weight (LBW) where the birth weight is below 2000gm and macrosomia was defined as birth weight above 4000gm. Umbilical cord diameter was considered lean if below 10th percentile and thick if above 90th percentile.

RESULTS: Within the study period, out of 150 patients 139 patients fulfilled the inclusion criteria. The mean maternal age 24 years (Range 19–30yrs) most patients delivered at term and mean gestational age at delivery 37 weeks (range 34 to 41 weeks). The mean birth weight 2.6 kg (range 1.7 kg to 4.2 kg) most newborns had normal Apgar score.

When the proportion of LBW neonates was compared between these groups, it was revealed that LBW was strongly correlated with thin umbilical cord (thickness below 10^{th} percentile in transverse diameter).

Out of 139 patients, 16 have lean cord, 112 patients have normal cord thickness and 11 patients have thick cords. Out of 16 lean cords, 15 have birth weights below 2 kg and 1 has birth weight more than 2 kg. Out of 112 normal thickened cords, 105 have birth weights more than 2 kg and 7 have birth weights less than 2 kg.

Out of 11 thickened cords 7 have normal birth weight between 2 – 4 kg, but 2 have birth weight more than 4 kg. Meconium staining found in 4 cases. We have found that low birth weight babies are associated with umbilical cord thickness below 10^{th} percentile. (P< 0.01).

Descriptive statistics for Umbilical Cord parameters

	Min.	Max.	Mean	10 th Percentile	90 th Percentile.
Thickness	0.77	2.14	1.43	10.2	17.5

Predictive values of Umbilical Cord thickness for LBW.

	Sensitivity	Specificity	PPV	NPV
Cord thickness	55.5%	94.3%	68.18%	90.6%

[PPV = Positive predictive value, NPV = Negative predictive value]

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DISCUSSION: Wharton's jelly surrounding the cord vessels within amniotic membrane in cord, protects cord vessels. Wharton's jelly amount may be reduced due to extra cellular dehydration or due to reduction in extra cellular matrix the causes cord vessels to be compressed or bended.^{2,3} Morteza et al also found that umbilical cord thickness and cross sectional area below 10th percentile corroborated with low birth weight fetuses having sensitivity 52% and specificity 95%,⁷ almost identical to ours study. Miladene Predanic et al found umbilical cord thickness or cross sectional area correlate well with fetal biometry and lean cord below 10th percentile increased the risk for small for date fetuses at delivery.⁸

Diminution of umbilical vessels has been found in IUGR, having umbilical arterial flow pattern abnormal. So it can be inferred that reduction in umbilical cord thickness can compromise fetal growth and there by LBW babies result causing high infant mortality rate.⁹ this is particularly very important in our region. The present study has shown the correlation between umbilical cord thicknesses with LBW.

LBW may be the result of IUGR, preterm delivery or both and is a major factor affecting neonatal and infantile mortality. LBW likely reflects the disease process which is associated with reduction in Wharton's jelly content.

It is concluded from ours study that umbilical cord thickness in free floating state are easily measured by USG and correlated well with LBW. So routine antenatal use of cord thickness may be helpful in pinpointing the fetuses at risk where the LBW and infant mortality are of major concern.

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