Original Research Article

Maternal and Fetal Outcome of Anaemia in Pregnancy

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Abstract

Background and Rationale: The commonest nutritional deficiency disorder affecting the pregnant women in India and other developing countries is Anaemia. Anaemia if not treated during pregnancy would lead to poor pregnancy outcome and can cause complications which would threaten the life of both mother and foetus. The prevalence of Anaemia changes with the progression of time due to multiple factors such as awareness, nutritional schemes and improved Health services. Subsequent to the published data of National Family Health survey-5 (NFHS-5) in 2019, a study is contemplated to estimate the proportion of anaemia in the southern Kerala.

Aims and objectives: To estimate the proportion of anaemia in pregnancy and its maternal and foetal outcome in admitted pregnant women in Kottayam Medical College Hospital and to correlate its outcome on the maternal and foetal health; to estimate risk factors associated with anaemia.

Objectives: To estimate the proportion of anaemia in OBG inpatients during their confinement for delivery in Kottayam Medical College Hospital and to estimate the risk factors associated; to estimate the mother and foetal outcomes in pregnant women with anaemia.

Research question: What is the proportion of anaemia in pregnant women admitted in Kottayam Medical College and Hospital and its outcome of foetal and maternal health?

Materials: A Descriptive Retrospective study on 268 pregnant women with Anaemia was conducted for 12 months in a Government Medical College Hospital Kottayam, Kerala. Women of child bearing age between 18 to 45 years were included. Pregnant women with anaemia due to acute blood loss (APH), medical disorders such as diabetes, hypertension, cardiac disease and chronic renal disease were excluded from the study. The Primary Outcome of the study was to assess the Prevalence of Anaemia in pregnant women at the time of admission. The secondary Outcomes were grading the severity of Anaemia among the pregnant women. Observing the risk factors associated with Anaemia among the admitted pregnant women. Haemoglobin estimation is the most important test for detection of anaemia in the community level. Mild anaemia was considered when Haemoglobin was between 10-10.9 g/dl, moderate when Haemoglobin was between 7-9.9g/dl and severe anaemia when Haemoglobin was less than 7g/dl.

Results: Among 268 pregnant women there were 28.35% in the age group of 18 to 22, 22.01% in the age group of 23 to 27, 19.40% women in the age group of 28 to 32, 14.55% were women in the age group of 33 to 37, 08.58% in the age group of 38 to 42, 19/268 (07.08%) women in

the age group of above 42 years. The mean age of the patients included in this study was 24.35± 3.64 years. There was no significant association between prevalence of Anaemia and the incidence among the different age groups, body weight, BMI, age at marriage, educational status, economic status and occupation. But there was significant correlation between the prevalence of Anaemia and parity and number of members of the family to which the women belonged.

Conclusions: Anaemia is a very common condition diagnosed in pregnant women with its effects on the Health of the mother and the newborn. The prevalence of Anaemia acts as a Health Care indicator of any society. The prevalence of Anaemia was in the form of mild, moderate and severe degrees in anaemia were 26.86%, 48.88% and 24.25% respectively. The risk factors were age of menarche, malnutrition, parity, heavy menstruation and irregular menstrual cycles.

Keywords: Anaemia, acute blood loss, national family health survey

Introduction

The word "Anaemia" was derived from the Greek language which literally means without blood. It denoted the deficiency of red blood cells and/or haemoglobin. Anaemia was reported as the most common deficiency disease in the world, where more than 1.82 billion people corresponding to 19.65% of the world population [1]. When the prevalence of anemia is low and less than 20% WHO considered it as a low public Health importance; medium Health importance when the prevalence was 20 to 39.9% and severe Health Importance when the prevalence was more than 40%. [2] In India its prevalence is linked to poverty and low socio economy. The National Health Survey (NHFS-5) 2019-21 reported the prevalence of anemia in women of child bearing age was 52.2%; which was 1.8% more than the NHFS-4 conducted in 2015-16. Similarly, the prevalence of anemia in adolescent girls aged 15 to 19 years was reported as increased from 54.1% to 59.1% with a hike of 5%. Anemia has a multifactorial etiology including blood loss, decreased red blood cell production and increased red blood cell breakdown [3]. Deficiency of Iron develops gradually and does not have clinically apparent symptoms until severe [4]. Anemia in pregnancy has been defined as a condition in which the haemoglobin concentration of a women during pregnancy is <11g/dl. Nutritional anemia especially iron deficiency anemia is the most common cause of anemia during pregnancy [5]. It is further classified into mild, moderate and severe. It is said to be mild when haemoglobin level is between 10-10.9 g/dl, moderate when it is between 7-9.9 g/dl and severe when it is less than 7g/dl [6]. It showed that every second woman in India is anemic and one in every five maternal deaths is directly due to anemia [7]. Most women are anaemic prior to their first pregnancy itself and others become so during pregnancy progressively [7]. The National Nutritional Anaemia Prophylaxis Programme (NNAPP) had started in 1973 with an aim to reduce the prevalence of Anaemia to 25%, the latest statistics show a rising trend of this disease which is alarming and a cause of great concern [8]. Iron deficiency Anaemia was considered as the third leading cause of disability-adjusted life years (DALYs) lost for females 15–44 years of age by the WHO. Anaemia contributed to 1, 68,000 deaths globally especially among the populations of low- and middle-income countries like India [9]. 18% of maternal mortality was considered due to pregnant women with untreated Anaemia. The effect of anaemia is borne by both the mother and the child as it predisposes to many adverse effects such as increased maternal mortality and morbidity, neonatal and perinatal

morbidity and mortality, low birth weight, poor immunity, poor cognitive development in children and decreased work productivity in adults. Taking into consideration of all these facts, the UNDP (United Nations Development Programme) has adopted reducing the maternal mortality rates as one of the three health related goals, Goal No. 5 in the Millennium Development Goals by the end of 2015 [10]. In this context the present study aims to study the prevalence of Anaemia in admitted pregnant women in Kottayam Medical College and Hospital and to correlate its outcome on the maternal and Fetal Health; to make recommendations for prevention and correction of Anaemia in pregnant Women.

Materials

A Descriptive Retrospective study was conducted at Kottayam Medical College, A tertiary referral Hospital. The study period was between June 2021and May 2022. All the data was collected from Medical Records Library, Government Medical College, Kottayam. Sample size was calculated using the formula $S=4pq/d^2$ where p=59.8, q=41.2, d=10% of p=$4\times59.8\times41.2/5.98$x5.98 =9615/35.76= 268. All medical records of pregnant patients admitted to the Obstetrics and Gynaecology department for delivery from June 2021 to May 2022 were scrutinized. Institutional review Board approval for the study was obtained.

Inclusion Criteria: Women of child bearing age between 18 to 45 years were included. Eligible pregnant women admitted to the Obstetrics ward for confinement or for General medical or surgical indications were included. Pregnant women admitted were of all gestational ages were included.

Exclusion Criteria: Pregnant women with anaemia due to acute blood loss (APH), medical disorders such as diabetes, hypertension, cardiac disease and chronic renal disease were excluded from the study.Patients with Toxoplasmosis, Rubella, Cytomegalovirus, Herpes infection, Patients with history of smoking and alcohol intake were excluded. Patients with multiple gestations were also excluded. The Primary Outcome of the study was to assess the Prevalence of Anaemia in pregnant women at the time of admission. The secondary Outcomes we regarding the severity of Anaemia among the pregnant women, observing the risk factors associated with Anaemia among the admitted pregnant women.

Patient's data was obtained from previous case records of pregnant women admitted in the OBG wards on all week days kept in the records section of the Government Medical College Hospital, Kottayam. Consent of Approval was obtained from the Superintendent of Medical College, Kottayam, Kerala (As informed consent from patients is not possible). A Study Proforma containing demographic details, Serum Hb level, Type and severity of anaemia, risk factors, and obstetric history details were filled by the investigator. The method of assessment of Haemoglobin was adopted as per WHO criteria. Measurement of Haemoglobin was done by cyanmethemoglobin method. Hb Measurement was done in all the three trimesters as and when the pregnant women were registered for antenatal check-up.

Haemoglobin estimation is the most important test for detection of anaemia in the community level. Mild anaemia was considered when Haemoglobin was between 10-10.9 g/dl, moderate when Haemoglobin was between 7-9.9g/dl and severe anaemia when Haemoglobin was less than 7g/dl. Type of anaemia was also assessed by looking in to peripheral smear of the blood report. The Primigravida was defined as when a woman becomes pregnant for the first time. Multi gravid was defined as when a woman becomes pregnant, who had been pregnant earlier also. The Maternal Outcomes in the present study were to include all the antepartum complications, intrapartum complications, postpartum complications, all types of

pregnancy outcomes, mode of delivery, indications for ICU admission and duration of hospital stay. Foetal Outcomes in the present study were to include gestational age at delivery, birth weight, congenital anomalies, perinatal loss, APGAR score, Indications for NICU admission.

The corresponding author was responsible for collecting all the data. Data entry was done using Epidata software with quality checks such as range and consistency. Statistical analysis was done by using SPSS version 19.0 software. Data was further screened with Boxplot and histograms. Description of means, proportions, frequencies and rates of the given data for each variable were calculated. The proportion was presented as point estimate with 95% CI. The statistics were presented separately for different age groups and risk groups. Presence of Anaemia (yes / no) had been taken as an independent variable. Univariate analysis was done to compare each independent variable.

Results

A Descriptive Retrospective study was conducted at Kottayam Medical College Hospital, A tertiary referral Hospital. The study period was between June 2021 and May 2022. All the data was collected from Medical Records Library, Government Medical College, Kottayam. There were 76/268 (28.35%) women in the age group of 18 to 22, 59/268 (22.01%) women in the age group of 23 to 27, 52/268 (19.40%) women in the age group of 28 to 32, 39/268 (14.55%) women in the age group of 33 to 37, 23/268 (08.58%) in the age group of 38 to 42, 19/268 (07.08%) women in the age group of above 42 years (Table 1). The mean age of the patients included in this study was 24.35± 3.64 years. 148/268 (55.22%) Patients with body weight less than 40 Kgs were observed and 120/268 (44.77%) patients with above 40 Kgs weight were observed (Table 1). Patients with BMI between 18 and 20 were observed in 64/268 (23.88%), BMI between 20 and 22 were observed in 71/268 (26.49%) patients, BMI between 22 and 24 were observed in 64/268 (23.88%) patients, BMI between 24 and 26 were observed in 69/268 (25.74%), (Table 1). Women aged below 20 years were 168/268 (62.68%) and above 20 years were 120/268 (44.44%). There were 112/268 (41.79%) primi patients, 97/268 (36.19%) second gravid patients and 59/268 (22.01%) multigravida patients in this study (Table 1).

Women who had passed SSC were 123/268 (45.89%), those who were inter passed were 64/268 (23.88%), there were 44/268 (16.41%) who were graduates and 37/268 (13.80%) who were Post graduates. 124/268 (46.26%) women belonged to two member family, 58/268 (21.64%) women were belonging to 4 member family, 49/268 (18.28%) women belonged to 06 member family and 37/286 (13.80%) women belonged to 08 member families (Table 1).

There was no significant association between prevalence of Anaemia and the incidence among the different age groups, body weight, BMI, age at marriage, educational status, economic status and occupation. But there was significant correlation between the prevalence of Anaemia and parity and number of members of the family to which the subjects belong (p value less than 0.05).

Table 1: Showing the demographic data of the subjects in the study (n-268)

Observation	Number	Percentage	P value
Age groups			
18 to 22	76	28.35	
23 to 27	59	22.01	0.126
28 to 32	52	19.40	
33 to 37	39	14.55	
38 to 42	23	08.58	
Above 42	19	07.08	

Body weight			
Above 40 Kgs	148	55.22	
Below 40 Kgs	120	44.77	0.143
BMI			
18 to 20	64	23.88	
20 to 22	71	26.49	0.241
22 to 24	64	23.88	
24 to 26	69	25.74	
Age at Marriage			
Above 20 years	168	62.68	0.411
Below 20 years	120	44.77	
Parity			
Primi	112	41.79	**0.01**
Second gravid	097	36.19	
Multipara	059	22.01	
Educational status			
SSC	123	45.89	
Inter	064	23.88	0.223
Graduate	044	16.41	
PG	037	13.80	
Occupation			
House wife	101	37.68	0192
Job holder	167	62.31	
Economic status			
Low	075	27.98	
Middle	141	52.61	0.813
High	052	19.40	
Number of family members			
02	124	46.26	
04	058	21.64	**0.001**
06	049	18.28	
08	037	13.80	

161/286 (60.07%) women had attained menarche before 13 years, 107/268 (39.92%) women and attained menarche after 13 years (Table 2). 175/268 (65.29%) had regular menstrual cycles and 93/268 (34.70%)women had irregular menstrual cycles. 64/268 (23.88%) women had heavy menstrual bleeding and 204/268 (75.11%) women had moderate menstrual bleeding in the study. 100/268 women had no abortions, 107 (39.92%) women had 01 abortion and 61/268 (22.76%) women had 02 abortions in their obstetrics history (Table 2). Malnutrition was present in 69/268 (25.74%) patients and absent in the remaining patients (74.25%). 209/268 patients were taking non-vegetarian diet and 59/268 (77.98%) were taking vegetarian diet (22.01%). There was significant statistical significant association between prevalence of Anaemia and age at Menarche, irregularity of menstrual cycles, menstrual bleeding, number of abortions, birth spacing and malnutrition in this study (p value was <0.05). But there was no significant association between the diet and prevalence of Anaemia (Table 2).

Table 2: Showing the Risk factors associated with Pregnancy as a cause of Anaemia (n-268)

Risk Factors	Number	Percentage	P value
Age at Menarche			
Below 13 years	161	60.07	**0.001**
Above 13 years	107	39.92	
Regularity of menstrual cycles			
Regular	175	65.29	**0.001**
Irregular	093	34.70	
Menstrual bleeding			
Heavy menstruation	064	23.88	**0.001**
Moderate menstruation	204	76.11	
Number of abortions			
0	100	37.31	**0.001**
1	107	39.92	
2	061	22.76	
Birth spacing			
2 years	129	48.13	**0.001**
3 years	081	30.22	
4 years	028	10.44	
More than 4 years	030	11.19	
Malnutrition			
Present	069	25.74	**0.001**
Absent	199	74.25	
Type of Diet			
Vegetarian	59	22.01	0.217
Non-vegetarian	209	77.98	

Mild Anaemia was observed in 14 (19.44%) women of first trimester, 34 (47.22%) belonged to second trimester and 24 (33.33%) belonged to third trimester. Moderate Anaemia was observed in 33 (25.19%) women of first trimester, 51 (38.93%) belonged to second trimester and 47 (37.87%) belonged to third trimester. Severe Anaemia was observed in 15 (23.07%) of the first trimester, 27 (41.53%) of the second trimester and 23 (35.98%) of the third trimester pregnant women of this study (Table 3). The prevalence of Anaemia among the different trimesters was statistically significant (p value was <0.05), (Table 3).In this study the most common Anaemia was Iron deficiency Anaemia in 59.45 % of the pregnant women. followed by sickle cell anaemia in15.4%. In this study there was significant association between the prevalence of degree Anaemia andits incidence in the different trimesters (P value less than 0.05), (Table 3).

Table 3: Showing the grading of Anaemia based on the serum Haemoglobin levels in the study (n-268)

Grades of Anaemia Haemoglobin values	Trimesters- Number-Percentage			P value
	First	Second	Third	
Mild- 72 (26.86%) 10-10.9 g/dl	14 (19.44%)	34 (47.22%)	24 (33.33%)	0.001
Moderate- 131 (48.88%) 7-9.9g/dl	33 (25.19%)	51 (38.93%)	47 (37.87%)	0.001
Severe-65 (24.25%) less than 7g/dl	15 (23.07%)	27 (41.53%)	23 (35.38%)	0.001
Total	62	112	94	--

The symptoms present in the patients of this study were observed and found that there was easy fatigability in 202/268 (75.37%) of the patients, Giddiness in 187/268 (69.77%) of the patients, Leg cramps in 164/268 (6.19%) of the patients, Breathlessness in 159/268 (59.32%) of the patients, palpitations in 143/268 (53.35%) of the patients, reduce concentrating power in 126/268 (47.38%) of the patients and Pica in 95/268 (47.38%) of the patients. There was statistically significant association between the symptoms like easy fatigability, giddiness, leg cramps, breathlessness and palpitations and the prevalence of Anaemia in this study. The other symptoms like Pica and reduced concentrating power had no significant association with prevalence of Anaemia (Table 4).

Table 4: Showing the symptoms observed in the study subjects of the study (n-268).

Symptoms	Number	Percentage
Easy fatigability	202	75.37
Giddiness	187	69.77
Leg cramps	164	61.19
Breathlessness	159	59.32
Palpitation	143	53.35
Reduced concentrating power	127	47.38
Pica	95	35.44

In the present study status of Anaemia continued till the time of delivery in 66/268 (24.62%), and Anaemia was corrected in the other 202/268 (75.37%) of the patients. Abortions and still births were noted in 25/268 (09.32%) patients. Obstructed labour was noted in 19/268 (07.08%) patients. Gestational age at below 36 weeks was noted in 50/268 (18.65%) patients, between 36 and 38 weeks was noted in 98/268 (35036%) patients, between 39 and 42 weeks was noted in 61/268 (22.76%) patients and below 42 weeks was noted in 59/268 (22.01%) patients (Table 5). Prolonged labour was noted in 17/268 (06.34%) of the patients. Normal deliveries were noted in 158/268 (58.95%) of the patients, Premature deliveries were noted in 50/268 (18.65%) patients, LSCS was done in 85 (31.71%) patients and prolonged Hospital stay in 85 (31.71%) patients (Table 5). The prevalence of anaemia in the study and the number pregnant women who benefited by the time their delivery and the gestational age at the time of delivery were statistically significant. (P value was found to be <0.05). The other maternal outcomes like incidence of abortions, still births, prolonged labour, LSCS, prolonged Hospital stay showed no significant association with prevalence of Anaemia (Table 5).

Table 5: Showing the Maternal outcomes observed in the study (n-268).

Maternal Outcome	Number	Percentage	P value
Anaemia status continued in pregnancy			
Yes	066	24.62	**0.001**
No	202	75.37	
Abortions and still birth	025	09.32	__
Obstructed Labour	019	07.08	__
Gestational age at Delivery			
< 36 weeks	050	18.65	
36 to 38 weeks	098	35.36	**0.001**
to 42 weeks	061	22.76	
42 weeks	059	22.01	
Prolonged Labour	**017**	06.34	__
Normal Delivery	**158**	58.95	--
Premature Delivery< 36 weeks	**050**	18.65	--
LSCS	**085**	31.71	--
Prolonged Hospital stay	**085**	31.71	--

Observation of Fetal outcomes was showing IUGR with low birth weight between 1.5 and 2.0 Kg in 55/268 (20.52%) new-borns, weight between 2.0 and 2.5 Kg was noted in 71/268 (26.49%) newborns and 2.5 to 3.0 Kg weight was observed in 142268 (52.98%) of the newborns(Table 6). Preterm births were noted in 50/268 (18.65%) newborns and normal births in 218/268 (81.34%) newborns(Table 6). NICU admissions were noted in 41/268 (15.29%) newborns. Prematurity was noted in 38/268 (14.017% of the newborns, Fetal Growth restrictions were noted in 28/268 (10.44%) of the newborn children. Birth asphyxia was noted in 48/268 (17.91%) of the newborns. Congenital anomalies were noted in 12/268 (04.47% of the newborns. APGAR scores were below 5 in 21/268(07.83%) newborns, between 5 and 7 was noted in 104/268 (38.80%) newborns and between 7 and 10 was noted in 151/268 (56.34% of the newborns in the study (Table 6). Indications for NICU admissions were observed and found that prematurity was the indication in 21/268 (07.83%), congenital anomalies in 12/268 (04.07%) newborns, Asphyxia in 33/268 (12.31%) newborns, infections in 19/268 (07.08%) newborns, Weal cry in 27/268 (10.07%) newborns and septicaemia in 21/268 (07.08%) newborns in the study (Table 6). There was significant statistical association between prevalence of Anaemia and low birth weight in the newborns, preterm births, APGAR score and indications for NICU admissions in this study (p value less than 0.05), (Table 6). There was no association between prevalence of Anaemia and prematurity, total NICU admissions, fetal growth restrictions (FGR), Birth Asphyxia, and congenital anomalies (Table 6).

Table 6: Showing the Fatal outcomes observed in the study (n-268).

Fetal Outcome	Number	Percentage	P value
Birth weight in Kgs (IUGR)			
1.5 to 2.0	055	20.52	
2.0 to 2.5	071	26.49	**0.001**
2.5 to 3.0	142	52.98	
Preterm birth			
Yes	050	18.65	**0.001**
No	218	81.34	
NICU admission	041	15.29	__
Prematurity	038	14.17	__
Fetal Growth Restrictions	028	10.44	--
Birth Asphyxia	048	17.91	--
Congenital Anomalies	012	04.47	--
APGAR score			
<5	013	04.85	**0.001**
5 to 7	104	38.80	
7 to 10	151	56.34	
Indications for NICU admissions- 79			
Prematurity	21	07.83	
Congenital anomalies	12	04.07	
Asphyxia	33	12.31	**0.001**
Infections	19	07.08	
Weak cry (APGA < 5)	27	10.07	
Septicaemia	21	07.83	

Discussion

The present study was a descriptive retrospective study conducted at Kottayam Medical College, a tertiary referral Hospital. It was conducted between June 2021 and May 2022. All the data was collected from Medical Records Library,

Government Medical College, Kottayam. The state of Kerala being a pioneer in the Health care system and nutrition supplement hub the prevalence of Anaemia with its complications in the pregnant women were re assessed through this study. Among the total 2135 pregnant women attended the Hospital during the study period the prevalence was calculated as 12.55%.

This finding was also in agreement with similar studies from Kerala by M.S. Ponny, V.R. Nandini, C.Nirmala et al [11] who observed a prevalence of 28.51% in their study. The mean age of the patients included in this study was24.35± 3.64 years; range was 18 to 45 years. In a similar study by Nair MS, Raphael L, Chandran P et al [12] the mean age was 25.27± 4.88 years (range: 18–39 years). The global prevalence of Anemia was found to be (41.8%), [13]. The national data from National Family Health Survey-4 the prevalence was 50.4% [14]. In rural Kerala the prevalence was observed as 22.5% [15]. Tiwari et al. [16] in a study from Karnataka found the prevalence as 41.5%.

The varied data from different parts of India showed the dissimilarity in its socio-demographic pattern, literacy, access to health facilities. There was no significant association between prevalence of Anaemia and the incidence among the different age groups, body weight, BMI, age at marriage, educational status, economic status and occupation. But there was significant correlation between the prevalence of Anaemia and parity and number of members of the family to which the subjects belong (p value less than 0.05).

A study by M.S. Ponny, V.R. Nandini, C et al [11] observed no significant association between prevalence of Anaemia and marriage age of tribal women. Perumal V. [16] reported a lower prevalence of Anaemia with increasing marriage age especially in the tribal areas of India and that could be a protective factor. This could be explained by higher awareness among the tribal populations. But in contrast a study by Rooney C. [17] the prevalence of Anaemia was higher among the high parity pregnant women. Al-Farsi et al [18] concluded that high parity was a significant risk factor leading to Anaemia, from his study from Oman.

This might be due to maternal nutritional problems and maternal postpartum hemorrhages. Antenatal women who have high parity and gravid status tend to be more anemic because they become pregnant frequently and are hence prone to anemia. There was significant statistically significant association between prevalence of Anaemia and age at Menarche, irregularity of menstrual cycles, menstrual bleeding, number of abortions, birth spacing and malnutrition in this study (p value was <0.05). But there was no significant association between the diet and prevalence of Anaemia (Table 2).

In the study by M.S. Ponny, V.R. Nandini,C et al [11], they observed Anaemia among the pregnant women with history of menorrhagia in 58.4% of cases. The present study is consistent with their observation. The present study was also similar to the study by Kefiyalew et al [19] who reported Anaemia in women who had irregular menstrual cycles and cycles with heavy bleeding. Another study by Idowu OA, Mafiana CF, Sotiloye D et al [20] from Southeast Ethiopia reported the prevalence of anemia was higher in pregnant women with heavy bleeding during menstruation for more than 5 days.

They also reported patients with early menarche and menorrhagia with higher prevalence of Anaemia in their country contributing to Anaemia during pregnancy. Noronha et al [21] from their study conducted in Udupi, Karnataka observed that higher prevalence of Anaemia was observed in women who attained menarche before 12 and had their first childbirth before 20 years. They also concluded that women in their second trimester showed prevalence of Anaemia which they attributed to Hemodilution. Similar reports were submitted by Sreejith et al. [22], from

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Thiruvananthapuram, Kerala, Bansal *et al.* [23], from Punjab andIdowu *et al.* [20] From Nigeria. But Bisoi *et al.* [24] and Cheema *et al.* [13] showed that greater prevalence of Anaemia was observed in the thord trimester according to their studies.

Mild Anaemia was observed in 14 (19.44%) women of first trimester, 34 (47.22%) belonged to second trimester and 24 (33.33%) belonged to third trimester. Moderate Anaemia was observed in 33 (25.19%) women of first trimester, 51 (38.93%) belonged to second trimester and 47 (37.87%) belonged to third trimester. Severe Anaemia was observed in 15 (23.07%) of the first trimester, 27 (41.53%) of the second trimester and 23 (35.98%) of the third trimester pregnant women of this study.

In this study there was significant association between the prevalence of degree Anaemia and its incidence in the different trimesters (P value less than 0.05), (Table 3) Similar reports were noted in the studies by Meera S Nair *et al* [12] who observed mild degree of Anaemia in 22% of pregnant women; moderate in majority of cases (26.66%) and severe anemia in 01.66%).89% of these women belonged to tribal areas. Similar findings were also reported by Gopinath *et al.* [25] from Karnataka and Bisoi *et al.* [24] from West Bengal. Similar to the present study Khan *et al* [26] observed higher incidence of moderate degree of Anaemia.

The prevalence of anaemia in the study and the number pregnant women who benefited by the time their delivery and the gestational age at the time of delivery were statistically significant. (P value was found to be <0.05). The other maternal outcomes like incidence of abortions, still births, prolonged labour, LSCS, prolonged Hospital stay showed no significant association with prevalence of Anaemia (Table 5). Uche-Nwachi EO, Odekunle A, Jacinto S, Burnett M, Clapperton M, David Y, *et al.* [27] from their study showed that Anaemia in pregnancy had significant association with parity, abortions and child

spacing in primary healthcare clinic attendees in Trinidad and Tobago. In a similar study by Nair MS, Raphael L, Chandran P *et al* [12] the mean number of abortions was 1.78±0.408. They also showed the prevalence of anaemia was associated with antenatal women with two abortions.

They opined that the cause for anaemia might be the acute blood loss which depleted the iron stores in women with multiple abortions. Rasmussen S, Oian P *et al.* have reported an inverse relation between the second trimester Hb% and birth weight [28]. Review of literature showed many studies [29-31] with an association between severely anaemic pregnant women and preterm delivery. Another retrospective study showed no association between first trimester anaemia and preterm delivery, similar to our study. But in this study, there was no association between Degree of anaemia and preterm delivery [32].

There was significant statistical association between prevalence of Anaemia and low birth weight in the newborns, preterm births, APGAR score and indications for NICU admissions in this study (p value less than 0.05), (Table 6). There was no association between prevalence of Anaemia and prematurity, total NICU admissions, fetal growth restrictions (FGR), Birth Asphyxia, and congenital anomalies (Table 6). Rasmussen S, Oian P *et al.* [28] reported an inverse relation between the second trimester Haemoglobin and newborn birth weight [29].

Geetanjali Kanwar, Shweta Rani Prasad *et al* [33] quoted a high incidence preterm birth in 22.9%, IUGR in 8.6%, NICU admission in 14.37% and IUD in 0.89% of the newborns in their study of fetal outcomes in anaemic pregnant women. The present study was comparable with the study of Upadhyay C *et al* [34] which showed Preterm deliveries in 20%, IUGR in 11.5% and IUD in 03% and also a study by Awasthi A *et al* [35] showed preterm births in 9.5%, IUGR in 37.5% and IUD in

08%. In this study the most common Anaemia was Iron deficiency Anaemia in 89.45 % of the pregnant women followed by sickle cell anaemia in 11.56%. Lagoo J *et al* observed Sickle cell Anaemia in 17% of their 214 patients. In the present study 98.8% of the pregnant women received Iron folate replacement therapy and periodical Hb% estimations were done to understand the improvement in Hb% recovery. There was a statistical association between anemia and complications during pregnancy in the present study.

Conclusions

Anaemia is a very common condition diagnosed in pregnant women with its effects on the Health of the mother and the newborn. The prevalence of Anaemia acts as a Health Care indicator of any society. The prevalence of Anaemia was in the form of mild, moderate and severe degrees in anaemia were 26.86%, 48.88% and 24.25% respectively. The risk factors were age of menarche, malnutrition, parity, heavy menstruation and irregular menstrual cycles. The significant fetal outcomes were low birth weight in the newborns, preterm births, APGAR score and indications for NICU admissions

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