

Correlated of Some Parameters of Placenta and Umbilical Cord with the Newborn Baby

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Abstract

Background :umbilical cord is a fetomaternal tubular organ; it has been described as “dairy of intrauterine life”; this remarkable organ responsible for living of the bay for about 266 days, Where the source of food and oxygen from the mother to the fetus as well as the disposal of waste. **Patients and methods** :209 umbilical cord and their placentae were studied thoroughly and the mothers ages were 15 -< 45 years old .The length and diameter of the umbilical cord, Wharton’s jelly ,placental weight and umbilical cord insertion were measured .The babies weights were measured and their gender were assigned. **Results**: current study showed the umbilical cord parameters (length and diameter) have no correlation to mothers’ age groups only in the length and diameter means there were Simple drop in group 1(15_19 year old) and the diameter group 7 (>45 year old).The umbilical cord knots percentage was normal in comparison to other studies. The study of Wharton’s jelly were correlated with baby’s weight was significant, whenever baby weight increases the Wharton’s jelly increase. And when the Wharton’s jelly Correlate with placenta weight in gm. There was significant correlation.

Keywords : *placenta; umbilical cord; newborn baby.*

Introduction

Plenty of inventions have been made by human beings beside mind and inspiration had made high influence, but the most remarkable development of all is a human being; how human come to be. In particular, the development of a new human life heavily depends on umbilical cord and placenta, an organ whose anatomy and histology ensure the nourishment of a developing baby ⁽¹⁾.

The umbilical cord is thin, long tube-like structure that is needed to form a connection between the fetus and the placenta in the mother’s uterus. To provide

sufficient and effective circulation of the blood to the growing fetus, the umbilical cord has one vein which carries oxygenated rich blood and two arteries which carry deoxygenated blood. These three blood vessels coil around in a helical Configuration to form the umbilical cord or the umbilical cord is a helical and tubular blood conduit connecting the fetus to the placenta ⁽¹⁾.

Umbilical cord achieves its final form of development by the 12th week of gestation and normally contains two arteries and a single vein; all embedded in Wharton’s jelly (Figure 1) ⁽²⁾.

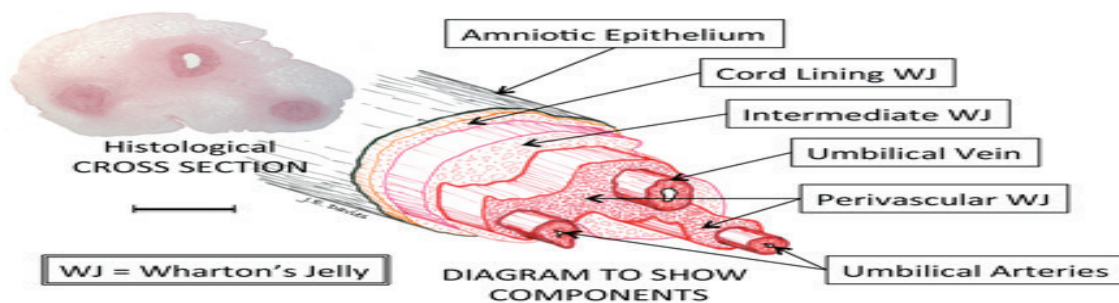


Figure 1: Diagram of umbilical cord at term

At term the umbilical cord has an average length of 43–94.5 cm (3). The umbilical cord arteries and vein are unlike their counterparts in the remainder of the foetal body as the umbilical cord vein transports oxygenated blood to the fetal heart, while the two arteries return oxygen-depleted blood to the placenta⁽³⁾.

Umbilical cord is physiologically and genetically part of the fetus and (in humans) normally contains two arteries (the umbilical arteries) and one vein (the umbilical vein), buried within Wharton's jelly. The umbilical vein supplies the fetus with oxygenated, nutrient-rich blood from the placenta. Conversely, the fetal heart pumps low oxygen containing blood, nutrient-depleted blood through the umbilical arteries back to the placenta⁽⁴⁾.

The aim of the study is to find umbilical cord parameters (length and diameter) by using gross anatomical study and calculate the Wharton's jelly in umbilical cord and find the knot of umbilical cord.

Materials and Method

During the period from March 2018 till Jun 2019, more than 209 placentas with its umbilical cord were collected from deferent labor room after vaginal delivery or theaters room after Caesarean section in Gynecology and Obstetrics department from various provinces like Kirkuk and salah-aladin, samples have been studied anatomically. 120 placenta and umbilical cord were collected from the delivery room in Bejei hospital these examined anatomically, and 89 placenta and umbilical cord were collected from delivery room in Kirkuk teaching hospital these were examined anatomically.

Regarding the mothers ages they were divided into 7 age groups (Group 1 – Group 7) with 5 years interval, starting from 15 - > 45 years old, and number of placenta and umbilical cord collected according to the mother's age groups.

Anatomical study of the placenta and their Umbilical cords

Regarding the placenta and umbilical cord after delivery and their separation from the babies, they were placed on a towel, cleaned and then studies anatomical gross by tape measure and the data were mentioned in and according to a questioner paper done for each mother.

In the beginning the placenta were weighted and baby's weighing device present in the delivery room, so the placenta and baby's weights in grams were measured by the same weighing device.

Regarding the umbilical cord, the type of their insertion to the placenta were mentioned, then their lengths were calculated in which after delivery of the baby the umbilical cord is clamped at two sits one near the baby and other near the mother then cut to handle the baby and taken for further management, waiting for the delivery of the placenta from the mother which occurs about 10 min later and sometime up to 30min, so the length of the umbilical cord was measured with flexible rubber length gauge and the summation of three measurements, one from the placenta to the clamped site, the other from the baby to the other clamped site and the last between the two clamping sits by the tape measure.

The umbilical cord diameters were measured in centimeters by the Vernier. The umbilical cord knots were calculated regardless their type whether true or false knots.

Measuring method of Wharton's jelly:

This study Included 54 women who visited the Tikrit Teaching Hospitals maternity department and Kirkuk Teaching Hospital's maternity department and pregnancy at 37–42 weeks of gestation. Gender, gravity, parity, weight gained during pregnancy and gestational age verified by the last cycle of menstruation or first trimester ultrasound were reported for each subject or EDD. The umbilical cord with three intact vessel structures was collected after delivery of the vaginal or cesarean section and after proper separation of the placenta.

Was cut 5 centimeter from the umbilical cord is cut by a Sharpe scalpel approximately 30 cm from the attachment of the umbilical cord to the placenta. Place the specimen in a normal saline solution, then clear the blood vessels from blood and measure the sample by sensitive balance with tolerance to 0.01 g. In individual containers, cord parts are incubated in 10% formaldehyde for 10 minutes.

The section of the cord was weighed again after removal and drying Smoothly isolated the cord vessels and membranes from the jelly of the Wharton's and the weight of the Wharton's Jelly was obtained using a scalpel. The volume of the Wharton's jelly was measured by calculated the amount of water displaced in a volume measurement jar when the Wharton's jelly was placed. Wharton's jelly density [Wharton's jelly (g)/water (mL)] was calculated.

Findings

The umbilical cord is appeared flexible, tube-like structure that has a spongy appearance, smooth, surrounded in a jelly-like substance, color yellowish-green. Conduit between the fetus and the placenta.

(Usually the umbilical cord lining membrane extension of the amniotic membrane covering the placenta. The umbilical cord lining membrane comprises two layers: the amniotic (or epithelial) layer and the sub-amniotic (or mesenchymal) layer and inside of umbilical cord gelatinous fluid called Wharton's jelly. It comprises two arteries (the umbilical arteries) and one vein (the umbilical vein). Figure 2



Figure(2): Umbilical cord

The following parameters were inspected and measured in the umbilical cords shown in (Table 1). According to the mothers age groups, there were no differences in umbilical cord length means only in the length and diameter means there were Simple drop in group 1 (15_19 year old) and diameter in group 7 (>45 year old) as shown in (Table 2).

Table (1) parameters of umbilical cord

parameter	frequency	Minimum	Maximum	Mean	Std. Deviation
Cord length	209	43.00	94.50	63.49	7.00
Cord diameter	209	0.3	2.50	1.31	.46

Table (2) Mean of cord length and cord diameter by mean age group.

Age group	frequency	Cord length		Cord diameter	
		Mean	Std. Deviation	Mean	Std. Deviation
14-19	44	62.84	6.59	1.18	0.44
20-24	42	63.44	6.36	1.38	0.40
25-29	43	63.83	6.63	1.37	0.49
30-34	39	64.53	7.89	1.37	0.51
35-39	21	64.33	7.37	1.35	0.45
40-44	12	63.08	8.39	1.39	0.38
45-	8	64.25	8.34	1.33	1.33

The following the result emerged after part of the umbilical cord was taken (5 cm), Mean of Wharton's jelly weight in gm. 4.92 ± 0.84 g, and mean volume 3.53 ± 0.87 ml. The mean Wharton's jelly density 1.45 ± 0.98 gm./ml (table 3).

Table (3) values of Wharton's jelly at 5 cm weight, volume and density.

Item	Mean \pm SD	maximum	Minimum
Wharton's jelly weight in gram	4.92 ± 0.84	6.21	3.35
Wharton's jelly volume in ml.	3.53 ± 0.87	5.41	1.80
Wharton's jelly density in gm/ml	1.45 ± 0.98	2.46	0.98

The mean Wharton's jelly weight in gm. were Correlated with mean babies weight there was significant correlation, whenever baby weight increases the Wharton's jelly increase, also The mean of Wharton's jelly in gm. were Correlated with Mean of placenta weight in gm. There was significant correlation (Table 4).

Table (4) Correlation between means Wharton's jelly weight and mean of baby weight and Mean of placenta weight

Mean of baby weight	Mean of Wharton's jelly weight in gm.	Correlation	p.value
$3.22 \pm .51$	4.92 ± 0.84	0.895**	S.
640.72 ± 51403	4.92 ± 0.84	0.290	S.

S: Significant

Discussion

In this research the umbilical cord parameter was studied anatomically (length and diameter) in this study the mean length of umbilical cord was 63.49 and in a range 43-94 cm, while the mean diameter was 1.31 cm. and in a range 0.3-3.50cm.in its diameter; these values and range studied and provide by shipp *et al.*,⁽⁵⁾ weeks⁽⁶⁾, Krakowiak *et al.*,⁽⁷⁾.

In this work, there was no correlation of the mean umbilical cord length with mother age groups while the diameter means there were decreases in group 1(15_19 year old) and group 7 (>45 year old).

The umbilical cord knots were present in about 5.3 %, this disagrees with the percentage in European countries where the percentage is about 1% only which was studied by Karina *et al.*,⁽⁸⁾. The Wharton's jelly was calculated in 54 women in 5 cm. the men Wharton's jelly weight 4.92 ± 0.84 gm. in the range 3.35- 6.21 gm., men Wharton's jelly volume 3.53 ± 0.87 ml. and in a range 1.80-5.41 ml. the mean density of umbilical cord was 1.45 ± 0.98 ml/gm. and the range 0.98 - 2.46 ml/gm. and the men Wharton's jelly weight was correlated with the mean baby weight in gm. and with mean of placenta weight gm. this agrees with study in Turkey by Filiz⁽⁹⁾.

The study of babies' weight shows, mean of babies weight was 3.22 ± 0.51 gr. And this value correlated with the mean placental weight, is significant, whenever the babies weight increase their placental weight also increase this is proved by Sultan *et al.*,⁽¹⁰⁾ and Kaplan⁽¹¹⁾.

The correlation between mean baby's weight and mean length and mean diameter of umbilical cord was non-significant. that was disagree to what has been claimed by Rio *et al.*,⁽¹²⁾ who said that there is a significant relation found between umbilical cord length and diameter with baby weight. in the correlation between baby gender with the umbilical cord length and diameter was no significant. This has been supported by the study in Columbia University, USA by Mills *et al.*,⁽¹³⁾.

Conclusion

1) The best parameter regarding the umbilical cord, both grossly and ultrasonography, found in the

mothers aged between 20-35 years old, which reflected on their babies' weight and health.

2) Umbilical cord parameter does not correlate with the maternal age, including umbilical cord length and diameter of umbilical cord.

Umbilical cord knot presence is randomly not dependent on the age of the mother; only the length of the umbilical cord sometimes affects the presence of the node; the longer the umbilical cord, the more likely the nodes are present. *Wharton's jelly weight (in gram) was correlated with mean baby weight; there was a significant correlation, whenever baby weight increases the Wharton's jelly increase. When correlated with mean of placenta weight (in gram), there was significant correlation, whenever placenta weight increases the Wharton's jelly increase.

Conflict of Interest : none

Source of Funding : self

Ethical Clearance : From patients and my college.

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