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Original Research Article

A study on association of placental morphometry with newborn anthropometry

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ABSTRACT

Fetal improvement is the fundamental part of maternal supplement stores & compelling transportation through the placenta. Consequently, any distinction in the placenta brings about inconsistent fetal advancement results of expanded danger of delayed sicknesses in the neonatal. This investigation was expected to find the impact of placental morphometry on infant anthropometry.

Materials and Methods: In current study lacentae were obtained from Obstetrics and Gynecology Unit & pacific medical college & hospital Udaipur and study was conducted in the Dept. of Anatomy, Geetanjali M.C. and Hospital, Udaipur (Rajasthan) from August 2018 to November 2019, by using standard operating methods in a pre-designed & pre-tested format, distributions of placental morphology & newborn anthropometry are stated in percentage & box plots, evaluation of variance is used to study the differences in means of placental morphometry in various groups of newborn anthropometry.

Results: The Means & SD of placental morphometry; weight, volume, surface area & thickness were found to be 440 ± 100gm, 386 ± 101 ml, 230 ± 50 cm sq, & 2.1±0.4cm respectively, whereas Mean for birth weight & length found to be 2700±500 gm & 46.6 ±2.5cm of newborn. Placental morphometry & newborn anthropometry improved significantly with pregnancy.

Conclusions: The study extrapolates that maternal pre-pregnancy & during pregnancy condition status along with placental morphology determines neonatal health status. Hence, variations in the maternal nutrient status lead to an adverse gestational outcome.

1. Introduction

Placental advancement was perceived from fossil indication of Ichthyosaurus, in excess of 170 million years prior. Circle molded haemochorial placenta of various humans, happened all through the Eutherian ancestry.[1]

Chorionic plate resultant from the developing incipient organism & decidual plate resultant from a change of the uterine covering of the mother, Consequently, the human placenta develops from both uterus & creating embryo.[2–5] In beginning the placenta assesses the embryo in size & keeps on creating till term. As gestation propels, it grows moderately more modest & by term, the proportion of its weight to that of the baby is about 1:6 to 1:72.

The chorionic plate part expresses the placental surface part covering the uterus & depicts, the number of maternal winding courses & veins are plausible gives to surface area.[6] Placental turn of events & profitability are the main fetal wellspring of supplements & oxygen flexibly. Placental improvement is around achieved by beginning third trimester, while the thickness of placenta increments in last third trimester.[7–10]

Placental thickness, by distinction, denotes the measure of arborisation of the villous slender bed, the genuine locus of maternal-fetal trade.[11] Placental volume was clearly comparative with the birth weight of the baby.[12]

Unordinary chorionic plate shape regularly uncovers pathologic villous decay from the finish of the principal

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trimester or placental infarct. Subsequently, these boundaries of placental advancement might be crucial pointers of placental load at delivery.[13]

2. Materials and Methods

The current examination was coordinated in the Department of Anatomy, Geetanjali Medical College and Hospital, Udaipur (Rajasthan) and pacific clinical school and emergency clinic Udaipur. Placentae were assembled from Obstetrics and Gynecology Unit. Data was gathered from August 2018 to November 2019. The examination was directed to 391 mothers & their singleton posterity. Information about mothers & consent was taken starting the real examination. Subjects without antenatal enrollment during the principal trimester & with history of pre-pregnancy key & industrious ailments were banished. Placental morphometry & baby limits were noted on the predesigned & pretested design.

1. Techniques for example assortment, planning, & evaluation of placental morphometry:[14]
   a. Placentae were assembled not long subsequent to secluding the newborn from the umbilical rope, assembled placentae were assessed inside & out washed under the running water, starting there, layers were overseen.
   b. The models were marked with numbers for ID & were delivered to the capacity lab by setting in a 10% formalin compartment.
   c. The weight of each placenta of newborn was kept constrained by the automated measuring scale CS-8316(CE guaranteed) & recorded with an exactness of 1 gm.
   d. The maternal surface locale of the placenta was resolved using the formula.[15]
2. Boundaries of infant evaluated were:
   a. Gestational age, weight & height of the newborn.
   b. The G.A. was recorded from LMP & further insisted by USG as 28-34, 35-36, 37+ wk.
3. Birth weight calculated using Digital baby measuring scale CS-8316 (CE asserted) with an accuracy of 10 gm.

2.1. Statistical analysis

Statistical Analysis was carried out using Analysis of Variances and comparisons of means were studied by t-test was done utilizing SPSS-16, the Box plots were set up to examine the relative circulations placental morphometry & infant anthropometry.

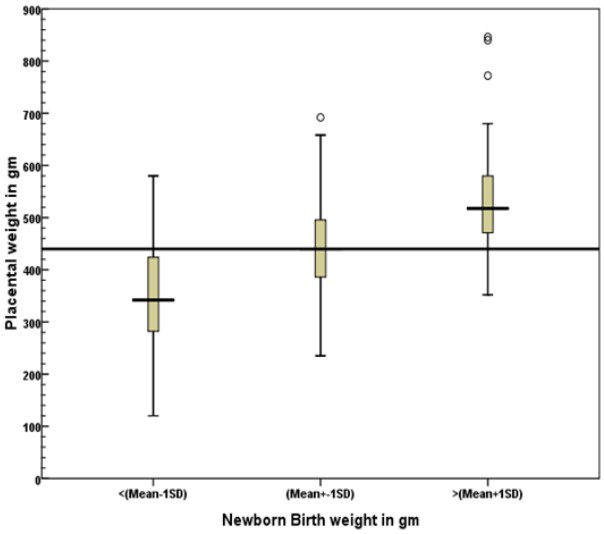

Fig. 1: Placental weight by birth weight

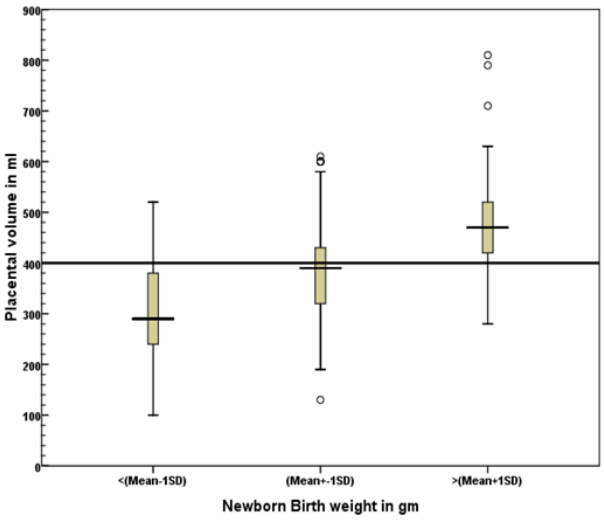

Fig. 2: Placental volume by birth weight

3. Result and Discussion

Mean birth weight if there should be an event of the current assessment was 2,700 gm, lesser than all recently referenced considers, yet practically like Mysore Parthenon study as they were from similar neighborhood belt of India.[16–18] Placental development is related with pregnancy results, as the placental morphology & its physiology decide the development direction of the embryo. Mean birth weight in the current assessment was nearer to that of Indian newborn children, it is decided the ideal extent of birth weight in made countries as 3000-4000 gm to keep up a key good ways from maternal & fetal mortality & morbidity[19] referred to the mean & SD of birth weight

Table 1: Distribution of gestation & birth weight

Variables	Percent	Cumulative Percent	
		Observed	Expected
a. Gestation in wks, Mean=38.3, SD=2.2			
28-32	4.1	4.10	0.87
33-36	10.7	14.80	28.00
37-40	78.5	93.40	88.70
41+	6.6	100.00	100.00
Total	100		
b. Birth weight in gm, Mean=2700, SD=500			
1000-1499	3.6	3.6	0.8
1500-1999	3.6	7.2	8.1
2000-2499	21	28.2	34.5
2500-2999	44.5	72.6	72.6
3000-3499	22.8	95.4	94.5
3500+	4.6	100	100
Total	100		

Table 2: Percentiles by birth weight groups

Newborn birth weight among groups (Mean=2700, SD=500)	Percent % (n=391)	Percentiles						
		5	10	25	50	75	90	95
a. Placental weight in gm								
<(Mean-1SD)	11.51	201.5	227.6	272.5	342.0	426.0	500.0	559.7
(Mean±1SD)	75.70	304.9	340.5	386.0	440.0	495.8	562.9	586.0
>(Mean+1SD)	12.79	373.1	402.1	469.8	517.5	580.0	649.8	802.6
b. Placental volume in ml								
<(Mean-1SD)	11.51	106.0	176.0	225.0	290.0	380.0	414.0	486.0
(Mean±1SD)	75.70	250.0	280.0	320.0	390.0	430.0	500.0	520.0
>(Mean+1SD)	12.79	300.0	371.0	420.0	470.0	520.0	609.0	746.0
c. Placental surface area in cm sq								
<(Mean-1SD)	11.51	106.5	127.0	154.0	187.0	213.7	243.3	262.4
(Mean±1SD)	75.70	164.8	176.8	200.4	226.3	253.8	282.9	314.3
>(Mean+1SD)	12.79	193.8	206.8	227.1	265.6	297.4	314.2	368.2
d. Placental thickness in cm								
<(Mean-1SD)	11.51	1.3	1.5	1.5	2.0	2.5	2.5	3.0
(Mean±1SD)	75.70	1.5	1.5	2.0	2.0	2.5	2.6	3.0
>(Mean+1SD)	12.79	1.5	1.6	2.0	2.1	2.5	3.0	3.0

of Malays, Chinese, & Indian youngsters as 3126±300gm, 3245±300gm & 2935±400gm respectively.[20]

In the current assessment birth weight indicated a dependably sure & tremendous connection with the going with limits: The current assessment declares the placental weight, volume, & surface domain are basic determinants of birth weight.[21] Placental morphometry: Weight ($p<0.001$), volume ($p<0.001$), surface zone ($p<0.001$), thickness ($p<0.05$), baby Length ($p<0.001$), current examination showed 28.2% LBW kids described as under 2500 gm.

LBW was identified with an extended risk of perinatal mortality & those youngsters who suffer are slanted to have hindered immune limit, diminished muscle quality, & bear cardiovascular diseases[22] so, birth weight can be used as a strong marker of newborn child unsullied perseverance.

A Norway based study declared the mean newborn child length of 50.8±SD 2.320cm. The placental weight mirrors the turn of events and capacity of the placenta and is corresponded with gestational age. The current examination indicated that placental weight expanded by birth weight and gestational age, which agrees with past perception. Another Indian assessment itemized the mean newborn child length of 47.06±1.18cm. The mean baby length from Malays 48.8 cm, Chinese 49.5 cm & Indians 48.1 cm, & assumed that Indian youngsters were more restricted than Malays & Chinese neonates.[23] The mean length 48.7 cm of newborn child & uncovered an immense positive association between's the placental weight & baby length.[24]

4. Conclusion

Maternal pre-pregnancy weight mean (48.4±8.9 kg) with 14.1% of women weighing less than 40 kg. Percentiles of birth weight & placental morphometry: weight, volume, & surface area with maternal pre-pregnancy

Table 3: Percentiles of birth weight & placental morphometry length among groups

Newborn length groups (Mean=46.6, SD=2.5 cm)	Percent (n=391)	Percentiles 5	10	25	50	75	90	95
a. Birth weight in gm								
<(Mean-1SD)	10.49	1100	1200	1372	1800	2000	2940	3100
(Mean±1SD)	79.28	2200	2300	2500	2700	2900	3000	3200
>(Mean+1SD)	10.23	3000	3000	3100	3325	3500	3698	3924
b. Placental weight in gm								
<(Mean-1SD)	10.49	196.5	225.2	261.5	334.0	430.0	511.4	560.9
(Mean±1SD)	79.28	307.2	344.4	388.0	440.0	496.0	560.0	583.5
>(Mean+1SD)	10.23	352.2	386.0	469.3	560.5	585.5	652.1	832.0
c. Placental volume in ml								
<(Mean-1SD)	10.49	102.0	172.0	210.0	290.0	370.0	426.0	479.0
(Mean±1SD)	79.28	260.0	280.0	320.0	400.0	430.0	500.0	520.0
>(Mean+1SD)	10.23	300.5	341.0	420.0	500.0	527.5	607.0	782.0
d. Placental surface area in cmsq								
<(Mean-1SD)	10.49	103.6	121.9	153.6	187.0	207.4	251.1	287.0
(Mean±1SD)	79.28	165.0	176.8	200.4	226.3	253.8	282.9	314.3
>(Mean+1SD)	10.23	177.3	212.3	235.7	267.1	298.5	314.2	329.5
e. Placental thickness in cm								
<(Mean-1SD)	10.49	1.2	1.4	1.5	2.0	2.5	2.5	2.6
(Mean±1SD)	79.28	1.5	1.5	2.0	2.0	2.5	2.6	3.0
>(Mean+1SD)	10.23	1.5	1.5	2.0	2.0	2.5	3.0	3.0

Table 4: Association of placental morphometry with birth weight

Birth weight groups	N	Percent	Mean	SD	SE	95% Confidence Interval Lower	Upper
Weight in gm;*; F2,388=49.94; p<0.001**							
<(Mean-1SD)	45	11.5	353.2	103.2	15.4	322.2	384.3
(Mean±1SD)	296	75.7	442.8	82.3	4.8	433.4	452.3
>(Mean+1SD)	50	12.8	533.4	103.8	14.7	503.9	562.9
Total	391	100.0	440.0	100.0	5.0	434.3	453.9
Volume in ml;*;F2,388=53.81; p<0.001**							
<(Mean-1SD)	45	11.5	296.1	98.8	14.7	266.4	325.8
(Mean±1SD)	296	75.7	384.2	82.8	4.8	374.7	393.6
>(Mean+1SD)	50	12.8	482.6	105.5	14.9	452.6	512.6
Total	391	100.0	384.6	101.0	5.0	376.8	396.5
Surface area in cm sq ;*; F2,388=38.13; p<0.001**							
<(Mean-1SD)	45	11.5	183.9	42.7	6.4	171.1	196.8
(Mean±1SD)	296	75.7	230.7	45.9	2.7	225.4	235.9
>(Mean+1SD)	50	12.8	266.1	48.8	6.9	252.2	279.9
Total	391	100.0	229.8	50.1	2.5	224.9	234.8
Thickness in cm;*;F2,388=4.12; p<0.05							
<(Mean-1SD)	45	11.5	2.0	0.5	0.1	1.9	2.2
(Mean±1SD)	296	75.7	2.1	0.4	0.0	2.1	2.2
>(Mean+1SD)	50	12.8	2.3	0.8	0.1	2.1	2.5
Total	391	100.0	2.1	0.5	0.0	2.1	2.2

Table 5: Association of placental morphometry with length of newborn

Newborn length groups		Percent	Mean	SD	SE	95% Confidence Interval	
						Lower Bound	Upper Bound
Birth weight in gm;*;F2,388=198.0; p<0.001**							
<(Mean-1SD)	41	10.5	1829	576	90	1647	2011
(Mean±1SD)	310	79.3	2685	312	18	2650	2719
>(Mean+1SD)	40	10.2	3341	270	43	3255	3427
Total	391	100.0	2700	500	25	2613	2711
Weight in gm;*;F2,388=46.7; p<0.001**							
<(Mean-1SD)	41	10.5	348.9	107.8	16.8	314.9	382.9
(Mean±1SD)	310	79.3	444.5	82.0	4.7	435.3	453.7
>(Mean+1SD)	40	10.2	538.7	112.2	17.7	502.8	574.6
Total	391	100.0	440.0	100.0	5.0	434.3	453.9
Volume in ml;*; F2,388=48.1; p<0.001**							
<(Mean-1SD)	41	10.5	291.2	101.3	15.8	259.3	323.2
(Mean±1SD)	310	79.3	386.6	83.7	4.8	377.2	395.9
>(Mean+1SD)	40	10.2	485.0	112.1	17.7	449.1	520.9
Total	391	100.0	384.6	101.0	5.0	376.8	396.5
Surface area in cm sq ;*; F2,388=30.30; p<0.001**							
<(Mean-1SD)	41	10.5	184.5	45.9	7.2	170.0	199.0
(Mean±1SD)	310	79.3	231.4	47.0	2.7	226.1	236.6
>(Mean+1SD)	40	10.2	264.2	45.2	7.1	249.8	278.6
Total	391	100.0	229.8	50.1	2.5	224.9	234.8
Thickness in cm;*; F2,388=3.91; p<0.05							
<(Mean-1SD)	41	10.5	2.0	0.4	0.1	1.8	2.1
(Mean±1SD)	310	79.3	2.1	0.5	0.0	2.1	2.2
>(Mean+1SD)	40	10.2	2.2	0.4	0.1	2.1	2.3
Total	391	100.0	2.1	0.5	0.0	2.1	2.2

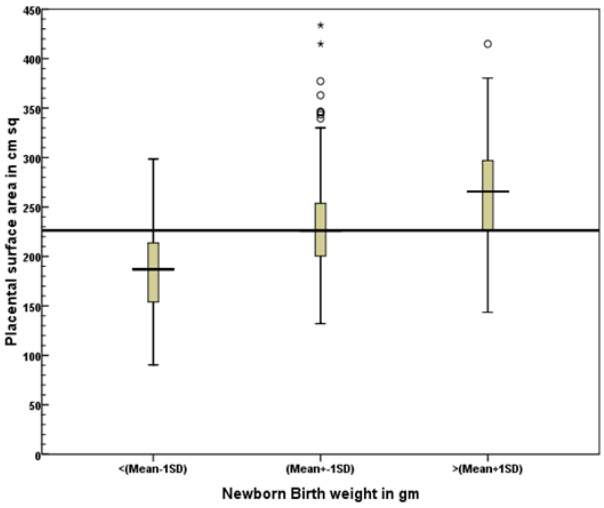

Fig. 3: Placental surface area by birth weight

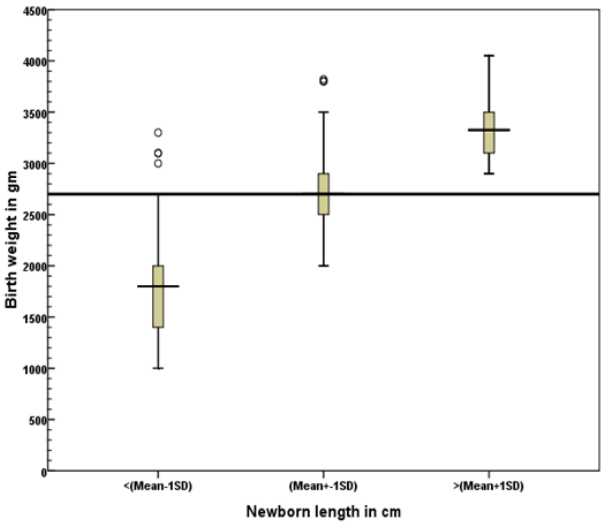

Fig. 4: Birth weight by newborn length

weight (p<0.001) & surface zone (p<0.05). Gestational weight gain was basically identified with birth weight (p<0.01) regardless, placental morphometry. Maternal height followed dissemination where 08.2% of pregnant women had height under 145 cm & 59.8% were from height pack 150-159 cm. The mean maternal height was 153.9±6.7cm. Percentiles of birth weight growing example with maternal height yet placental morphometry & Birth weight (p<0.05) extended dependably with the growing maternal height, nevertheless, placental morphometry didn't

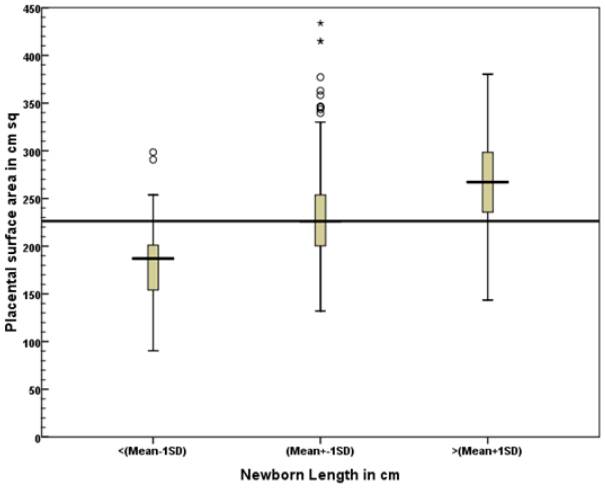

Fig. 7: Placental surface area by newborn length

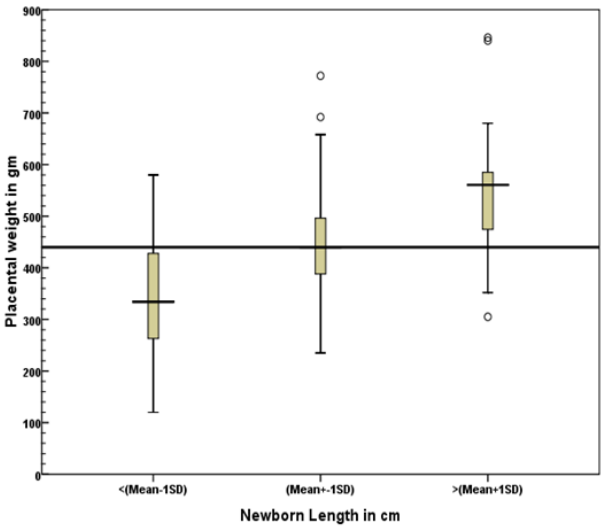

Fig. 5: Placental weight by newborn length

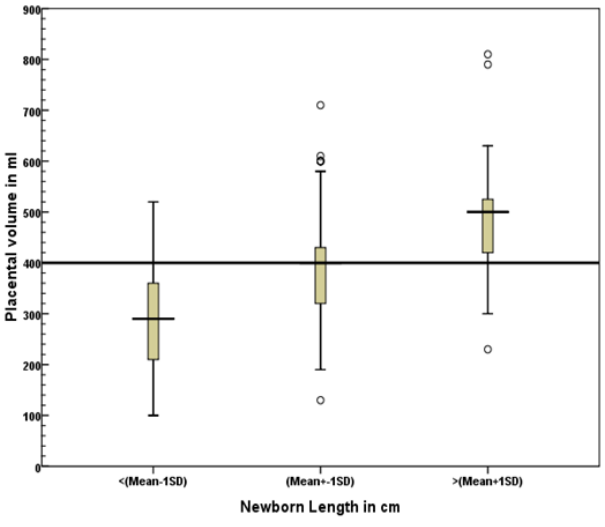

Fig. 6: Placental volume by newborn length

show any consistent association

5. Limitations

Placental morphometry determines the birth weight & newborn length. However, the results need further validation in other setups with a large number of subjects.

6. Source of Funding

None.

7. Conflict of Interest

The authors declare no conflict of interest.

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