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Morphological Study of Human Placenta in North Karnataka Region

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ABSTRACT
Placenta is an essential materno-fetal organ that fulfills wide range of fundamental functions for maintenance of pregnancy. All the Eutherian mammals possess definitive placenta for nourishing their young in intra-uterine life. Its complex vascular system that allows transfer of nutrients and oxygen between maternal and fetal circuits, therefore successful development, growth and maturity of placenta is vital for fetal growth and survival. Placenta depicts the intra-uterine condition of an infant, thus gross examination of placenta gives us the idea of factors endangering the fetus in perinatal life. Although normal standards have been established, very few studies are present on morphology of placenta in North Karnataka population. The present study was carried out to observe any gross morphological change in placenta of normal individuals in North Karnataka region. Hundred placenta were carried to study area-Dept of Anatomy, Mahadevappa Rampure Medical College, Kalaburagi from labor room and OT of Sangameshwar Hospital attached to the college, washed and blot dried. Maximum diameter was noted, radius obtained and surface area was calculated using the formula. Placental weight was recorded by measuring on the weighing machine. Cord attachments were noted. 92% of placenta were circular and 8% were oval in shape. Diameter was <15 cms in 6%, 16- 20 cms in 75%, >21cms in 9%. Surface area was 100-200 cms^2 in 9%, 201-300 cms^2 in 64%, 301-400 cms^2 in 25%, >401 cms^2 in 2%. Placental weight was between 300-400 gms in 19%, 401-500 gms in 46% and >501 gms in 35%. Umbilical cord insertion on fetal surface was found to be central-54%, Paracentral-27% and Peripheral-19%. From the study we know that average placental parameters are within normal ranges. Morphometric analysis of placenta with its clinical relevance proves to be useful in the early assessment of placental insufficiency and also the state of fetal well being. Placenta, umbilcal cord, fetal surface, placental weight.

INTRODUCTION

The word "PLACENTA" is derived from a Greek word "PLAKUOS" which means "FLAT CAKE". Placenta is the most accurate record of infant's prenatal experience. Thus gross examination of placenta gives us the idea of factors endangering the fetus in perinatal life. Placenta during ancient days was known as "AFTERBIRTH" and knowledge of the Afterbirth goes far back into the human history and reference is found in many age old literature including the old testament of Bible, where in Placenta is designated as "EXTERNAL SOUL" being tied up in the "Bundle Of Life" the umbilical cord[1]. Human Placenta is Discoidal, Deciduate, Haemochorial, Chorioallantoic and Labrynthine type of Materno-fetal organ that fulfills wide range of fundamental functions for maintenance of pregnancy.

At term the expelled Placenta is flattened, discoidal mass with an average volume of 500ml, weight 470 gms, thickness 23 mm, diameter 185 mm and surface area 30,000 sq mm. It has two surfaces Maternal surface is rough and irregular, marked by numerous fissures which separate number of polygonal areas known as cotyledons (15-30) and Fetal surface is smooth covered by amnion and umbilical cord is attached to this surface most commonly near its center[2]. These two surfaces meet at periphery, resulting in a peripheral margin. It weighs about 1-6th the fetal weight[3].

Placenta is the only source of life for fetus and organ of union between mother and fetus in utero. It has complex source of vascular system that allows transfer of nutrients and oxygen from maternal to fetal circuits and transfer of excretory products from fetal to maternal circuits. In addition, placenta also secretes hormones such as Human Chorionic Gonadotrophin, Placental Estrogen, Placental Progesterone and Placental Lactogen/Somatomammotrophin, which provide easy pathway and safe place for the growing fetus. It provides immunity so that fetus is not recognized as a foreign body and accepted by mother as her own. Placenta protects fetus against certain diseases. Therefore successful development, growth and maturity of placenta is vital for fetal growth and survival. This organ should be properly examined and inference concluded, as it provides record of infant's life. Since it is materno-fetal organ, knowledge of placenta can help to plan future care for child and mother.

MATERIALS AND METHODS

Study was conducted in the Department of Anatomy, M. R. Medical College, Kalaburagi. Placenta were collected from labor room and operation theater, from Sangameshwar Hospital attached to college. Placenta collected were washed and preserved in 10% formalin and carried to the study area. Total of 100 placenta were studied. Placental parameters studied shape, diameter (measuring tape) surface area (calculated using the formula) placental weight (weighing machine) and site of umbilical cord insertion noted.

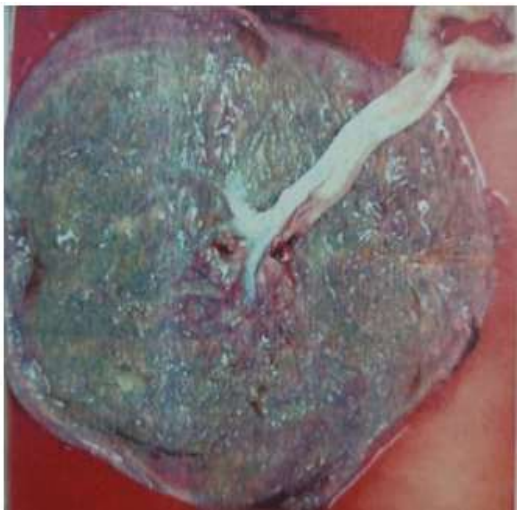

Fig. 1: Central UC

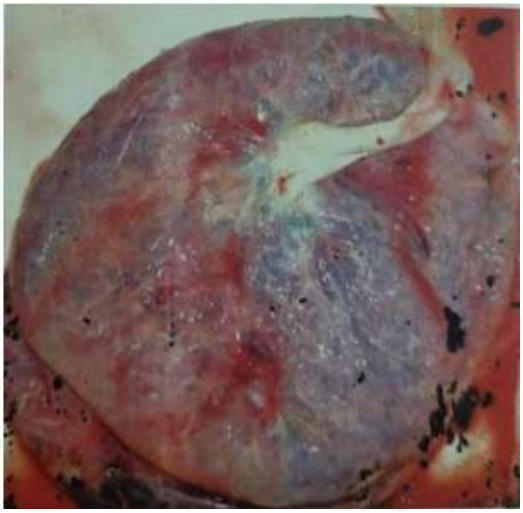

Fig. 2: Paracentral UC

Study included maternal age group from 18-35 years with average height and weight. Gestational age ranging from 37-42 weeks. Study excluded Hypertensive, Diabetic, Anaemic, twin, preterm and other abnormal pregnancies. Descriptive Statistical Analysis was carried out. Results on continous measurements were presented on Mean±SD and results on categorical measurements were presented in number (%).

RESULTS

Nineteen percent of placenta were circular and 8% were oval in shape. Diameter was <15 cms in 6%,

Fig. 3: Peripheral UC

1: Percentage distribution and Mean±SD of Placental Parameters

Variables	% distribution (100)	Mean±SD
Shape		
Circular	92 (92%)	
Oval	8(8%)	--
Diameter		
≤15 cms	6 (6%)	
16-20 cms	75(75%)	18.48±2.01
≥21 cms	19 (19%)	
Surface Area: (cms^2)		
100-200	9 (9%)	
201-300	64 (64%)	272.7±60.34
301-400	25 (25%)	
≥401	2 (2%)	
Placental weight		
300-400 gms	19 (19%)	
401-500 gms	46(46%)	476.2±36.54
≥501 gms	35 (35%)	
Cord insertion		
Central	54 (54%)	
Paracentral	27 (27%)	--
Peripheral	19 (19%)	

16-20 cms in 75%, >21 cms in 9%. Surface area was 100-200 cms^2 in 9%, 201-300 cms^2 in 64%, 301-400 cms^2 in 25%, >401 cms2 in 2%. Placental weight was between 300-400gms in 19%, 401-500gms in 46% and >501 gms in 35%. Umbilical cord insertion on fetal surface was found to be central (Fig 1) 54%, Paracentral (Fig 2) 27% and Peripheral (Fig 3) 19%. Mean±SD were 18.48±2.01, 272.7±60.34 and 476.2±36.54 of diameter, Surface area and placental weight respectively. 1: Shows the result of present study.

DISCUSSION

Gunapriya *et al.* in their study on 101 Placenta found 94 to be circular and 7 oval[4]. average PW 528.55 gms. Dhinesh Kumar and Muthuprasad in their study on 50 placenta found 30 (60%) circular, 19 (38%) oval and 1(2%) triangular[5]. In circular placenta, there is circular and regular regression of surrounding chorion leaving a rounded disc at chorion frondosu Multiparous women provides more favourable condition for placental development and function by remodeling of maternal vasculature through previous pregnancies[6].

Salafia *et al*. in their study on 24,061 placenta found mean diameter to be 19.0 in primi, 19.1-19.5 in multi's of different parities , average SA as 247.7cms^2 mean PW 427.9 gms in primi and 439.6-459.5 gms in multi's of different parities[7]. Chung *et al.* in their study on 340 placenta found average SA to be 276 cms^2 [8]. ManopJanthnaphan in his study on 238 placenta opined average PW to be 519 gms[9]. 2 Shows the morphometric comparison of present study with different authors. Rath *et al.* in their study on 74 Placenta opined UC insertion as 18(24%) 20 (27%) and

2 : Comparison of placental morphometric variablZ

Variables	Present study N = 100	Gunapriya *et al.*[4] N = 10	Dhinesh kumar and muthuprasad[5] N = 50	Salafia *et al.*[7] N = 24,061	Chung *et al.*[8] N = 340	ManopJanthnaphan[9] N = 238
Shape						
Circular	92 (92%)	94	30 (60%)	---	---	---
Oval	8(8%)	07	19(38%)			
			01 (02%)-T			
D (cms)	18.48	---	---	19.0 in primi,	19.1- 19.5 in multi's	---
SA (cms^2)	272.7	---	---	247.7	276	---
PW (gms)	476.2	528.55	---	427.9 in primi and 439.6-459.5 in multi's	---	519

3: Comparison percentage of UC insertion

Site	Present study N = 100	Rath G *et al.*[10]	Dhinesh kumar and muthuprasad[5]	N.K. Arora *et al.*[11]	Abeer zubair khan *et al.*[12]
Central	54 (54%)	18(24%)	13 (26%	5 (15.62%)	53 (70.67%)
Paracentral	27 (27%)	20 (27%)	27 (54%)	19 (59.38%)	19 (25.33%)
Peripheral	19 (19%)	36(49%)	9 (18%)	6(18.75%)	3 (4%)
Velamentous	--	--	1 (2%)	1(3.12%)	--
Furcate	--	--	--	1(3.12%)	--

36(49%) central, paracentral and peripheral respectively[10]. Dhinesh Kumar and Muthuprasad mention UC insertion to be 13 (26%) 27 (54%) 9 (18%) and 1 (2%) central, paracentral, peripheral and velamentous respectively[5]. Arora *et al*. in their study on 32 Placenta opine 5 (15.62%) central 19 (59.38%) paracentral, 6(18.75%) marginal, 1(3.12%) velamentous and 1(3.12%) furcate[11]. Abeer Zubair Khan *et al.* their study on 75 control group (normal pregnancies) found UC as 53 (70.67%) central, 19 (25.33%) Paracental and 3 (4%) peripheral[12]. 3 Shows comparison of UC insertion.

CONCLUSION

Placenta enjoys much attention as an organ of union between mother and fetus in-utero and is the only source of life for fetus during that period. As the fetus grows, owing to the needs of fetus many morphometric and functional changes happen in the placenta. Thus, placenta provides near accurate record of intra uterine journey of fetus. Every placenta before discarding should be examined. With advent of advanced technologies such as the gray scale ultrasound and colour doppler imaging, an adequate knowledge of the morphometric analysis of placenta with its clinical relevance proves to be useful in the early assessment of placental sufficiency and also the state of fetal well being. Therefore the present study was conducted to know the morphometry of placenta in North Karnataka region.

Abbrevation:

- D-Diameter
- T-Triangular
- SA-Surface Area
- PW-Placental Weight
- UC-Umbilical Cord

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