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A Comparative Study to Assess the Impact of Maternal Anaemia on Placenta Weight and Foetal Well-Being, in a Selected Tertiary Care Hospital, Chengalpattu District, Tamil Nadu, India

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ABSTRACT

Background of the study: Anaemia is the most common blood disorder that may occur during pregnancy. It has varied prevalence, etiology and degree of severity in different populations, being more common in non-industrialized countries. Anaemia is responsible for approximately 40% of maternal deaths in third world countries. It causes direct as well as indirect deaths due to cardiac failure, haemorrhage, infection and pre-eclampsia.

Methodology: Quantitative exploratory research approach was selected to assess the placental weight and fetal wellbeing among anaemic and non-anaemic pregnant women. An analytical cross-sectional design was selected for this study. Eighty two pregnant women (41 anaemic and 41 non-anaemic women), who visited the labor ward at Chrompet government hospital, Tamil Nadu, India were selected. A structured interview schedule was used to collect the demographic, placental and fetal characteristics. Comparison of the impact of maternal anaemia on placental weight and fetal wellbeing among anaemic and non-anaemic pregnant women was done.

Result and analysis: The comparative study reveals an evident statistically significant association between the placental weight and neonates birth weightamong non-anaemic pregnant women ($\chi 2 = 17.680$) at $p < 0.05$, which indicates that the placental weight gain has successfully influenced the birth weight of the newborn among non-anaemic pregnant women, while this association was not statistically significant among the anaemic pregnant women ($\chi 2 = 9.938$) as low haemoglobin levels have hindered the effective weight gain of the placenta and thereby birth weight of the newborn. There exist a positive correlation between the placental weight and neonate's birth weight among anaemic and non-anaemic pregnant women which indicates that adequate weight gain of the placenta has a direct effect on the fetal weight gain and vice-versa among anaemic and non-anaemic pregnant women.

Conclusion: The study concludes that the level of haemoglobin has a positive correlation and significant association with the placental weight and birth weight of newborn which indicates that maintenance of normal haemoglobin is essential for the normal growth and development of the placenta which proportionately influences the growth of the baby. Among mothers for whom this scenario was not met it was evident that there was a vice-versa effect on the placental weight and birth weight of newborn due to low haemoglobin level. The maintenance of maternal health must ideally begin much before the childbearing age and continue further through the postpartum period in order to prevent various complications pertaining to anaemia.

1. INTRODUCTION

Anaemia during pregnancy is diagnosed when pregnant women has haemoglobin level less than 11 grams/decilitre, which reduces the oxygen carrying capacity of red blood cells. Anaemia during pregnancy is easily treatable and predominantly preventable when detected on time; although it remains as a major cause of maternal and neonatal morbidity and mortality in developing countries. The prophylactic and therapeutic management of anaemia during pregnancy can be planned based on the understanding of the prevalence and determinants of anaemia. The pregnancy outcome largely depends on the management of anaemia during pregnancy.

About one in four women conceive with inadequate or absent iron stores with the levels of serum ferritin below 80mg and up to 90% have iron stores of below 70mg. Globally the prevalence of anaemia in pregnancy is estimated to be approximately 38.2% or it affects 32 million pregnant women.

In India, anaemia during pregnancy is a significant public health problem, with 45.7% of pregnant women in urban areas and 52.1% in rural areas having haemoglobin levels <11 g/dl. Anaemia is the underlying cause or contributing factor for 20-40% of maternal deaths in India, which account for 80% of maternal deaths attributable to anaemia in South Asia.

The world health organization (WHO) has established the prevalence of anaemia during pregnancy (<11gm/dl) as 14% in developed and 51% in developing countries. The Indian council of medical research (ICMR) survey showed over 70% pregnant women and adolescent girls in India to have anaemia, despite the availability of effective, low cost interventions for prevention and treatment.

Based on the WHO stratification, anaemia is taken as a disease of low public health importance when the prevalence is less than 20%, of medium public health importance, when it is between 20% to 39.9% and severe forming the deadly triad, leading up to 80% of maternal death in India.

Placenta is not only the central supply of nutrients and oxygen to the foetusbut also an exit point to eliminate waste and also acts as a protective barrier. Anaemia during pregnancy affects placental function that in turn affects the fetal outcome dreadfully as placenta is the vital organ that binds them both. Therefore, the effective functioning of the placenta is necessary for good fetal outcome. **[Jyoti]** The healthy placenta and fetal outcome depends on maternal health during the antenatal period.

Extensive research on the area of pre-conception, antenatal, intranatal and postnatal anaemia are to be conducted to provide evidence based literature for management of anaemia during pregnancy. This study was developed in order to add more scientific data to the existing body of knowledge on anaemia during pregnancy in Indian scenario. The researcher with an intention to throw light upon this less noticed and more vibrant factors has studied the impact of anaemia on placental weight and birth outcome among anaemic and non-anaemic pregnant women toestablish the preventive and corrective care, thereby minimizing the impact of anaemia during pregnancy.

2. MATERIALS AND METHODS

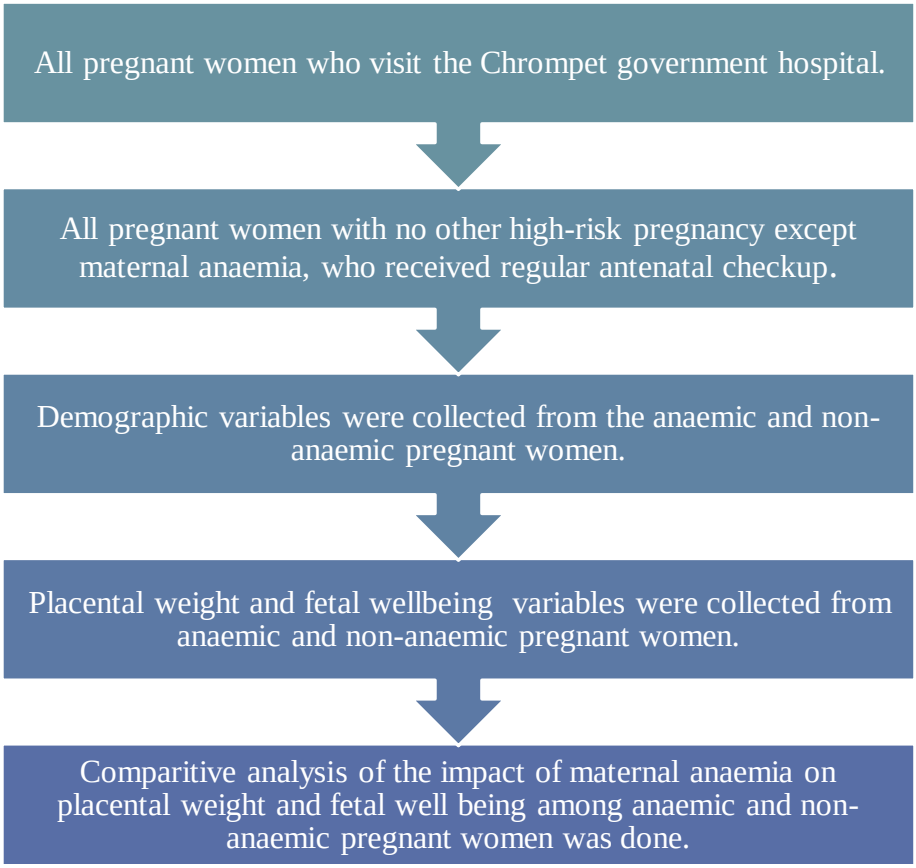
The extensive review of literature, the investigators professional experience and the expert guidance received from the field of gynaecological department has helped the researcher to design the methodology, select appropriate and reliable tools for the data collection.

The study was conceptualized based on "The Ernestine Wiedenbach's - Helping Art of Clinical Nursing Theory" to compare the impact of maternal anaemia on placenta weight and fetal wellbeing among anaemic and non-anaemic pregnant women. Through this theory the nurse investigator has explained nursing as the practice of identifying the need of maintaining normal haemoglobin levelduring pregnancy through regular monitoring of haemoglobin level and the impact of maternal anaemia on placental weight and fetal well-being among anaemic and non-anaemic pregnant women.

A structural interview schedule was developed and used by the researcher, the sample details consisting of 14 items that assess the demographic data of anaemic and non-anaemic pregnant women, 5 items that assess the placental characteristic of anaemicand non-anaemic pregnant women and 4 items that assess the newborn characteristics among anaemic and non-anaemic pregnant women was acquired**.**

Health education regarding prevention and corrective care of anaemia was given to both anaemic and non-anaemic pregnant women and pamphlet was provided to the pregnant women to promote health and prevent anaemia in future. The pamphlet contained information on the effects of anaemia during pregnancy, causes, signs and symptoms, and management of anaemia.

DATA COLLECTION PROCESS (Fig 1)



3. RESULT

The entire placenta taken up for the study was completely separated from the uterine wall with normal maternal and fetal surface. Majority of 44% of anaemic and 42% of non-anaemic pregnant women had placental weight at 501-600 grams. **(Table:1, Fig: 2)**

Table 1: Frequency distribution of placental characteristics of anaemic and non-anaemic pregnant women (N=82)

Placental characteristics		**Anaemic women**		**Non-Anaemic women**	
		Frequency	**%**	**Frequency**	**%**
Placental weight	401-500 grams	8	19.5	12	29.3
	501-600 grams	18	43.9	17	41.5
	>600 grams	15	36.6	12	29.3
Umbilical cord length	≤ 45 cms	1	2.4	1	2.4
	46 to 49 cms	36	87.8	40	97.6
	≥ 50 cms	4	10	0	0
Insertion of umbilical cord	Marginal	37	90.2	41	100
	Central	4	9.8	0	0

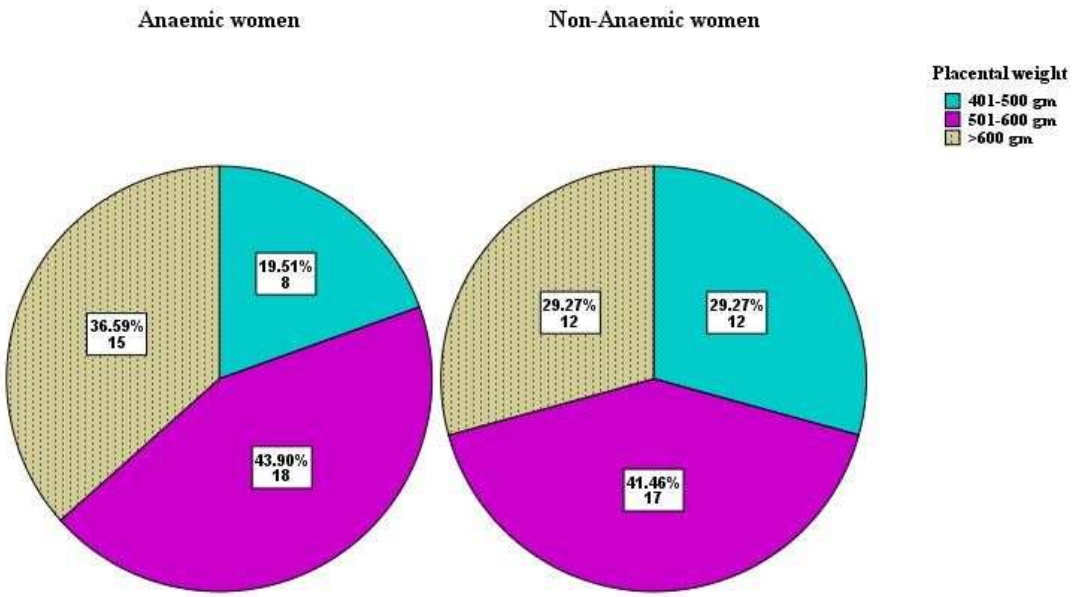


Fig: 2 Comparison of the frequency distribution of the placental weight among anaemic and non-anaemic pregnant women.

The independent sample t-test of the placental weight and umbilical cord length reveal that there was no significant difference in the mean placental weight and the mean umbilical cord length among the anaemic and non-anaemic pregnant women respectively. **Table: 2**

Table 2: Comparison of Mean, Standard deviation and Independent t-test of placental characteristics of anaemic and non-anaemic pregnant women (N=82)

Comparison of placental characteristics	Anaemic women		Non-Anaemic women		Independent t-test	
	Mean ± SD	SE	Mean ± SD	SE	t-test value	P value
Placental weight	586.63 ± 90.726	14.169	565.24 ± 85.822	13.403	1.097	0.276 NS
Umbilical Cord length	45.512 ± 1.502	0.235	45.07 ± 0.469	0.073	1.787	0.078 NS

NS: Not Significant.

The comparative analysis of the fetal characteristic revealed that majority of 51% newborn of the anaemic pregnant women had birth weight of 2.5 to 3 kg. **(Fig: 3)**

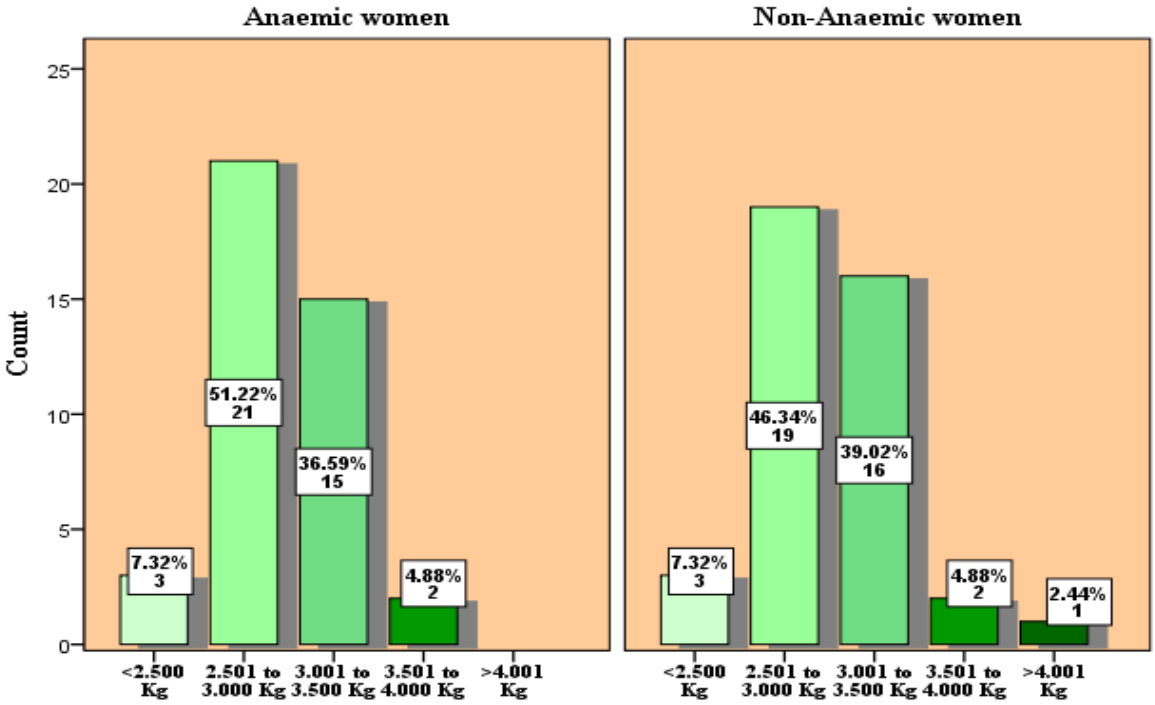


Fig. 3: Comparison of the frequency distribution of the birth weight of the baby among anaemic and non-anaemic pregnant women.

Table 3: Frequency distribution of characteristics of the baby of anaemic and non-anaemic pregnant women (N=82)

Fetal characteristics		Anaemic women		Non-Anaemic women	
		Frequency	%	Frequency	%
Birth weight	<2.500 Kg	3	7.3	3	7.3
	2.501 to 3.000 Kg	21	51.2	19	46.3
	3.001 to 3.500 Kg	15	36.6	16	39
	3.501 to 4.000 Kg	2	4.9	2	4.9
	>4.001 Kg	0	0	1	2.4
Length	47 to 48 cm	7	17.1	6	14.6
	49 to 50 cm	29	70.7	31	75.6
	> 50 cm	5	12.2	4	9.8
Head circumference	≤ 32 cm	16	39	12	29.3
	33 to 35 cm	23	56.1	28	68.3
	> 35 cm	2	4.9	1	2.4
Apgar score (1 minute)	7/10	2	4.9	2	4.9
	8/10	39	95.1	39	95.1
Apgar score	8/10	2	4.9	2	4.9

Fetal characteristics		Anaemic women		Non-Anaemic women	
		Frequency	%	Frequency	%
(5 minutes)	9/10	39	95.1	39	95.1

The pregnant women in both the groups were considered as an equivalent group with regard to thebaby's birth weight, baby's length, head circumference, and Apgar score (at 1 minute and 5 minutes) as the independent sample t-test was not statistically significant. **(Table: 4)**

Table 4: Comparison of Mean, Standard deviation and Independent t-test of fetal characteristics among anaemic and non-anaemic pregnant women (N=82)

Comparison of fetal characteristics	Anaemic women		Non-Anaemic women		Independent t-test	
	Mean ± SD	SE	Mean ± SD	SE	t value	p value
Baby's weight	2.98 ± 0.354	0.055	2.97 ± 0.421	0.066	0.114	0.910 NS
Baby's length	49.49 ± 1.121	0.175	49.51 ± 0.978	0.153	0.105	0.917 NS
Head circumference	33.05 ± 1.161	0.181	33.07 ± 0.985	0.154	0.103	0.919 NS
Apgar score (1 minute)	7.95 ± 0.218	0.034	7.95 ± 0.218	0.034	0.000	1.000 NS
Apgar score (5 minutes)	8.95 ± 0.218	0.034	8.95 ± 0.218	0.034	0.000	1.000 NS

NS: Not Significant.

Chi-square test reveals significant association between the type of family the pregnant women was living in with the placental weight among the anaemic pregnant women and the monthly income of non-anaemic pregnant women with the placental weight as they were statistically significant at $p < 0.05$.

Table 5: Association of placental weight of anaemic and non-anaemic pregnant women with the selected demographic variables (N=82)

Demographic Data			Placental Weight						Chi Square	
			401-500 grams		501-600 grams		>600 grams			
			Frequency	%	Frequency	%	Frequency	%	χ^2	p value
Family	Anaemic women	Joint family	3	37.5	5	27.8	0	0	6.068	0.048

		Nuclear family	5	62.5	13	72.2	15	100		**
	Non-Anaemic women	**Joint family**	2	16.7	7	41.2	3	25	2.191	0.334 NS
		Nuclear family	10	83.3	10	58.8	9	75		
Monthly Income	**Anaemic Women**	**<10,000 pm**	2	25	4	22.2	3	20	4.798	0.570 NS
		10,000 to 15,000 pm	5	62.5	7	38.9	5	33.3		
		15,000 to 20,000 pm	1	12.5	6	33.3	4	26.7		
		above 20,000 pm	0	0	1	5.6	3	20		
	Non-Anaemic women	**<10,000 pm**	2	16.7	0	0	2	16.7	16.739	0.010 **
		10,000 to 15,000 pm	3	25	13	76.5	2	16.7		
		15,000 to 20,000 pm	3	25	0	0	5	41.7		
		above 20,000 pm	4	33.3	4	23.5	3	25		

** Significant at $p<0.05$

NS: Not Significant.

Chi-square test revealed a statistically significant association between the age of non-anaemic pregnant women,the gravida of the anaemic and non-anaemic pregnant women, parity and number of live babies deliveredby the anaemic pregnant women with birth weight as they were statistically significant at $p < 0.05$. **Table: 6**

Table 6: Association of birth weight of newborn among anaemic and non-anaemic mothers with the selected demographic variables (N=82)

Demographic Data			**Birth Weight**										**Chi Square**	
			<2.500 Kg		**2.501 Kg to 3.000 Kg**		**3.001 Kg to 3.500 Kg**		**3.501 Kg to 4.000 Kg**		**>4.001 Kg**			
			Frequency	**%**	**Frequency**	**%**	**Frequency**	**%**	**Frequency**	**%**	**Frequency**	**%**	**χ^2**	**p value**
Age	**Anaemic women**	**21-25 years**	0	0	9	42.9	8	53.3	1	50	0	0	7.901	0.245 NS
		26-30 years	3	100	9	42.9	4	26.7	0	0	0	0		
		31-35 years	0	0	3	14.3	3	20.0	1	50	0	0.0		
	Non-Anaemic Women	**18-20 years**	0	0	0	0	1	6.3	1	50	0	0	38.814	0.001 ***
		21-25 years	1	33.3	10	52.6	8	50.0	1	50	0	0.0		
		26-30 years	1	33.3	9	47.4	5	31.3	0	0	0	0		
		31-35 years	0	0	0	0	2	12.5	0	0	1	100		
		>35 years	1	33.3	0	0	0	0	0	0	0	0		

Gravida	**Anaemic women**	**G1**	0	0	13	61.9	5	33.3	0	0	0	0	18.244	0.032 **
		G2	3	100	6	28.6	8	53.3	1	50	0	0		
		G3	0	0	1	4.8	2	3.3	0	0	0	0		
		G4	0	0	1	4.8	0	0	1	50	0	0		
	Non-Anaemic women	**G1**	1	33.3	13	68.4	11	68.8	2	100	0	0	15.375	0.052 **
		G2	2	66.7	6	31.6	1	6.3	0	0	1	100		
		G3	0	0	0	0	4	25	0	0	0	0		
Para	**Anaemic women**	**P1**	0	0	13	61.9	5	33.3	0	0	0	0	14.919	0.021 **
		P2	3	100	6	28.6	10	66.7	1	50	0	0		
		P3	0	0	2	9.5	0	0	1	50	0	0		
	Non-Anaemic women	**P1**	1	33.3	13	68.4	11	68.8	2	100	1	100	7.233	0.512 NS
		P2	2	66.7	6	31.6	3	18.8	0	0	0	0		
		P3	0	0	0	0	2	12.5	0	0	0	0		
Live	**Anaemic women**	**L1**	0	0	13	61.9	5	33.3	0	0	0	0	14.919	0.021 **
		L2	3	100	6	28.6	10	66.7	1	50	0	0		
		L3	0	0	2	9.5	0	0	1	50	0	0		
	Non-Anaemic women	**L1**	1	33.3	13	68.4	11	68.8	2	100	1	100	7.223	0.512 NS
		L2	2	66.7	6	31.6	3	18.8	0	0	0	0		
		L3	0	0	0	0	2	12.5	0	0	0	0		

** Significant at $p<0.05$

NS: Not Significant.

Chi-square test reveals significant association between placental weight and birth weight of the newborn among non-anaemic pregnant women as they were statistically significant at $p<0.05$. **Table:7**

Table 7: Association betweenplacental weight and birth weight of newborn among anaemic and non-anaemic pregnant women. (N=82)

Association of placental weight and birth weight		**Fetal Weight**										**Chi Square**	
		<2.500 Kg		**2.501 Kg to 3.000 Kg**		**3.001 Kg to 3.500 Kg**		**3.501 Kg to 4.000 Kg**		**>4.001 Kg**			
		Frequency	**%**	**Frequency**	**%**	**Frequency**	**%**	**Frequency**	**%**	**Frequency**	**%**	**χ2**	**p value**
Placental Anaemic	**401 gm-500 gm**	1	33.3	4	19.0	3	20.0	0	0	0	0	9.938	0.127 NS

		501 gm-600 gm	0	0	13	61.9	5	33.3	0	0	0	0		
		>600 gm	2	66.7	4	19.0	7	46.7	2	100	0	0		
	Non-Anaemic women	**401 gm-500 gm**	3	100	5	26.3	3	18.8	1	50.0	0	0		
		501 gm-600 gm	0	0	11	57.9	4	25.0	1	50.0	1	100	17.680	0.024 **
		>600 gm	0	0	3	15.8	9	56.3	0	0	0	0		

** Significant at P < 0.05; NS: Not Significant.

There exist a positive correlation between the placental weight and birth weight among anaemic and non-anaemic pregnant women which indicates that adequate weight gain of the placenta has direct effect on the birth weight of the newborn and vice-versa among the anaemic and non-anaemic pregnant women.

Table 8: Correlation of placental weight and birth weight among anaemic and non-anaemic pregnant women. (N=82)

Correlation Parameters	**Anaemic women**		**Non-Anaemic women**	
	Pearson R-value	**p value**	**Pearson R-value**	**p value**
Comparison of Placental weight and Fetal weight	0.157	0.327 NS	0.303	0.054 **

** Significant at P < 0.05

NS: Not Significant.

4. DISCUSSION

The major findings of the study which can be considered to be incorporated in the body of scientific knowledge for an evidence based practice were:

First, the entire placenta was completely separated with normal maternal and fetal surface among anaemic and non-anaemic pregnant women. Almost 43.9% and 41.5% of placental weight of anaemic and non-anaemic pregnant womenwas 501-600 grams whereas a maximum of 36.6% of placental weight of anaemic pregnant womenwas >600 grams.**(Fig: 2)** Majority of 87.8% and 97.6% of anaemic and non-anaemic pregnant womenhad umbilical cord length of 46 to 49 cm. The placenta had undergone physiological adaptations in order to adapt to the growing need of the fetus.

The independent sample t-test of the placental weight and umbilical cord length reveal that there was no significant difference in the mean placental weight at 586.63 ± 90.726 and 565.24 ± 85.822 and the mean umbilical cord length at 45.512 ± 1.502 and 45.07 ± 0.469 among the anaemic and non-anaemic pregnant women respectively that means a homogenous group was taken up in this study to compare the impact of anaemia among anaemic and non-anaemic pregnant women. The pregnant women in both the groups were considered as an equivalent group with regard to their placental weight and umbilical cord length.

The independent sample t-test of the fetal characteristics such as the mean baby's birth weight at 2.98 ± 0.354 and 2.97 ± 0.421, mean baby's length at 49.49 ± 1.121 and 49.51 ± 0.978, mean head circumference at 33.05 ± 1.161 and 33.07 ± 0.985, and mean Apgar scores (at 1 minute = 7.95 ± 0.218 and 5 minutes = 8.95 ± 0.218) reveal that a homogenous group was taken up in this study to compare the impact of maternal anaemia on birth weight of the neonate among anaemic and non-anaemic pregnant women. The pregnant women in both the groups were considered as an equivalent group with regard to the baby's birth weight, baby's length, head circumference, and Apgar score (at 1 minute and 5 minutes) as the independent sample t-test was not statistically significant.

A descriptive study on placental weight in normal and pre-eclampsia pregnancies and birth weight revealed that 68.19% cases of low birth weight babies were found in pre-eclampsia group. Mean placental weight was 454.24± 47.52 grams and mean fetal weight was 2633.6±302.2 grams in normal group. Whereas, in preeclampsia group, mean placental weight was 406.32±59.33 grams and mean fetal weight was 2435.2±280.56 grams. **Sharma D., Jain A., et.al (2016)[9]**

A study to assess the relationship between the weight of the placenta and birth weight of the neonate in a Nigerian hospital showed that the placental birth weight ranged from 300 to 890g with the mean of 590±82g while the birth weight of the neonate ranged from 2030 to 5020g with an average of 3275±469g, the mean gestational age at delivery was 38.8±1.1 weeks.**Abubakar A. Panti., (2012)**[25]

Prospective study to assess the placental weight and its ratio to birth weight in normal pregnancy at Songkhlanagarind Hospital reveals that the mean placental weight at 36-40 gestational age was 519g (SD=89.01g). **Janthanaphan M., (2006)**[10]

A prospective study related to placental fetal weight ratios (PFWR) among anaemic and non-anaemic pregnant womenand the results shows that mean placental weight for male newborns was higher in the anaemic pregnant women group than in the non-anaemic pregnant women group (492.5±84.5 Vs 409.7±42.4 g, p<0.0001). Female newborns from anaemic women also had higher mean placental weight (498.8±72.9 Vs 408.2±38.6 g, p<0.0001). No difference in mean placental weight was found between male and female babies either in the anaemic pregnant women group (492.5±84.5 Vs 498.8±72.9g, p=0.58). **Nkwabong E., (2018)**[21]

A comparative study on the relationship between the weight of the placenta and birth weight of theneonate in a Nigerian Hospitalshowed that placental birth weight ranged from 300 to 890 g with a mean of 590±82 g while the birth weight of the neonate ranged from 2030 to 5020 g with an average of 3275±469 g. The mean gestational age at delivery was 38.8±1.1 weeks while the mean placental birth weight ratio was 18.2±2.4.**Panti A.A., et.al (2012)**[25]

A study on effect of anaemia on pregnancy outcome; a prospective study at tertiary care hospital and the study observed moderate anaemia observed in almost 53.0% cases followed by mild (29.5%) and severe (17.5%) respectively. Risk factors present in 58.0% and maternal complications in puerperium observed in 14.5% cases, High incidence of adverse fetal outcome in the form of preterm (20%).IUGR (28%), NICU admission (25.5%), IUD (3%) seen in present study. **Uphadyey C., (2017)**[38]

Secondly,Chi-square test reveals significant association between the type of family the pregnant women was living in with the placental weight among the anaemic pregnant women and the economic status of the family such as the monthly income of the non-anaemic pregnant women with the placental weight as they were statistically significant at $p < 0.05$, which indicates that the type of the family the pregnant women was living in and their economy would significantly influence the development of the placenta among anaemic and non-anaemic pregnant women respectively.

Chi-square test reveals a significant association between the age of non-anaemic pregnant women with birth weight as they were statistically significant at $p \leq 0.001$, which indicates that the age of non-anaemic pregnant women such as 21-25 years (49%) had a statistically significant association with the birth weight.

Chi-square test reveals a statistically significant association between the gravida of the anaemic and non-anaemic pregnant women, parity and number of live babies deliveredby the anaemic pregnant women with birth weight as they were statistically significant at $p < 0.05$, which indicates that the number of times a women became pregnant (gravida) influenced birth weight of the babies among anaemic and non-anaemic pregnant women and also the parity and number of live babies delivered by the anaemic pregnant women had significant association with birth weight of the newborn among anaemic pregnant women. This reveals a statistical association that greater number of conception and deliveries greater was its influence on the birth weight of the neonate.

Chi-square test reveals a statistically significant association between placental weight and birth weight of the neonate among non-anaemic pregnant women as they were statistically significant at $p < 0.05$, which indicates that the placental weight gain is influencing the birth weight of the newborn among non-anaemic pregnant women, while this association is not statistically significant among anaemic pregnant women as low haemoglobin levels have hindered the effective association between the placental weight and birth weight.

A comparative cross-sectional study on ratio of placenta to birth weight in anaemic and non-anaemic mothers and the results shows that in anaemic 2973.17±680.97g and mean placenta to birth weight ratio was 0.20±0.05. In non-anaemic group, mean placental weight was 575.96±128.88 g, mean placental weight ratio was 0.19±0.05. Significant difference was observed in means of placenta to birth ratio in anaemic and non-anaemic groups (p-value 0.05).**Khatun S., (2022)**[14]

A study to assess the relationship between the placentalweight and birth weight of the neonate in a Nigerian hospital showed that the mean placental birth weight ratio was 18.2±2.4 increase in birth weight of the neonate was associated with corresponding increase in placental weight.**Abubakar A. Panti., (2012)**[25]

A prospective study related to placental fetal weight ratios (PFWR) among anaemic and non-anaemic pregnant womenand the results shows thatthe mean PFWR for non-anaemic pregnant womenwas 12.8% for female babies (p=0.80). The PFWR for male babies was higher in the anaemic pregnant womengroup (0.144±0.019) than in the non-anaemic pregnant womengroup (0.124±0.019) (p<0.0001); that of female babies was also higher in the anaemic pregnant womengroup (0.157±0.03) than in the non-anaemic pregnant womengroup (0.128±0.013) (p<0.0001).**Nkwabong E., (2018)**[21]

A population based registry study on the assessment of placental weight and placental weight to birth weight ratio in relation

to Apgar score at birth studied a population of 522 360 singleton pregnancies.The result ofall singleton live births during the period 1999-2008 showed that in births after pregnancy week 29, and at every 2-week gestational age interval, the mean placental weight and placental weight to birth weight ratio were higher in newborn with Apgar score ≤7 than in infants with Apgar >7. The crude odds ratio of Apgar score ≤7 was 1.65 (95% CI 1.57–1.74), comparing the highest to the lowest quartile of placental weight to birth weight ratio. **EskildA,Haavaldasen C., et. al (2014)[7]**

Prospective study to assess the placental weight and its ratio to birth weight in normal pregnancy at Songkhlanagarind Hospital reveals thatthere was an association between placental weight below the 10th percentile and fetal distress (p=0.003). Placental weight to birth weight ratio below the 10th percentile was also associated with fetal distress (p=0.02).Placental weight above the 90th percentile was associated with newborns requiring neonatal intensive care admission, (p=0.016) **Janthanaphan M., (2006)[10]**

A comparative study on the relationship between the weight of the placenta and birth weight of theneonate in a Nigerian Hospitalshowed that an increase in birth weight of the neonate was associated with corresponding increase in placental weight. However, as the gestational age at term advances the proportion of increase the former was greater than the latter.**Panti A.A., et.al (2012)[25]**

A study on effect of anaemia on pregnancy outcome; a prospective study at tertiary care hospital and the study found association between space between pregnancy, LSCS and fetal outcome with severity of anaemia. Ensuring maternal iron sufficiency during gestation is the most common cost-effective method of preventing prenatal iron deficiency and related morbidities.**Uphadyey C., (2017)[38]**

Lastly,there exist a positive correlation between the placental weight and birth weight of the neonate among anaemic and non-anaemic pregnant women which indicates that adequate weight gain of the placenta has direct effect on the birth weight of the newborn and vice-versa among the anaemic and non-anaemic pregnant women.

The statistically significant positive correlation of $p < 0.05$ that exist between placental weight and birth weight among non-anaemic pregnant women indicates that the normal level of haemoglobin was significantly effective in improving the placental weight and birth weight among non-anaemic pregnant women.

The positive correlation that exist between placental weight and birth weight among anaemic pregnant women was not statistically significant at $p < 0.05$ which indicates that the abnormal level of haemoglobin was not significantly effective in improving the placental weight and birth weight of the newborn among anaemic pregnant women.

A descriptive study on placental weight in normal and pre-eclampsia pregnancies and its correlation with birth weightreveals that mean placental and fetal weight were significantly lower in pre-eclampsia group, whereas feto-placental weight ratio was significantly higher in pre-eclampsia group. A significant positive correlation was found between placental weight ($r = 0.975$, $p<0.001$) in normal and ($r = 0.971$, $p<0.001$) in pre-eclampsia group. **Sharma D., Jain A., et.al (2016)[9]**

Prospective study to assess the placental weight and its ratio to birth weight in normal pregnancy at Songkhlanagarind Hospital reveals that the placental weight increased according to the birth weight ($r = 0.45$,$p<0.005$). The mean placental weight to birth ratio was 17.08%.This ratio decreased slightly with advancing gestational age. **Janthanaphan M., (2006)[10]**

A study to assess Placental weight and placental weight to birth weight ratio in relation to Apgar score at birth: a population study of 522 360 singleton pregnancies. Results shows that the mean placental weight and placental weight to birthweight ratio were higher in newborn with Apgar score ≤7 than in infants with Apgar >7. **EskildA,Haavaldasen C., et. al (2014)[7]**

The study concludes that the level of haemoglobin shows a positive correlation and significant association between the placental weight and fetal weight which indicates that maintenance of normal haemoglobin level is essential for the normal growth and development of the placenta that directly influences the growth of the baby. In cases where this scenario is not met it is evident that there is a vice-versa effect on the fetal weight gain.

5. CONCLUSION

Identification and Intervention goes hand-in-hand, thus in-order to get complete control of anaemia the explorative study on the impact of maternal anaemia on the wellbeing of the fetus is vital. The need for long term positive approach towards maternal anaemia can be incorporated through effective understanding of the impact that maternal anaemia makes on the health of the pregnant women and newborn.Thus timely assessment and holistic (pre-conception and perinatal) care are the key components to prevent the hazards of anaemia during pregnancy.

6. DECLARATIONS

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