Study Of Anthropometric Indices Of Human Placenta

Dr. Paras S. Shrimankar*; Dr Dipali J. Trivedi*;Dr. Tejal Patel*

* Associate Professor, Department of Anatomy, B.J. Medical College, Ahmedabad, Gujarat.

Abstract: The aim of the study is to determine birth weights, placental weights and feto-placental ratio in consecutive, live singleton term births and study their relationship with some maternal and fetal factors. Method: Fifty placentae were obtained from the labour room of the department of obstetrics and gynecology , Civil hospital, Sola , Ahmedabad between September to December 2010. Each placentae was weighed and the feto-placental ratio and insertion percentage was calculated. Maternal data, including name, age, hospital number, date of last menstrual period, parity, duration of pregnancy, hematological findings and the gestational age were recorded and correlated with birth weight and placental weight. Result: There was 52% of female and 48 % of male babies. The mean birth weight of female babies was 2.58 Kg and that of male babies was 2.69 Kg . The mean placental weight of female babies was 472.70 gms and that of male babies was 513.75 gms. The mean feto-placental ratio of female and male babies was 5.46 and 5.28 respectively. The mean placental weight was found lower with mother's age < 20 years , increase number of parity and Hb less than 8 gm %. The mean placental weight was found slightly higher in mother's with blood group A +ve and AB +ve. The site of insertion of umbilical cord was central in 40 %, medial in 38 %, lateral in 14 % and marginal in 8 %. The birth weight of babies was directly proportional to their placental weight. Conclusion: With extra precautions for the factors reducing placental weight and or birth weight one can reduce further risk to mother and foetus .[Shrimankar P et al NJIRM 2013; 4(1) : 67-71]

Key Words: placenta, placental weight, insertion of umbilical cord, fetoplacental ratio

Author for correspondence: Dr Dipali J. Trivedi , Associate Professor, Department of Anatomy, B.J. Medical College, Ahmedabad, Gujarat.. E mail: pandyadm@yahoo.co.in

Introduction: The placenta ' The life of the fetus in utero 'functions delivery to support the growth of the foetus, interacts with the two individuals, the mother and the developing foetus . It is the most accurate record of the infants prenatal experiences. It is genetically and biologically part of the foetus[1].

It has metabolic, endocrine, immunogenic functions and also forms a barrier, the placental barrier filtering noxious substances from the baby. Many abnormalities in the babies have been traced to problems in the placenta. The gross examination of and specially the weight of the placenta has been found to be relevant as source of immediate information in the delivery room for the pediatrician on the intrauterine well being of the baby. Placental weight is also known to have a direct relationship with birth weight. This shows that what affects the placenta is also likely to affect the baby[2].

The present study is therefore to access the relationship between placental weight and birth weight , insertion of umbilical cord and effect of some other maternal factors like age, parity including haematological findings on the placental weight.

Material and Method: Before the commencement of the study, informed consent was obtained from hospital authority as well as the parents of each baby. Permission as well as co-operation was obtained from the consultants and the nursing staff of the maternity and neonatal units. Fifty placentae were obtained from the labour room of the department of obstetrics and gynaecology , Civil hospital, Sola , Ahmedabad. Normal placentae were obtained from uneventful pregnancies ending at term.

Each placenta was held by the cord under running water to wash off the blood smears and clots and surfaces dried between blotting papers. The umbilical cord was cut 4 cms from the site of insertion. The chorion was striped from amnion and the maternal surface was examined for : colour, completeness of the cotyledons and any abnormalities. The fetal surface was examined for: colour, insertion of the cord, distribution of the blood vessels, number of the blood vessels in the cord, state of the membrane and presence of deposits/infarcts. The placental weight and baby's

weight were taken using a portable single pan weighing balance (weighing to the nearest 10gm) and fetoplacental ratio was calculated.

The minimum distance between the site of insertion and the margin of placenta was measured with a measure tap and denoted as "d". Assuming the placenta to be a perfect circle, the distance between two farthest points on the placenta was taken and then radius (r) was calculated from it. The insertion percentage i.e d/r X 100 was then worked out. A low insertion percentage implied a marginal insertion, while a high insertion percentage indicated a centrally attached umbilical cord. Each placenta was classified in four categories depending on insertion percentage i.e central, medial, lateral and marginal. Relationship between placental weight and insertion percentage was noted down[3].

Maternal data, including name and age, hospital number, date of last menstrual period, parity, duration of pregnancy, hematological findings and the gestational age were recorded and correlated with birth weight and placental weight. Maternal history including any illness during pregnancy especially anaemia, malaria, pregnancy induced hypertension and diabetes mellitus were also recorded.

Observation :

Table – I Relationship between placental weight , birth weight and sex of the baby.

Weight of the baby (kg)	Sex of the baby		Weight of the placenta (gms)	Sex of the baby	
	Male	Female		Male	Female
≤ 2 Kg	-	1	300-400	0	6
2- 2.5	9	14	401-500	15	13
2.6- 3	11	10	501-600	7	7
> 3 Kg	4	1	601-700	2	-
Total	24	26	Total	24	26

Table- I shows that out of 50 babies, 24 were males and 26 were female babies. Most of the babies (44) have weight ranging from 2 -3 Kg whereas placental weight ranges between 401-600 gms in 42 cases.

Table – II Analysis of Mean birth weight, Mean placental weight and Feto placental ratio in male and female babies.

Sex of the baby	Range of birth weight (Kg)	Mean birth weight (Kg)	Range of placental weight (gms)	Mean placental weight (gms)	Mean Feto-placental ratio
Female	1.9-3.4	2.58	350-600	472.70	5.46
Male	2.1-3.5	2.69	430-700	513.75	5.28

Table II shows that in female babies, birth weight ranges from 1.9 to 3.4 kg with mean birth weight of 2.58 kg and placental weight ranges from 350-600 gm with mean placental weight of 472.70 gm. In male babies, birth weight ranges from 2.1 to 3.5 kg with mean birth weight of 2.69 kg and placental weight ranges from 430-700 gm with mean placental weight of 513.75 gm. Feto-placental ratio was 5.46 in females and 5.28 in males.

Table – III Correlation of mother's age with mean birth weight and mean placental weight.

Age of the mother (yrs)	No. of mothers	Mean birth weight Kg)	Mean placental weight (gms)
≤ 20 yrs.		2.37	436.66
21-25 yrs.	28	2.58	491.25
26-30 yrs.	14	2.81	525.71
> 30 yrs.	2	2.50	442.50

Table III shows that in 6 mothers with age ≤ 20 years , the mean birth weight was 2.37 Kg and mean placental weight was 436.66 gms. In age group of 21-25 there were 28 mothers with mean birth weight of 2.58 Kg and mean placental weight of 491.25 gms. In age group of 26-30, there were 14 mothers with mean birth weight of 2.81 Kg and mean placental weight of 525.71 gms. In 2 mothers with age above 30 years , mean birth

weight was 2.50 Kg and mean placental weight was 442.50 gms.

Table – IV Relationship of Mean placental weight, Mean birth weight and maternal factors.

Variable	No. of subjects	Mean placental weight (gms)	Mean birth weight (Kg)
Parity			
1	17	485.58	2.59
2	20	514.50	2.63
3	8	437.50	2.46
4	5	515	2.84
Hb gm %			
<8	2	467.50	2.40
8-10	26	471.15	2.59
10-12	22	498.40	2.66
Blood group			
A +ve	14	506.78	2.69
B+ve	18	463.33	2.59
AB+ve	6	513.33	2.50
O+ve	12	498.75	2.61

Table – IV shows that in present study, 20 out of 50 mothers were 2nd gravid having mean birth weight of 2.63 Kg and mean placental weight of 514.50 gms. Only 2 mothers with haemoglobin less than 8 gm % had mean birth weight of 2.4 Kg and mean placental weight of 467.50 gms which was slightly lower than 48 mothers with Hb ranging between 8-12 gm %. With different blood groups, the birth weight of babies remained more or less same but in mothers with A +ve and AB +ve blood group the placental weight was slightly higher.

Table –V Insertion percentage in relation to placental weight.

Placental weight (gms)	Insertion percentage				
	Central (76-100)	Medial (51-75)	Lateral (26-50)	Marginal (0-25)	Total
350-450	7	4	4	3	18
451-550	10	12	1	1	24
551-650	2	2	2	0	06
651-750	1	1	0	0	02
Total	20	19	7	4	50

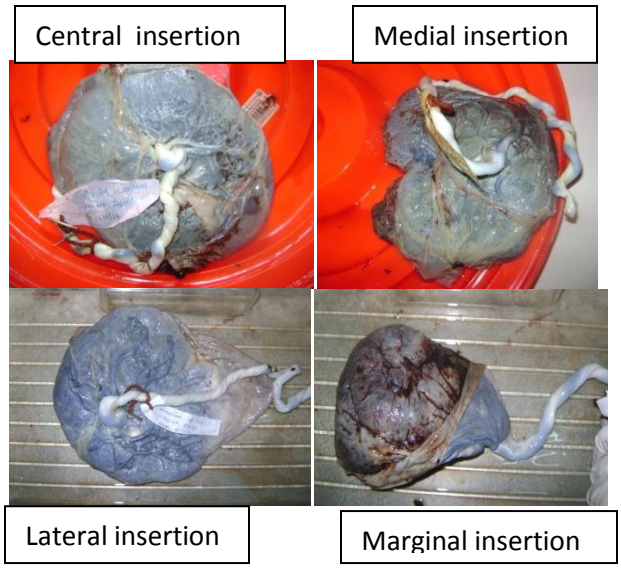

Table –V shows that site of insertion of umbilical cord was central in 20, medial in 19, lateral in 7 and marginal in 4 placentae. Out of 50 placentae, there were 24 placentae with weight ranging from 451-550 gms having 10 central, 12 medial, 1 lateral and 1 marginal insertion of umbilical cord.

Discussion : The human placenta is the functional centre of the feto-maternal system. It can be a 'Sentinel' indicator of nutritional and/or environmental problems[4].

Relationship between placental weight, birth weight and sex of the baby.D. S. Jaya[5] found that out of 3693 babies, 3230 were of ≥ 2500 gms and 473 were < 2500 gms. Udania[6] found that out of 25 babies, 8 were of < 2500 gms whereas 17 were of >2500 gms. Adebami[2] observed that out of 473 babies, 53 were < 2500 gms and 420 were >2500 gms. Present study found that out of 50, 24 babies were of <2500 gms and 26 were of >2500 gms.

Palaskar et al[1] found that 44 out of 100 placentae were of 351-450 gms and 56 out of 100 were of 451-550 gms. Udainia[6] observed that 5 out of 25 placentae were < 400 gms , 9 out of 25 between 400-500 gms , 7 out of 25 between 500-600 gms

and 4 out of 25 were >600 gms. Present study stated that out of 50 placentae, 6 were < 400 gms, 28 between 400-500gms , 14 between 500-600 gms and 6 were >600 gms.

Analysis of Mean birth weight, Mean placental weight and Feto-placental ratio.

Name of the author	Mean birth weight (gms)	Mean placental weight (gms)	Feto-placental ratio
S. Lurie[7]	3382.10	613	5.6
Rath G. et al [3]	2718.20	382.14	7.11
Udainia [6]	2640	495	-
Helana sanin[4]	3369	537	-
Palaskar et al[1]	2790	475	5.87
Majumdar S.[8]	2800	485.85	5.89
Present study	2630	492.40	5.37

Above table compares mean birth weight, mean placental weight and mean feto-placental ratio of present study with that of the other authors. Placental weight is known to vary from region to region , it is found higher in countries other than India as shown in table.

According to S. Lurie[7] the feto-placental ratio of male was 5.7 and of female was 5.6. In present study it was found 5.28 and 5.46 in male and female babies respectively. It suggests that there is no significance of sex in regards of feto-placental ratio.

Correlation of mother's age with mean birth weight and mean placental weight.: Jaya et al[5] found that prevalence of low birth weight babies was higher (22%) among the mothers aged between 15-19 years. Adebami[2] studied that younger mothers have low placental weight and low birth weight of the babies, present study also confirms the same.

Insertion percentage in relation to placental weight.: Rath G. et al [3]observed that site of insertion of umbilical cord was central in 24 % , medial in 22 %, lateral in 27 % and marginal in 27 %. In our study it was 40 %, 38 %, 14 % and 8 % central, medial, lateral and marginal respectively. The marginal insertion of umbilical cord is usually correlated with hypertensive mothers and low birth weight babies. We included all normotensive mothers in our study so the incidence of marginal insertion of umbilical cord was only 8 %.

Relationship of Mean placental weight, Mean birth weight and maternal factors.: Adebami[2] observed that out of 473 mothers, 265 were with parity 1 and 2 , 143 mothers with parity 3 and 4 and 65 mothers with parity > 4. In present study there were 37 mothers with parity 1 and 2 and 13 mothers with parity 3 and 4. Adebami[2] found mean placental weight 553.36 gms and mean birth weight 3017 gms in mothers with parity 1 and 2, and it was 582.62 gms and 3186 gms in mothers with parity 3 and 4. In our study, birth weight of the babies remains almost constant without the influence of parity but placental weight slightly decreased with more number of parity.

Reference:

1. Pandit A. Palaskar ; Kamlesh R. Chaudhari ; Niranjan M. Mayadeo : Fetoplacental weight relationship in normal pregnancy and pre-eclampsia-eclampsia-A comparative study. Bombay Hosiptal journal original/Research. Vol. – 43 (3) 2001.
2. O. J. Adebami ; J. A. Owa ; G. A. Oyedeji : Factors associated with placental weight and placental weight / birth weight percent (placental ratio) among mothers in Ilesa, south Western Nigeria. International Journal of Tropical medicine , Vol. 2 (2) P: 68-73, 2007.
3. Rath G.; Garg K. ; Sud M. : Insertion of umbilical cord on the placenta in hypertensive mothers. Journal of Anatomical society of India. Vol. -49 (2) P: 149-152, 2000.
4. Luz Helana Sanin ; Sandra Reza Lopez ; Edith Tufino Olivares ; Martha Corral Terrazas ; Miguel Angel Robles Silva ; Margarita Levario Carrillo : Relation between birth weight and

placental weight. Journal of Neonatology. Vol. – 80 , No. 2 P: 113-117, 2001.
5. D. S. Jaya ; N. Suresh kumar ; L. Sandhavathy Bai : Anthropometric indices , cord length and placental weight in new borns. Journal of Indian paediatrics. Vol. 32 November 1995.
6. Udainia, A ; Jain M.L. : Morphological study of Placenta in Pregnancy Induced Hypertension with its Clinical Relevance. Journal of Anatomical Society of India. Vol. – 50(1) P : 24-27 , 2001.
7. Samuel Lurie ; Michael Feinstein ; Yaakov Mamet : Human fetal-placental weight ratio normal singleton near term pregnancies. Gynacologic and Obstretrics Investigations. Vol. -48 (3) P : 155-157, 1999.
8. Majumdar S. ; Das Gupta H. ; Bhattacharya K. ; Bhattacharya A. : A study of placenta in normal and hypertensive pregnancies. Journal of anatomical society of India, Vol. 54 (2) P: 1-9, 2005.

Conflict of interest: None
Funding: None