



RESEARCH ARTICLE

STUDY OF HISTOPATHOLOGICAL CHANGES IN PLACENTAE OF ANAEMIC WOMEN

\*Dr. Sukhjinder Kaur, Dr. Sunita Bhargava and Dr. Nitin Chaudhary

Department of Pathology, R.N.T. Medical College, Udaipur (Raj.) – 313001

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ABSTRACT

**Background:** Placenta is considered throwaway product but it provides insight about maternal and fetal disorders. Severe anaemia during pregnancy can lead to poor fetal outcome and the changes are reflected in the placenta. **Objective:** This study was undertaken to evaluate morphological and histological changes in placenta during pregnancy. **Methods:** 100 placentae from term mothers were studied over a period of one year, of which 75 placentae were from anaemic females (Hemoglobin <11g/dl) and remaining were from mothers with Hemoglobin  $\geq$  11g/dl. Severity of anaemia was judged according to WHO criteria. Placentae were examined grossly, processed, tissue sections prepared and examined after Haematoxylin and Eosin staining. **Results:** Anaemic females delivered low birth weight fetuses and heavier placentae as compared to non-anaemic females. Grossly, infarction and calcification was more frequent in the anaemic group. Histopathological study revealed significantly increased syncytial knots, fibrinoid necrosis, stromal fibrosis, calcification, hyalinization of villi in the placentae of anaemic females. **Conclusion:** The better outcome of pregnancy depends upon the adequate and timely treatment of maternal anaemia which can prevent low birth weights, premature births, still births and intrauterine growth retardation.

\*Corresponding author:

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INTRODUCTION

Placenta is the reflection of fetal health as it serves metabolic and endocrine functions. Mother and placenta work in harmony to sustain new life. The pathologies in mother's body ultimately have detrimental effects on placenta as well as on fetus. Hence, careful examination of placenta can reveal etiopathogenesis of fetal and maternal disorders. (Mondal et al., 2017) According to WHO, prevalence of anaemia in pregnancy in developing countries is around 51%. The prevalence ranges from 33%-89% in India. India contributes to 80% maternal deaths due to anaemia in South Asia. (Sahu Krishna Kumar et al., 2013). Severe anaemia during pregnancy can have potential hazardous effects on baby's health. Its responsible for premature births, still births, low birth weight, intrauterine growth retardation and even it increases maternal morbidity and mortality (Rohini, 2013). The present study was carried out in South Rajasthan where maternal anaemia is very common due to multiple factors like poverty, malnutrition, lack of education, multiparity, early age at pregnancy etc. Hence, this study was carried out to evaluate the morphological and histopathological changes in placenta and to quantitate them in the placentae of non-anaemic and anemic

females as these changes serve as guide to duration and extent of the disease (Rohini, 2013). Quantitative determination of placental changes is essential because normal pregnancies can also show significant histopathological changes.

MATERIALS AND METHODS

The present study on placentae was carried out in the department of Pathology at RNT Medical College and Maharana Bhopal hospital, Udaipur. The study was carried on placentae of mothers who delivered in the department of Gynaecology in a time period of one year from September 2016 to September 2017. Written consent was taken from the mothers after explaining the study details and a proforma was maintained. A total of 100 placentae were studied. The study was divided into 2 groups:

Non-anaemic group- comprised of 25 placentae from mothers having no signs and symptoms of anaemia (haemoglobin  $\geq$  11 gm/dl). Anaemic group- comprised of 75 placentae from mothers having anaemia (haemoglobin < 11 gm/dl). Singleton, uncomplicated full term pregnant females with normal vitals were included whereas pregnant females with associated

obstetric complications, medical disorders of pregnancy and twin pregnancies were excluded from the study. Both deliveries were included either normal vaginal or caesarean. Haemoglobin estimation was done by automated cell counters. Complete blood counts and peripheral blood smears were also evaluated. The severity of anaemia among the mothers was judged by the criteria suggested by WHO (World Health Organization, 1993). The placenta were collected along with detailed case history and were examined as soon as possible after delivery in the fresh state. The placenta was blotted with filter paper and weighed accurately in grams. Gross features like cord attachment, number of umbilical vessels, true knots, torsion, stricture, hematoma, thrombosis, no. of cotyledons were examined. Placenta were fixed in 10% formalin for 24-48 hours thereafter sections were taken, further processed and stained with conventional Haematoxylin and Eosin stain. Microscopic examination was carried out on 100 villi per section and histopathological changes like syncytial knots, vasculosyncytial membranes, fibrinoid necrosis, stromal fibrosis, hyalinised villi and calcification was noted.

- Syncytial knots in more than 30% of the villi were considered excessive.
- Normally, 6-30% of the villi in a placenta show vasculo syncytial membranes.
- Placenta in which fibrinoid necrosis involves upto three percent of placental villi was normal.
- In the term placenta normally less than 3 percent of villi may show increase in stromal fibrosis (Adil, 2012).

## RESULTS

The age of females involved in our study ranged from 17-38 years. Out of 100 females, 25 were non-anaemic and 75 were anaemic. Their Hb levels ranged from 5-13.1g/dl. Majority of females (44%) were mildly anaemic with Hb 9-10.9g/dl. 56% of females were primigravida and 44% were multigravida. The fetal weight recorded was 1.4kg-3.9kg. Majority of the females (41%) delivered fetuses with birth weight 2.5- 3.5kgs.

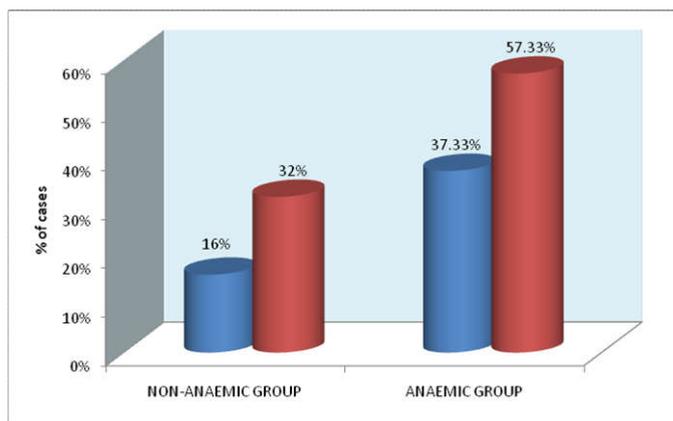


Figure 1. comparison of gross infarction and calcification in both groups

The placenta delivered weighed 110-900 grams and majority of females (41%) delivered placenta weighing 330-750 grams. In anaemic group; mean fetal weight and mean placental weight recorded was  $2.57 \pm 0.58$  kg and  $472.26 \pm 146.11$  grams respectively. Cord attachment was eccentric in placenta of anaemic females whereas it was central in non-anaemic females.

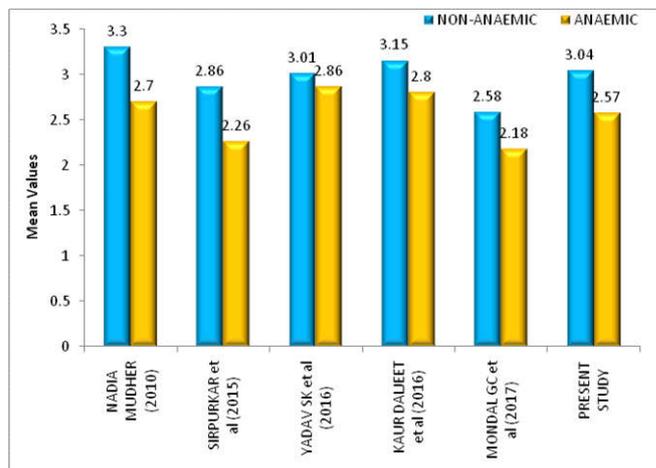


Figure 2. Showing comparison of mean fetal weight (kilograms) in different studies

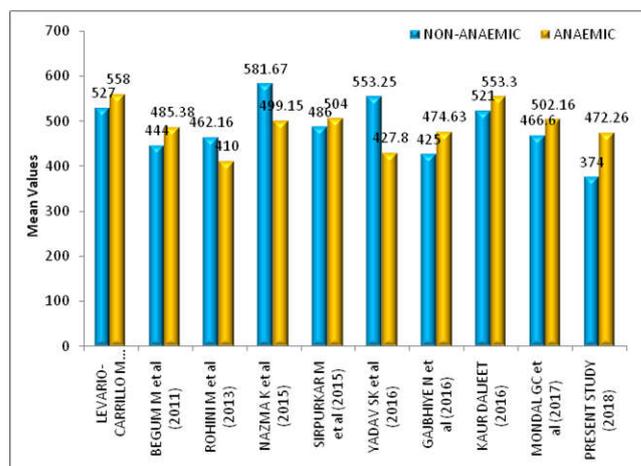


Figure 3. Showing comparison of mean placental weight (grams) in different studies

Gross examination of the placenta of anaemic females revealed infarction and calcification more frequently than the non-anaemic females (Figure no 1). The histopathological changes seen were calcification, stromal fibrosis, syncytial knots, fibrinoid necrosis, hyalinised villi and vasculosyncytial membranes; out of which syncytial knots was the most common histopathological feature noted (Table no 1). In the anaemic group, 78.66% placenta showed significant (>30% villi) syncytial knots count as compared to 56% cases in non-anaemic group (Table no 2). Significant fibrinoid necrosis and stromal fibrosis in >30% villi was observed in 46.66% cases and 42.66% cases respectively in the anaemic group. There was no significant statistical difference observed in the incidence of vasculosyncytial membranes in the anaemic and non-anaemic groups.

## DISCUSSION

Severe anaemia during pregnancy leads to hypoxia which affects formation, development and maturation of placenta; ultimately the growth and survival of baby gets affected (Adil, 2012). The histopathological changes occurring in placenta during severe anaemia are also seen in normal placenta but the extent of involvement varies i.e. more in anaemic placenta (Fox, 1997). It was seen in our study that the mean fetal weight in non-anaemic group was more as compared to anaemic group with significant p value.

**Table 1. Comparison of histopathological features of placenta in the present study**

Parameters	Non-anaemic group	Anaemic group	P value
Calcification	8 (32%)	43 (57.33%)	<0.05
Stromal fibrosis	5 (20%)	32 (42.67%)	<0.05
Syncytial knots	14 (56%)	59 (78.67%)	<0.05
Fibrinoid necrosis	6 (24%)	35 (46.67%)	<0.05
Hyalinized villi	16 (64%)	65(86.67%)	<0.05
Vsm	9 (36%)	12 (16%)	<0.05

**Table 2. Comparison of microscopic features according to involvement of villi**

Microscopic Features	Non-Anaemic				Anaemic			
	≤30% of villi		>30% of villi		≤30% of villi		>30% of villi	
	No. of cases	%	No. of cases	%	No. of cases	%	No. of cases	%
Syncytial knots	11	44	14	56	16	21.33	59	78.66
Vasculo syncytial membrane	20	80	5	20	43	57.33	32	42.66
Fibrinoid necrosis	19	76	6	24	40	53.33	35	46.66
Stromal fibrosis	20	80	5	20	43	57.33	32	42.66

The studies shown in Figure no 2 (Nadia Mudher , 2010; Sirpurkar Manik , 2015; Yadav Shekhar Kumar et al., 2014; Kaur Daljeet , 2016; Mondal , 2017) show that anaemia in pregnancy is associated with low fetal birth weights. Anaemic females delivered heavier placenta as compared to females of non-anaemic group. The studies supporting and contrasting with our study is depicted in Figure no 3 (Levario et al., 2013; Rohini et al., 2013; Begum, 2010; Kiran Nazma et al., 2015; Sirpurkar Manik, 2015; Yadav Shekhar Kumar et al., 2014; Gajbhiye Nisha et al., 2016; Kaur Daljeet, 2016; Mondal et al., 2017). The difference in method of delivery, the amount of blood remaining in the placenta as well as collection and processing techniques may have lead to such variations as seen by Nazma Kiran et al. (2014). In the present study; calcification and gross infarction was increased in the anaemic group as compared to non-anaemic group. Similar findings were observed by (Rohini et al., 2013; Nigam et al., 2014; Mondal et al., 2017).

In present study, high villous syncytial counts (in >30% of villi) were seen in placentae of anaemic group as compared to placentae of non-anaemic group. Villous hypovascularity leads to formation of syncytial knots suggesting that an attempt was made to form new villi so as to increase an effective surface area for exchange (Adil, 2012). Similar findings were also observed by (Adil, 2012; Sabharwal, 1987; Nadia Mudher, 2010) but a study done by (Rohini et al., 2013) reported low incidence of excessive syncytial knots in anaemic group. No statistical significant difference in vasculo-syncytial membranes were found in both groups. The findings are similar to findings of (Adil, 2012) and dissimilar to findings of (Dhall, 1994; Sirpurkar Manik, 2015). In case of fibrinoid necrosis, our study corroborated with the findings of (Adil, 2012; Nadia Mudher, 2010) who observed increased fibrinoid necrosis in the anaemic group. In contrast, a study by (Rohini et al., 2013) reported decreased incidence of villi with fibrinoid necrosis in anaemic group. Villous stromal fibrosis which may be due to relative hypoxia in the peripheral part of placental lobule also increases with severity of anaemia. The findings are in consonance with the findings of (Adil, 2012; Sabharwal , 1987; Nadia Mudher , 2010; Rohini , 2013; Sahu Krishna Kumar et al., 2013; Agboola , 1975; et al., 1979). Our study showed hyalinization of villi was more in anaemic group than the non-anaemic group which is corroborated by studies of (Sabharwal et al., 1987; Nadia Mudher, 2010) depicting that hyalinization of villi increases with anaemia.

## Conclusion

Its concluded that better outcome of pregnancy depends upon the adequate and timely treatment of maternal anaemia which can prevent low birth weights, premature births, still births and intrauterine growth retardation.

**Conflicts of Interest:** This study has no conflict of interest to declare by any author.

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