



Comparative assessment of Placental Weight and Fetal Outcome in Normal and Anaemic Mothers during Intranatal Period in Selected Hospitals in India

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

Background: Despite the fact that anaemia during pregnancy is the most prevalent and significant health problem in impoverished nations, anaemia has a negative impact on the placenta and fetal development. The placenta is a growing organ that provides nutrition, oxygen, and eliminates excretory wastes for the fetus while also acting as a protective barrier throughout pregnancy. If the placenta is compromised by anaemia, it has a negative impact on the foetus's growth.

Methods and Materials: Comparative descriptive research design was used, 60 subjects (30 normal mothers and 30 anaemic mothers) were allotted and in this study the purposive sampling technique was used to select the sample. The aim of the study was to compare the placental weight and fetal outcome in normal mothers and anaemic mothers. The objectives of the study were (i) To assess the placental weight in normal mothers and anaemic mothers. (ii) To assess the fetal outcome in normal mothers and anaemic mothers. (iii) To compare the placental weight and fetal outcome in normal and anaemic mothers.

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Results: The result of the study shows that 93% normal mothers had average condition of placental weight, 2% normal mothers had good condition of placental weight while in anaemic mothers it was found that 30 percent had average condition of placental weight, 73.3% normal mothers had average condition of fetal outcome, 26.7% normal mothers had good condition of fetal outcome while in anaemic mothers it was found that 93.3% percent had average condition of fetal outcome, 06.7% had good condition of fetal outcome.

Conclusion: The study concludes that the comparison between placental weight and birth weight of babies shows significant difference with a positive relationship in both the groups. This means as the placental weight increases the birth weight also increases and vice-versa.

Keywords: Anaemia; placental outcome; fetal outcome; intranatal.

1. BACKGROUND

The placenta is a feto-maternal organ made up of a maternal component, an endometrium-derived decidua basalis, and a fetal component, chorion frondosum develops from chorionicsac [1]. At full term the human placenta consists of: - (i) Fetal surfaces which is shiny, gray and translucent enough, due to the color of the underlying maroon villous tissue; (ii) Maternal surface which is, finely granular, mapped into 15-20 cotyledons limited by placental septum. (iii) Umbilical cord; insertion is usually central but may vary in some specimens like battledore/marginal, velamentous or eccentric [2,3].

In different types of hypoxic stress, such as high altitude and maternal iron deficiency anaemia, the fetal vasculature of the human placenta adapts uniformly. Hypoxic conditions, such as maternal iron deficiency anaemia, cause increased capillarization of term villi. The main adaptation to hypoxia is dilatation of the capillary sinusoid, which is accompanied by thinning of the villous membrane. There is a relative hypoxia in maternal anaemia, which could be the main reason in syncytia trophoblast proliferation and syncytium thickness growth [4]. Anaemia is a medical disorder characterised by a low level of haemoglobin in the blood. It is a condition in which a person's haemoglobin concentration is lower than normal for his or her age, gender, and environment, resulting in a reduction in the blood's oxygen carrying capability [5]. Anaemia during pregnancy is defined as a haemoglobin concentration of less than 11 g/dL, according to the World Health Organization (WHO), which ranges from mild to severe. WHO classify anaemia in pregnancy based on haemoglobin level as 10.0 – 10.9g/dL(mild anaemia) and <7g/dL(severe anaemia). Pregnancy causes an increase in iron requirement, which climbs from 2.5 mg per day in the first trimester to 6.6 mg per

day in the third trimester. Women will get anaemia if demand and supply are not balanced [6].

The cause of anaemia is multifactorial; the disease is thought to be mainly caused by iron deficiency in developing countries. In sub-Saharan Africa where iron deficiency is common, the prevalence of anaemia has often been used as an alternative for iron deficiency anaemia (IDA) [7]. Anaemia in pregnancy most commonly results from nutritional deficiency either iron or folic acid, other types during pregnancy include anaemia of chronic disease, hemoglobinopathies, hereditary spherocytosis or paroxysmal nocturnal hemoglobinuria, drug induced, and aplastic anaemia [6]. Pregnancy anaemia can be asymptomatic, and it can be detected with regular testing. The signs and symptoms are frequently nonspecific, with the most prevalent being weariness. Women may also complain of lethargy, reduced mental alertness, pallor, dyspnea, weakness, headaches, palpitations, and dizziness [6,8].

2. METHODS

A comparative descriptive research design was used in this study. 60 samples, 30 normal mothers (Hb>12%) and 30 anaemic mothers (Hb<12%) were purposively selected during intranatal period in Wardha district. The samples are calculated as:

$$n = \frac{(sD_1^2 + sD_2^2)(1.96 + 1.645)^2}{(x_1 - x_2)^2} = 60(30 \text{ in 1 group} \& 30 \text{ in 1 group})$$

In this study the purposive sampling technique was used for selecting the sample. The tool was validated by experts from obstetrics and gynaecological nursing, the tool was developed after the investigator updated theoretical risk about anaemia. The investigator's own

experience, theoretical knowledge, and guidance from specialists, as well as a review of literature, all contributed to the development of the tool needed for the study. The research tool consist of two part:

Part A: Performa for collecting socio-demographic data.

Part B: Standard electronic weight machine, and Performa to collect maternal and fetal variables.

Study was approved by the Institutional Ethical Committee. Based on the objectives and the hypothesis the data were analyzed by using various statistical tests such as frequency, percentage, mean, and standard deviation, paired and unpaired ' t ' test, one way analysis of

variance (ANOVA). The level of significance set for testing the hypothesis was at 0.05.

To accomplish the objective of the study the investigator approached the mothers during intranatal period and explained the purposes of the study and explained how it will be beneficial for them. The investigator questioned about their desire to take part in the study and obtained their consent. The samples were divided into two groups i.e, those who have normal haemoglobin and those who were anemic mothers. Soon after the delivery the placenta was collected and the weight was checked as well as the fetal outcome, maternal and fetal variables was also collected by using structured performa, each sample required around 30 minutes to complete the placenta and newborn assessment.

Table 1 Percentage wise distribution of normal mothers and anaemic mothers according to their demographic characteristics n=60

Demographic variables	Normal mothers		Anaemic mothers	
	Frequency	Percentage	Frequency	Percentage
Age				
18-22 years	08	26.7%	08	26.7%
23-27 years	10	33.3%	08	26.7%
28-32 years	10	33.3%	08	26.7%
33- 37 years	02	06.7%	06	20.0%
Parity				
Primigravida	10	33.3%	08	26.7%
Multipara	20	66.7%	22	73.3%
Family				
Joint	12	40%	08	26.7%
Nuclear	18	60%	22	26.7%
Education				
Primary school	02	06.7%	00	00.0%
Middle school	14	46.7%	12	40.0%
High school	08	26.7%	10	33.3%
Higher secondary school	04	13.3%	08	26.7%
Graduate	02	06.7%	00	00%
Religion				
Hindu	26	86.7%	28	93.3%
Muslim	04	13.3%	02	06.7%
Christian	00	00%	00	00%
Buddhist	00	00%	00	00%
HB%				
8-10%	00	00%	17	56.7%
11-13%	28	93.3%	13	43.3%
14 and above%	02	06.7%	00	00%
Diet				
Vegetarian	22	73.3%	28	93.3%
Mixed	08	26.7%	02	06.7%

3. RESULTS

3.1 Section I: Percentage Wise Distribution of Normal Mothers and Anaemic Mothers According to their Demographic Characteristics

The above table shows that, according to age group in normal mothers 26.7 % belongs to 18-22 years of age, 33.3% belongs to 23-27 years, 33.3% belongs to 28-32 years and 6.7% belongs to 33-37% years of age. While in anaemic mothers 26.7 percent belongs to 18-22 years of age, 26.7% belongs to 23-27 years, 26.7% belongs to 28-32 years and 20% belongs to 33-37% years of age.

According to parity in normal mothers, 33.3% belongs to primigravida, 66.7% belongs to multipara. While in anaemic mothers 26.7% belongs to primigravida, 73.3% belongs to multipara.

According to family in normal mothers, 40% belongs to joint family, 60% belongs to nuclear family. While in anaemic mothers, 26.7% belongs to joint family, 26.7% belongs to nuclear family.

According to education in normal mothers, 6.7% belongs to primary school, 46.7% belongs to middle school, 26.7% belongs to high school, 13.3% belongs to higher secondary school and 6.7% belongs to graduate. While in anaemic mothers, 0% belongs to primary school, 40% belongs to middle school, 33.3% belongs to high school, 26.7% belongs to higher secondary school and 0% belongs to graduate.

According to religion in normal mothers, 86.7% belongs to Hindu religion, 13.3% belongs to Muslim religion and none of them were from Christian and Buddhist religion. While in anaemic mothers, 93.3% belongs to Hindu religion, 6.7% belongs to Muslim religion and none of them were from Christian and Buddhist religion.

According to Hb in normal mothers, 0% were 8-10%, 93.3% were 11-13% and 6.7% were 14 and above %. While in anaemic mothers, 56.7% were 8-10%, 43.3% were 11-13% and 0% were 14 and above %.

According to diet in normal mothers, 73.3% were taking vegetarian diet, 26.7% were taking mixed diet. While in anaemic mothers, 93.3% were taking vegetarian diet, 6.7% were taking mixed diet.

3.2 Section-II: Assessment of Placental Weight and Fetal Outcome in Normal Mothers and Anemic Mothers

In assessment of placental weight, it shows that 93% normal mothers had average condition of placental weight while 2 % normal mothers had good condition of placental weight. The score of the minimum was 15 and the maximum was 21, with a mean score of 17.80 while the standard deviation was 1.540 in normal mothers. While in anemic mothers it was found that 30 percent had average condition of placental weight. The minimum score found was 11 and the maximum score found was 20, the mean score was 16.23 while the standard deviation was 2.661 in anemic mothers.

3.3 Section- III: Assessment of Fetal Outcome in Normal Mothers and Anemic Mothers

In assessment of fetal weight it shows that the seventy three point three percent (73.3%) normal mothers had average condition of fetal outcome while 26.7% normal mothers had good condition of fetal outcome. The score of the minimum was 06 and the maximum was 13, with mean score of 9.53 while the standard deviation was 1.525 in normal mothers. While in anemic mothers it was found that 93.3% percent had average condition of fetal outcome, while, 06.7% had good condition of fetal outcome. The minimum score

Table 2. Assessment of placental weight in normal mothers and anaemic mothers n=60

Condition of placental weight	Normal mothers		Anaemic mothers	
	Frequency	Percentage	Frequency	Percentage
Poor	00	00%	00	00%
Average	28	93.3%	30	100%
Good	02	06.7%	00	00%
Minimum score	15		11	
Maximum score	21		20	
Mean score	17.80± 1.540		16.23± 2.661	

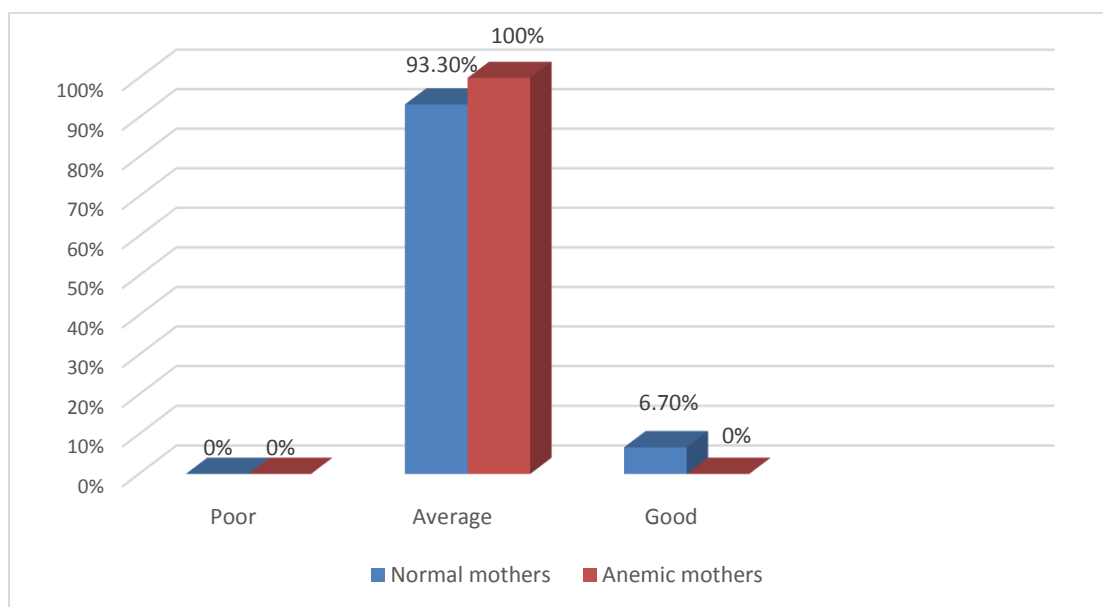


Fig. 1. Assessment of placental weight in normal mothers and anemic mothers

Table 3. Assessment of fetal outcome in normal mothers and anemic mothers n=60

Condition of fetal outcome	Normal mothers		Anemic mothers	
	Frequency	Percentage	Frequency	Percentage
Weight of the baby				
Poor	00	00%	00	00%
Average	22	73.3%	28	93.3%
Good	08	26.7%	02	06.7%
Minimum score	06		06	
Maximum score	13		11	
Mean score	9.53±1.525		8.47±1.279	

found was 06 and the maximum score found was 11, the mean score was 8.47 while the standard deviation was 1.279 in anemic mothers.

significant difference in placental weight and fetal outcome in normal mothers and anaemic mothers.

3.4 SECTION-IV: Comparison of the Placental Weight and Fetal Outcome in Normal and Anemic Mothers

Table 4 shows that the mean score of normal mothers is 17.80 while the anemic mothers is 16.23 and the standard deviation for normal mothers is 1.540 and anemicmothers is 2.661. the degree of freedom found was 29 and the p value found is .006 which is less than the p value 0.05 which is significant, hence the alternative hypothesis (H1) is accepted that, there may be a

Table 5 states the comparison of the fetal outcome in normal and anemic mothers, that the mean score of normal mothers is 9.53 while the anemic mothers is 8.47 and the standard deviation for normal mothers is 1.525 and anemicmothers is 1.279. the degree of freedom found was 29 and the p value found is .014 which is less than the p value 0.05 which is significant hence the alternative hypothesis (H1) is accepted that, there may be a significant difference in placental weight and fetal outcome in normal mothers and anaemic mothers.

Table 4. Comparison of the placental weight in normal and anemic mothers n=60

	Mean	Frequency	Std. deviation	df	t value	p-value
Normal mothers	17.80	30	1.540	29	2.987	.006< 0.05
Anemic mothers	16.23	30	2.661			S

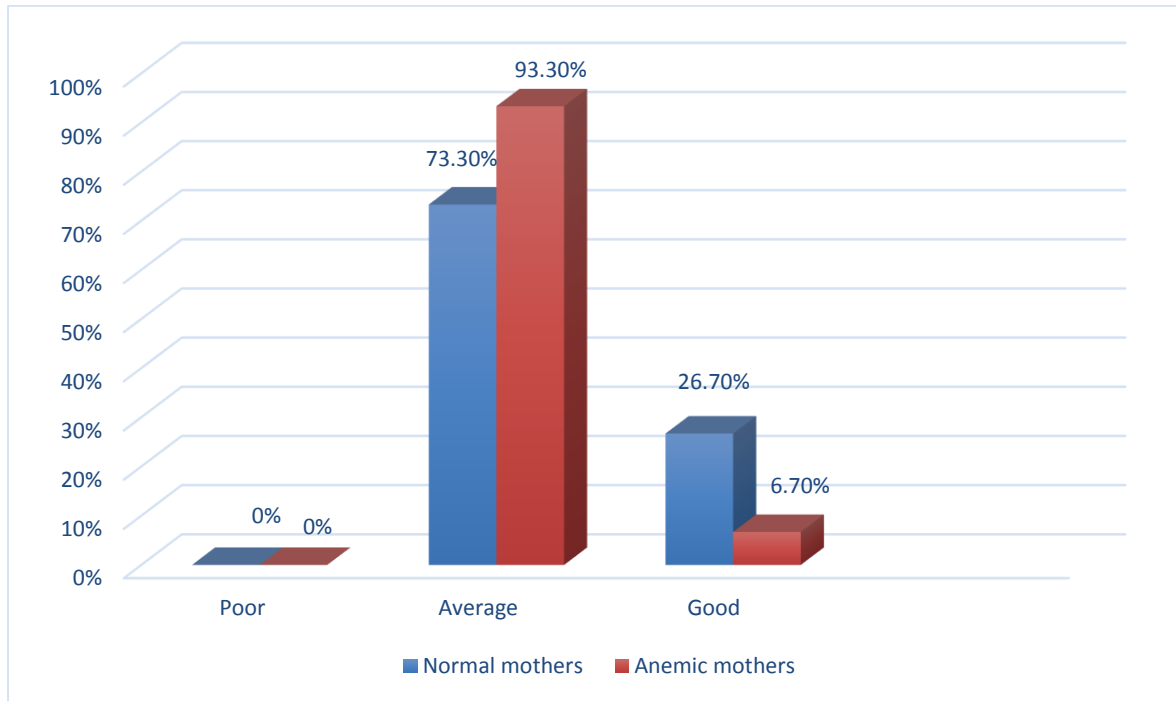


Fig. 2. Assessment of fetal outcome in normal mothers and anemic mothers

Table 5. Comparison of the fetal outcome in normal and anemic mothers n=60

	Mean	Frequency	Std. deviation	df	t value	p-value
Normal mothers	9.53	30	1.525	29	2.605	.014 < 0.05
Anemic mothers	8.47	30	1.279			S

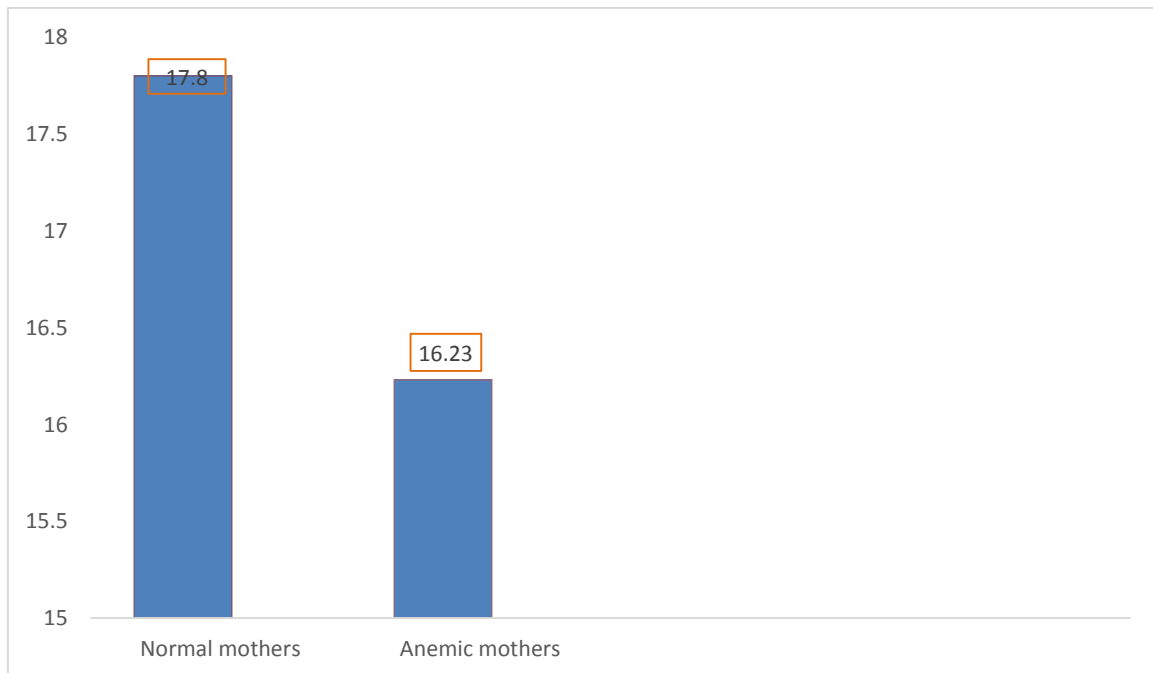


Fig. 3. Comparison of the placental weight in normal and anemic mothers

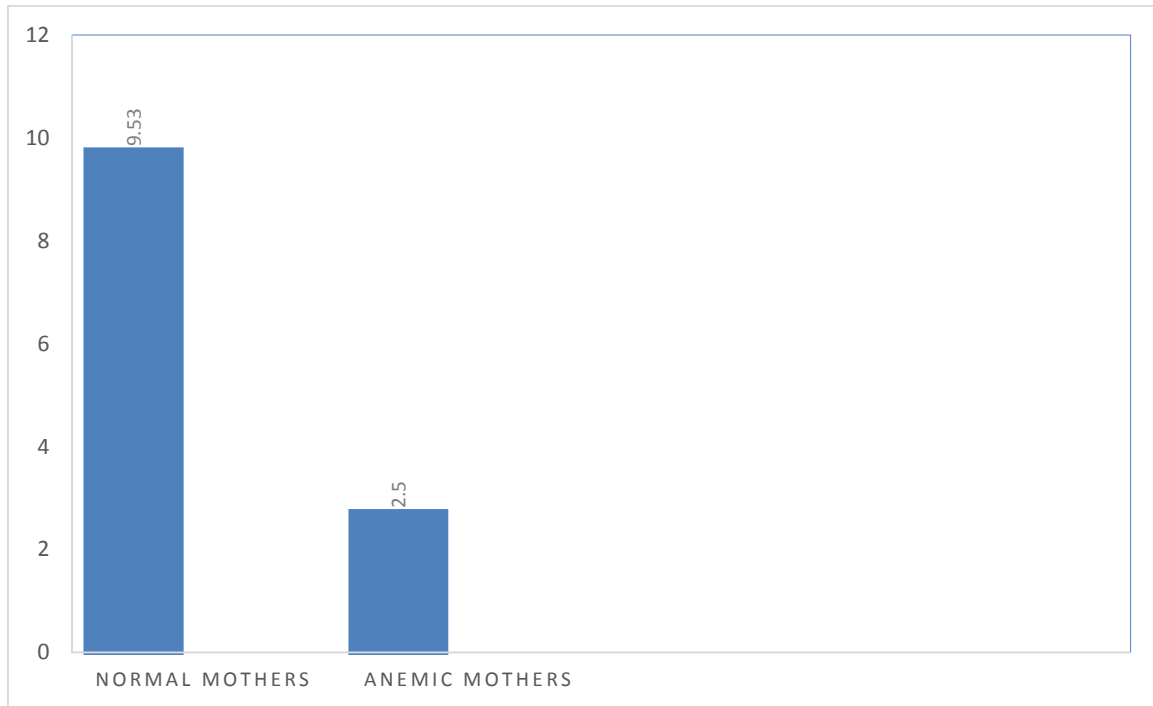


Fig. 4. Comparison of the fetal outcome in normal and anemic mothers

4. DISCUSSION

In the present study, the assessment of placental weight shows that the ninety three percent (93%) normal mothers had average condition of placental weight while 2% normal mothers had good condition of placental weight. The score of the minimum was 15 and the maximum was 21, with the mean score of 17.80 while the standard deviation was 1.540 in normal mothers. While in anemic mothers it was found that 30 percent had average condition of placental weight. The minimum score found was 11 and the maximum score found was 20, the mean score was 16.23 while the standard deviation was 2.661 in anemic mothers.

In assessment of fetal weight shows that the seventy three point three percent (73.3%) normal mothers had average condition of fetal outcome while 26.7% normal mothers had good condition of fetal outcome. The minimum was 06 and the maximum was 13, with the mean score of 9.53 while the standard deviation was 1.525 in normal mothers. While in anemic mothers it was found that 93.3% percent had average condition of fetal outcome, while, 06.7% had good condition of fetal outcome. The score of the minimum was 06 and the maximum was 11, with the mean score of 8.47 while the standard deviation was 1.279 in anemic mothers.

A similar study was conducted on assessment of Placental Weight, Newborn Birth Weight in Normal Pregnant Women and Anemic Pregnant Women: A Correlation and Comparative Study. The study shows that The mean placental weight in 30 normal pregnant women was 521.00 gms, Mean Placental weight in anemic pregnant women was 553.00 gms. There is statistically no difference in placental weight in both groups. The mean birth weight in 30 normal pregnant women was 3152 gms, Mean Placental weight in mild, moderate, severe anemic pregnant women was 3100 gms, 2800 gms, 2930gms. There was positive correlation between placental weight and baby's weight at p value 0.05 level of significance [9].

In comparison, the mean score of normal mothers is 17.80 while the anemic mothers is 16.23 and the standard deviation for normal mothers is 1.540 and anemic mothers is 2.661. the degree of freedom found was 29 and the p value found is .006 which is less than the p value 0.05 which is significant and also, table no. 5 states the comparison of the fetal outcome in normal and anemic mothers, that the mean score of normal mothers is 9.53 while the anemic mothers is 8.47 and the standard deviation for normal mothers is 1.525 and anemic mothers is 1.279. the degree of freedom found was 29 and the p value found is .014 which is less than the p

value 0.05 which is significant hence the alternative hypothesis (H1) is accepted that, there may be a significant difference in placental weight and fetal outcome in normal mothers and anaemic mothers.

Similar study was conducted to determine the effect of maternal anaemia on placenta and newborn. The sample of total 69 anemic mothers (<110g/L) and 16 mother without anaemia (>110g/L) were studied fetal birth weight, placental morphometry. The result shows that the birth weight, placental weight and number of cotyledons were significantly severely reduced in severe anemic mother (Hb \leq 60 g/l) and had direct relationship with maternal hemoglobin level. However, placental volume and surface area showed no constant relation to maternal hemoglobin. The hemoglobin and iron levels in the cord blood and placental tissue were found to have linear correlations with the maternal hemoglobin levels. The low levels of placental and cord serum iron in the severely anemic mothers suggest that iron supply to the placenta and the fetus is affected in maternal anaemia and the fetus takes iron in direct proportion to the levels available in the mother. This study concluded that maternal anaemia affects placenta and newborn [10].

A similar study was conducted on a Comparative Study to Assess the Fetal and Placental Outcome among Anaemic and Non-Anaemic Mothers of Selected Hospital of District Mohali, Punjab, India. The study shows that out of 100 mothers majority of the anaemic mothers 74% were in the age group of 21-30 years and in non-anaemic 86% were in age group of 21-30 years, 66% anaemic mothers were from joint family and 52% nuclear family and in non-anaemic 71% were from nuclear family, most of the anaemic mothers 48% of mothers had 5001-10000 family income and in non-anaemic mothers 66% had 5001-10000, maximum 44% anaemic mothers had Sikh religion and in non-anaemic 58% also from Sikh religion, 46% of anaemic mothers had primary and 32% of non-anaemic mothers had secondary education, 78% of anaemic mothers and 66% of non-anaemic mothers were home maker, 54% of anaemic mothers were vegetarian and 66% of non-anaemic mothers were non-vegetarian, 58% of anaemic mothers were from rural and 60% of non-anaemic mothers were from urban area. Fetal outcome the 28.0% anaemic and 72.0% non-anaemic mothers had good fetal outcome and 68.0% anaemic and 32.0% non-anaemic mothers had poor fetal

outcome. Placental outcome the 18.0% anaemic and 82.0% non-anaemic mothers had good placental outcome and 46.0% anaemic and 54.0% non-anaemic mothers had poor placental outcome. χ^2 value showed that there was statistically no significant association with demographic variables of anaemic and non-anaemic mothers [11].

The present study revealed that proper health education should be given to mothers to improve their knowledge regarding proper nutritional care which will prevent from anaemia.

5. CONCLUSION

The study concludes that the comparison between placental weight and birth weight of babies shows significant difference with a positive relationship in both the groups. This means as the placental weight increases the birth weight also increases and vice-versa.

CONSENT

The investigator questioned about their desire to take part in the study and obtained their consent.

ETHICAL APPROVAL

Study was approved by the Institutional Ethical Committee. Based on the objectives and the hypothesis the data were analyzed by using various statistical tests such as frequency, percentage, mean, and standard deviation, paired and unpaired 't' test, one way analysis of variance (ANOVA). The level of significance set for testing the hypothesis was at 0.05.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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