STUDY OF MORPHOLOGY AND HISTOLOGY OF PLACENTA AND ITS CORRELATION WITH MATERNAL PARAMETERS AND BIRTH WEIGHT OF NEWBORN IN ANAEMIC MOTHERS

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Abstract

Abstract: The aim of this study was to determine whether maternal anaemia [Hb <11gm/dl] would affect the morphology and histology of placenta and correlate it with maternal parameters and birth weight of newborn and compare this with that of non-anaemic mothers. It was a cross-sectional comparative study carried out at the maternity ward and anatomy department of NSCB MEDICAL COLLEGE JABALPUR. **Background & Method:** Background & Method: The study was carried out on 100 placentae, mothers and their babies. The placenta was collected from Obstetrics and Gynaecology, Department of NSCB Medical College, Jabalpur. Out of 100 placentae 50 from anaemic and 50 from NON anaemic mothers. As soon as the placenta was delivered, the umbilical cord was cut it was put into formal saline. It was kept in a tray, to the membranes were trimmed off cord was cut about 10 cm from the insertion. The blood clots adherent to maternal surface were picked up. Morphological parameters like placental weight, volume, diameter, thickness, no of cotyledons were measured. Any abnormality like calcification, accessory lobe, haematoma, etc were noted. histological slides were made and stained with H and stain and Masson's Trichrome stain. **Result:** A Macroscopic study of the placenta revealed placental weight, placental volume, diameter, placental thickness were more than non anaemic group and number of cotyledons were less in study group. Mean placental weight in study group was 474gm and in control group was 425 (p<0.05). Mean placental volume in study group & control group were 393.23 and 352 ml respectively (p<0.05). Mean number of cotyledons were 13.24 and 16 in study & control group significant [p<0.05] and mean diameter 18.30cms and 17.05cms in study and control group. Mean placental thickness 2.4cms in study and 2.1 in control group respectively. There was an accessory lobe present in one patient of anaemic group. All morphometric parameters of placenta weight, volume, diameter, thickness were increased, no of cotyledons were reduced. Histological findings were placental tissues shows intense congestion of septal capillaries. In the present study age, parity, height, weight, built, doesn't found to be related with morphology of placenta. Maternal blood Hb found to be +vely correlated with weight, volume, diameter, thickness and -vely correlated with no of cotyledons and birth weight of baby. **Conclusion:** From the study it is concluded anaemia in pregnancy affects morphology and histology of placenta and it is correlated with various maternal parameters and birth weight of baby.

Keywords: morphology, histology, placenta, anaemia, birth weight & mothers.

Introduction

Anaemia is a common medical problem in pregnancy. The extent up to which, maternal anaemia affects maternal and neonatal health is still uncertain. Anaemia in pregnancy is linked with an increased risk of preterm delivery, low birth weight, perinatal and maternal mortality and it is related with variable morphological changes and histological changes in placenta which show a reflection for the poor foetal outcome.

Material & Method

The study was carried out on 100 sets placentae, mothers and their babies. The placentae were collected from Obstetrics & Gynecology Department of NSCB Medical College Jabalpur from September 2009 - September 2011.

Serial number of placentae, mother and baby will be same. placentae were taken for the study. It will be collected soon

after the normal vaginal delivery or caesarian section along with 10 cm long stump of umbilical cord. As soon as the placenta was delivered, the umbilical cord was cut it was put into formal saline. It was kept in a tray, to the membranes were trimmed off cord was cut about 10 cm from the insertion. The blood clots adherent to maternal surface were picked up. Morphological parameters like placental weight, volume, diameter, thickness, no of cotyledons were measured. Any abnormality like calcification, accessory lobe, haematoma, etc were noted. histological slides were made and stained with H and stain and Masson's Trichrome stain.

A general examination of the patients on admission into the labour room were noted from clinical records which included age, parity, heights, weight, built, B.P. Routine laboratory investigations were noted - blood haemoglobin,

blood sugar, urine examination USG report recorded from the clinical records. Grouping of the sample :- All the cases were divided into 2 groups :

Group A (Control Group) - this group comprises pregnant women without any obstetric history of complications like anaemia pregnancy induced hypertension and gestational diabetes mellitus etc.

Group B (Anaemic Group) - this group comprises, pregnant women with haemoglobin level < 11gm%.

This included examination of bay after birth in respect of the following: 1. Baby's weight: accurate weight of baby on the weighing machine in the labour room was recorded from clinical notes. Sex of the bay - male of female.

Maturity of the baby whether term preterm or post term done with help of clinical criteria -

a. Skin creases on the sole of foot

b. Size of breast nodule

c. Cartilaginous development of ear.

d. Genitalia - in male infant scrotum was observed as to its size pendulousness, descent of testes into the scrotum. In female infants the extent of labia minora covered by labia majora was examined. Apgar score at birth-noted from clinical notes score 5-7 indicate mild asphyxia score.

Results

Figure 1: Histology slide [H and E staining] of anaemic group showing congested septal capillaries

Figure 2: Congested septal capillaries in H and E staining

Figure 3: Anaemic group;intense congested capillaried

Figure 4: Anaemic placental tissue

Figure 5: Placenta with accessory lobe

Table 1: Maternal parameters

Group		Height	Weight
Normal	Mean	153.7	56.54
	Std. Deviation	4.589	5.968
	N	50	50
Anemic	Mean	152.46	53.07
	Std. Deviation	3.775	7.418
	N	50	50
Total	Mean	153.49	56.02
	Std. Deviation	4.194	8.057
	N	100	100

In each group height & weight of the mother were noted. The height ranging from 146 cm. to 160 cm, in group A, 144 to 156 cm., in group B . The mean height was found at 153.70 (± 4.5), 152.46 (± 3.77) and cms. in group A group B respectively. The weight ranging from 45 to 74 kg in group A, 38 to 76 kg, in group B. The average weight was found at 56.4 (± 5.9)kg., 53.07 (± 7.4)kg and in group A, B respectively.

Table 2: Hb[gm%]

Group	MEAN	STD DEVIATION	No.
NORMAL	11.57	0.550	50
ANAEMIC	8.36	1.120	50
Total	9.17	1.640	100

In each group hemoglobin of the mother were noted. It is ranging from in group A 11-12.6 gm%, and in group B 6-10 gm% . The average hemoglobin in gm/% was observed as 11.57 (4.55) and, 8.36 (11) in group A and B respectively.

Table 3: Correlations of Morphological parameters with maternal age and parity

Group			Vol. Pl	Weight Pl	Mean diameter	Thickness	Cotyledons
Anemic	Age	Pearson Correlation	-0.004	.061	.075	-.020	0.101
		Sig. (2- tailed)	.975	.592	.509	.864	.375
		N	50	50	50	50	50
	Parity	Pearson Correlation				.79 80	
			-0.032	-0.028	-0.02	.39	.222°
		Sig. (2- tailed)	.778	.806	.860	.734	.047
		N	50	50	50	50	50
Normal	Age	Pearson Correlation	.193	.313	.196	.269	0.080
		Sig. (2- tailed)	.414	.178	.408	.252	.737
		N	50	50	50	50	50
	Parity	Pearson Correlation	.215	.406	-.058	.292	0.182
		Sig. 2- tailed	.363	0.076	.809	.212	.442
		N	50	50	50	50	50

Table 4: Correlations of Morphological parameters with maternal height and weight

	Group		Vol. Pl	Weight Pl	Mean diameter	Thickness	Cotyledons
Anemic	Height	Pearson Correlation	-.055	0.016	-0.12	-0.029	.028
		Sig. (2- tailed)	0.628	0.885	0.288	0.802	0.803
		N	50	50	50	50	50
	Weight	Pearson Correlation	.249*	.242°*	0.049	.105	.106
		Sig. (2- tailed)	0.026	0.031	0.663	0.358	0.348
		N	50	50	50	50	50
Normal	Height	Pearson Correlation	0.015	-0.21	-0.053	0.191	-.100
		Sig. (2- tailed)	0.950	0.375	.825	0.420	0.674
		N	50	50	50	50	50
	Weight	Pearson Correlation	-0.255	-0.319	-0.23	-0.114	0.037
		Sig. (2- tailed)	0.277	0.17	.329	.632	.877
		N	50	50	50	50	50

Table 5: Correlations of Morphological parameters with maternal haemoglobin and birth weight of baby

Group			Vol. Pl	Weight Pl	Mean diameter	Thickness	Cotyledons
Anemic	Hb	Pearson Correlation	-.233*	-.147	-.117	-.121	-.171
		Sig. (2- tailed)	.057	.194	.302	.290	.130
		N	50	50	50	50	50
	Birth Wt	Pearson Correlation	0.024	-.056	-0.031	.199	-0.195
		Sig. (2- tailed)	.830	.623	.787	.078	.083
		N	50	50	50	50	50

Normal	Hb	Pearson Correlation	-0.236	-0.242	.331	-0.246	-0.265
		Sig. (2- tailed)	0.316	0.304	.154	0.296	.259
		N	50	50	50	50	50
	Birth Wt	Pearson Correlation	-0.016	.074	-0.226	.261	.563**
		Sig. (2-tailed)		.758	.339	.267	.010
		N	50	50	50	50	50

Table 6: Morphometry of Placenta

Group		Weight Pl[gms]	Vol. Pl[ml]	Mean_diameter[cm]	Thickness[cm]	Cotyledons	Birth Wt[kg]
	Mean	425	352.5	17.050	2.160	16.00	2.727
Normal	Std.	69.921	58.881	1.8174	0.2989	2.357	0.2947
	Deviation						
	N	50	50	50	50	50	50
	Mean	474.63	393.23	18.306	2.411	13.24	2.406
	Std.						
Anemic	Deviation	70.194	63.674	2.0378	0.5715	3.107	0.4237
	N	50	50	50	50	50	50
Significance	t-A/B	2.83 p<0.05	2.72 p<0.05	2.70 p<0.05	6.57 p<0.05	4.38 p<0.05	2.47 p<0.05

A Macroscopic study of the placenta revealed placental weight, placental volume, diameter, placental thickness were more than non anaemic group and number of cotyledons were less in study group. Mean placental weight in study group was 474gm and in control group was 425 (p<0.05) . Mean placental volume in study group & control group were 393.23and352 ml respectively (p<0.05). Mean number of cotyledons were 13.24 and 16 in study & control group significant[p<0.05] and mean diameter 18.30 cms and17.05cms in study and control group. Mean placental thickness 2.4cms in study and 2.1 in control group respectively. There was an accessory lobe present in one patient in anaemic group.

Correlations

This table shows the correlation (**Pearson's** co-relation co-efficient) of various maternal and neonatal parameters with morphometry of placenta.

Age -

In anaemic group, the presenting age of the studied subject showed +ve correlation with placental weight, mean diameter and cotyledon i.e. as age? Co-related with pl. vol. and thickness. However these co-relation were weak.

While among the normal category age found +vely co-related with all these parameters such as pl. vol., pl. weight, mean diameter, thickness and cotyledons and all these co-relation were weak and insignificant.

Parity -

In group A parity of the studied subjects show +ve co-relative with placental weight, volume, thickness, cotyledons and -ve co-relation with placental diameter. However these co-relations were weak (not significant i.e., P>0.05)

In group B the parity showed +ve correlation with placental thickness and this correlation is significant (P<0.05). The parity also showed +ve correlation with cotyledons however the correlation is significant (P<0.05).

Height:

In group A height showed +ve correlation with placental volume a thickness and -ve correlation with placental weight, mean diameter and cotyledens but the co-relation is not significant

In group B height showed +ve correlation with cotyledon which is significant P<0.05 and -ve with placental weight and thickness which is significant. It also showed -ve co-relation with placental volume and mean diameter which is not significant. In group C the height showed +ve and insignificant (P<0.05) correlation with placental volume and -ve and insignificant correlation with placental weight and cotyledons. It also showed -ve co-relation with mean diameter and thickness! which is not significant.

Weight -

In group A weight of the placenta showed +ve and insignificant correlation with cotyledons and -ve and

insignificant correlation with placental weight, volume, mean diameter and thickness.

In group B weight of the placenta showed +ve correlation with placental weight, volume mean diameter, thickness and cotyledons. However it is significant only with placental weight and volume.

Haemoglobin –

In group A maternal haemoglobin showed +ve correlation with mean diameter of placenta however it is not significant, and -ve correlation with placental volume, weight, thickness and cotyledons which is not significant

In group B maternal haemoglobin showed -ve co-relation with placental weight, volume, mean diameter, thickness and cotyledons however not significant.

Birth Weight -

In group A birth weight of the baby showed +ve co-relation with placental weight, thickness, however not significant, it showed +ve correlation with no. of placental cotyledons. It showed -ve correlation with placental weight, which is significant [$P>0.05$.] And mean diameter which is not significant ($P>0.05$.] In group B birth weight of the baby showed +ve correlation with placental weight which is significant and also with placental thickness but not significant [$P>0.05$.]. It showed -ve correlation with placental weight and cotyledons which are not significant [$P>0.05$.]. It also showed -ve correlation with mean diameter which is significant

Age doesn't showed any significant correlation in the studied groups. Parity showed positive and significant correlation with cotyledons in group B. (anaemic group) Height doesn't showed any significant correlation in both the studied groups.

Weight showed positive and significant correlation with placental volume and weight in group B

Weight in group B (anaemic group) and significant correlation with placental un diameter in group C (PIH group). Maternal Hb doesn't showed any significant correlation in all the three ITILDI studied groups.

Birth Weight - In group A Birth weight showed positive and significant correlation with no. of cotyledons. In group C it showed positive and significant correlation with placental thickness. The histological feature in placenta of anaemic cases increases in number of syncytial knots, cytotrophoblastic proliferation, basement membrane thickening, formation of vasculosyncytial membrane, capillaries per villi and stromal fibrosis with the increase in severity of anaemia). The histological findings of the present study correlates with the findings of the above studies

Discussion

In the present study the mean of placental weight anaemic group is found 474.63 gm (± 95.194) which significantly

higher than control group. Beischer et al[3] established an association between maternal anaemia and placental hypertrophy which was significantly higher. Increased placental weight in anaemic group. Mongia, Yadav, Jain [4] also observed similar findings in anaemic group. In our study the mean of placental volume is found to be 393.23 ml (± 463.674) which is significantly higher ($p<0.05$) than the control group. These findings were similar with study of Begum[5], who correlate the difference between volume of the placenta of different grades of anaemia and normal cases and found that volume increased with increase in grade of placenta[6]. This findings was in accordance with those of Mongia, Jain, Yadav, (2011)[4]. The shape of placenta in anaemic group is found oval in 63.3%, round 15%, irregular in 10%, and triangular in 2.5% cases. Irregular shape of placenta is anaemia is found significantly more in comparison with control group. In the present study the mean diameter of placenta in anaemic group is found to be 18.306(± 2.03) which is significantly higher ($p<0.05$) than the control group (16.725 ± 1.77). The thickness of placenta is also found statistically increased i.e. 2.311 cm in anaemic mothers is comparison with control group thickness i.e. 2.075 cm. The number of cotyledons of placenta is found to be statistically decreased in anaemic group (3.24 ± 3.70) comparison to control group (0.075 ± 0.255), same was observed by Olga et al (1995). This findings also similar with the study of Mongia, Jain, Yadav (2011)[4]. the mean birth weight of baby is found to be 2.638 kg with 0.3312 is normal cases, 2.476 kg with S.D. of 0.455 in anaemic[7,8&9]. Age doesn't showed any significant correlation in the studied groups. Parity showed positive and significant correlation with cotyledons in group B. (anaemic group) Height doesn't showed any significant correlation in both the studied groups. Weight showed positive and significant correlation with placental volume and weight in group B Weight in group B (anaemic group) and significant correlation with placental diameter in group C (PIH group)[10&11]. Maternal Hb doesn't showed any significant correlation in all the three ITILDI studied groups. **Birth Weight -** In group A Birth weight showed positive and significant correlation with no. of cotyledons[12]. In group C it showed positive and significant correlation with placental[13&14]. Histological findings-placenta in anaemic group shows intense septal congestion of capillaries.

Conclusion

Anemia also exerts profound changes on the maternal circulatory system and has serious effects both on mother and fetus. Growth of fetus is intricately linked with that of placenta, because placenta causes transfer of nutrients as well as oxygen from mother to fetus. So chances of Low birth weight baby and premature delivery increases. Hypoxia cause morphological changes in placenta like increased weight, diameter & thickening of placenta and histological changes like intense congestion of septal capillaries. Placenta is a focus of increasing interest in modern obstetrics because significant pathology afflicts the

placenta, often before affecting the fetus. Placental abnormalities therefore can be an 'early warning system' for fetal problems. The evaluation of placenta thus becomes essential in high risk pregnancy.

References

1. Khandaker Abu Rayhan Microscopic Changes of the Placental Components in Maternal Anaemia 5 Bangladesh Journal of Anatomy July 2010, Vol. 1965:72-356-373.
2. Shen-Schwaviz S. Ruchelli E. Villous oedema of the placenta a clinicopathological study. Placenta, 1989 May - June; 10 (3): 297-307.
3. Beischer N.A.: Placental hypertrophy in severe pregnancy and anemia. BJOG: An International Journal of obstetrics & Gynaecology, Vol. 77, 398-409, May 19.
4. Mongia Yadav, S.M. Jain S.K.: Placenta the wonder organ, original research paper. J. Indian Acad forensic med. April - June 2011, Vol. 33, No. 2.
5. Begum Nunnabi: A.S.M., Ara S., Begum G.N., Effect of Antenatal Anaemia of the mother on the volume of the placenta. AKMMC 1, 2011; 2 (i): 22-25.
6. Rath G., Gark K. and Sood M.: Insertion of umbilical cord the placenta in hypertensive mother. J. and Soc. India 49 (2) 149-152 (2000).
7. Majumdar S*, Dasgupta H***. Bhattacharya K*** Bhattacharya A. A study of placenta in normal and hypertensive pregnancies. Journal of the Anatomical Society of India Vol. 54, No.2 (2005-07-2005-12) 37.
8. Chakraborty R. Das SR : The effect of parity on placental weight and birth weight : interaction with placental alkaline phosphatase polymorphism (Ann.Hum Biol. 1975 Jul; 2 (3): 227-34.) 15.
9. Ara G. Bari M.A. Siddiquey AK : Effects of age parity and length of pregnancy on the morphology and histology of human placenta. Bangladesh Med. Res. Count. Bull. 1984 Dec. 10 (2); 53-8.
10. Younges B, Basement membrane thickening in the placenta from diabetic women pathology international Vol. 46, Issue 2, Pages 100-104. February 1996.
11. Zahra H. Bokhari,1 Attiya Khalid 2 Nadia Tazeen, Bukhari, Histomorphometric study of maternal side of placenta in preeclampsia 209. ANNALS Vol. 16 No. 3 July-Sept 2010.
12. Pankaj Saini, Jai Prakash Pankaj, Anjali Jain and Gyan Chand Agarwal. Effect of gestational diabetes mellitus on gross morphology of placenta: a comparative study. Int J Anat Res 2015;3(1):889-94.
13. Saha S, Biswas S, Mitra D, Adhikari A and Saha C. Histologic and morphometric study of human placenta in gestational diabetes mellitus. Ital J Anat Embryol. 2014;119(1):1-9.
14. Ashfaq M, Janjua MZ and Channa MA. Effect of gestational diabetes and maternal hypertension on gross morphology of placenta. J Ayub Med Coll Abbottabad. 2005; 17(1):44-4.