Retrospective analysis of admitted pregnant women for anemia and associated factors at a tertiary care centre of Haryana, India

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ABSTRACT
Background: Health of a pregnant female affects the health of her baby.Anemia is one of the major reason for mortality and morbidity of pregnant females as well as deciding factor for foetal outcome.

objectives: To study the prevalence of anemia in pregnant women admitted for delivery and its association with foetal outcome at a tertiary care centre (Maharaja Agrasen Medical College) Agroha in Haryana.

Materials & Methods: This was a record-based study conducted at a tertiary care hospital in Haryana catering mainly rural areas. Records of all the women who were admitted for delivery during January 2018 to April 2018 were analysed. Information regarding hemoglobin levels at the time of admission, parity, period of gestation at time of delivery, socio demographic details and foetal factors (birth weight, foetal well being, APGAR score & NICU admission) were recorded. The outcomes were compared in anemic and non anemic women.

Results:A total of 1002 women with live pregnancy were admitted for delivery, out of these 319 (31.8%) were non-anemic and 683 (68.2%) were anemic. Out of 246 total low birth weight babies 179 (72.8%) were born to anemic women where as out of 14 very low birth weight babies 9(64.3%) were born to anemic women.

Conclusion: In the present study prevalence of anemia in pregnant women was found to be high specially among illiterates, multiparous, low income group indicating lack of knowledge and nutritional deficiencies in the region.

Key words: Birth weight, Foetal outcome, haemoglobin, mode of delivery, Parity

I. INTRODUCTION:
Pregnancy, a vital part of a woman's life but is also a period of greater risks of different complications for mother and fetus. One of the most prevalent complication is anemia, which is being faced throughout the world. This challenge is more commonly faced in developing countries due to poor nutritional status (1).

According to WHO, the prevalence of anemia among pregnant population in developed and developing countries is 14% and 51% respectively. South Asian countries has highest prevalence of anemia in the world. Among the South Asian countries, India has the highest prevalence of anemia in pregnant women, that is 65-75% (2). As per the report of the National Family Health Survey, 2015–2016 (NFHS4), 50.4% of the pregnant women in India are anemic (3). The same report shows that 55% of pregnant women in Haryana has anemia which is more in rural areas (58.1%) as compared to urban areas (50.2%) (4).

As far as anemia in pregnancy is concerned, some women have iron deficiency anemia at start of pregnancy, which begins to exacerbate due to physiological changes (as hemodilution leads to fall in hemoglobin) during pregnancy. This complication begins in first trimester and increases with passage of pregnancy. The prevalence of anemia is maximum in third trimester and has a very significant adverse impact on maternal health and fetal outcome (5).

Maternal anemia is responsible for 20-40% of maternal deaths directly or indirectly because of cardiac failure (maximum risk at 34 weeks, during labor and immediately after delivery due to increased cardiac output load of up to 40-50% on hypoxic heart), preeclampsia, antepartum hemorrhage, postpartum hemorrhage and puerperal sepsis (6-8). Rare but serious complications such as DVT, thromboembolism and pulmonary atelectasis are also associated with maternal anemia. South Asian countries contributes about half of the global maternal deaths due to anemia; out of these mater-

nal deaths India has reported maximum (80 %) maternal deaths due to anemia (9).

In neonates born to anemic women, the risk of complications like preterm delivery, low birth weight, prematurity, intrauterine growth retardation, intrauterine death and birth asphyxia is increased (8,10). The hemoglobin levels of the new-born may be normal at birth but the child may have poor milestones and can develop anemia even after 3 months.

II. AIMS AND OBJECTIVES:
1. To study the prevalence of anemia in pregnant women admitted for delivery and its association with foetal outcome at a tertiary care centre (Maharaja Agrasen Medical College) Agroha in Haryana.
2. To study the sociodemographic factors influencing maternal anemia.

III. MATERIALS AND METHODS:
This was a record-based study conducted at a tertiary care hospital in Haryana catering mainly rural areas. The ethical approval for the study was taken from ethics committee. A total of 1002 women with live pregnancy were admitted for delivery during January 2018 to April 2018 and records of all of them were retrieved & analysed. All women who were admitted for delivery during this period were included in the study. Information regarding hemoglobin levels at the time of admission, parity, period of gestation at time of delivery, socio demographic details and foetal factors (birth weight, foetal well being, APGAR score & NICU admission) were recorded. The outcomes were compared in anemic and non anemic women.

Anemia was classified as per the WHO grading criteria (11). All women who have hemoglobin less than 11 g/dL at the time of admission was considered anemic. Further division done according to WHO criteria into mild anemia (Hb 10-10.9 g/dL), moderate anemia (7-9.9 g/dL) and severe anemia (<7 g/dL). Hemoglobin estimation was done by using cell counter method. Statistical analysis was done using SPSS version 22. The prevalence of anemia was reported as percentages with 95% confidence interval. Qualitative variables were analyzed using Chi Square test and Fisher exact test. Quantitative variables were represented in form of mean & Standard deviation.

IV. RESULTS:
Table-1.Distrribution of study subjects according to age, literacy and occupation (N=1002)

Characterstics	Frequency	Percentage (%)
Maternal age group (years)		
18-23	425	42.4%
24-29	468	46.7%
≥30	109	10.9%
Maternal literacy status		
Illiterate	176	17.6%
1-5	137	13.7%
6-12	552	55.1%
Diploma /Graduate/ Postgraduate	137	13.7%
Paternal literacy status		
Illiterate	151	15.1%
1-5	102	10.2%
6-12	619	61.8%

Diploma /Graduate/ Postgraduate	130	13.0%
Maternal occupation		
Housewife	984	98.2%
Employed	18	1.8%
Paternal occupation		
Labourer	510	50.8%
Government / private Job	241	24.1%
Farmer	183	18.3%
Others	68	6.8%

Table 1 shows most of the participants (46.7%)were belonged to age-group 24 to 29 years followed by 18 to 23 years age-group (42.4%) and ≥30 years age group (10.9%). The mean age of women in the study was 24.75 ± 3.90. One hundred seventy six (17.6%) pregnant females were illiterate, 137(13.7%) had education up to class 5, 552 (55.1%) had secondary education and only 137 (13.7%) had a degree. Husbands' literacy status showed almost same pattern with majority 619 (61.8%) had education up to class 12 and 151(15.1%) were illiterate. In our study maximum females 984 (98.2%) were housewives and only 18 (1.8%) were employed. In male partners maximum 510 (50.8%) were labourers followed by 241(24.1%) in private job.

Table-2 Distrribution of study subjects by different characterstics (N=1002)

Characterstics	Frequency	Percentage (%)
Gravida status		
G1	425	42.4%
G2	328	32.7%
G3	151	15.1%
≥G4	98	9.8%
Haemoglobin status		
Normal	319	31.8%
Mild anemia	208	20.8%
Moderate anemia	440	43.9%
Severe anemia	35	3.5%
Mode of Delivery		
LSCS	533	53.2%
NVD	469	46.8%

Gestational status		
Preterm	287	28.6%
Term	715	71.4%

Table 2 shows four hundred twenty five (42.4%) females were primigravida followed by G2 (32.7%), G3 (15.1%) and ≥G4 (9.8%). A total of 1002 women with live pregnancy were admitted for delivery, out of these 319 (31.8%) were non-anemic and 683 (68.2%) were anemic. Mean he-moglobin was 10.1±1.83. In 533 (53.2%) females, LSCS was done for obstetric reasons whereas 469 (46.8%) females had normal vaginal delivery. Out of 1002 deliveries 287(28.6%) were preterm and 715 (71.4%) were term pregnancy.

Table-3 Association of severity of anemia with age, occupation and literacy of participants (N=1002)

	Normal	Mild anemia	Moderate anemia	Severe anemia	Total anemic	Total (normal + anemic)	P value
Age groups							0.35
18-23	126 (29.6)	99 (23.3)	190(44.7)	10(2.4)	299 (70.4)	425	
24-29	158(33.8)	90 (19.2)	200(42.7)	20(4.3)	310(66.2)	468	
≥30	35 (32.1)	19 (17.4)	50(45.9)	5 (4.6)	74(67.9)	109	
Maternal literacy status							**0.000**
Illiterate	30(17)	29(16.5)	103(58.5)	14(8)	146(83)	176	
1-5	49(35.8)	20(14.6)	62(45.3)	6(4.4)	88(64.2)	137	
6-12	172(31.2)	137(24.8)	229(41.5)	14(2.5)	380(68.8)	552	
>12	68(49.6)	22(16.1)	46(33.6)	1(0.7)	69(50.4)	137	
Paternal literacy status							**0.000**
Illiterate	29(19.2)	22(14.6)	89(58.9)	11(7.3)	122(80.8)	151	
1-5	33(32.4)	20(19.6)	46(45.1)	3(2.9)	69(67.6)	102	
6-12	204(33)	125(20.2)	269(43.5)	21(3.4)	415(67)	619	
>12	53(40.8)	41(31.5)	36(27.7)	0	77(59.2)	130	
Maternal occupation							0.689
Housewife	315(32)	205(20.8)	430(43.7)	34(3.5)	669(68)	984	

Employed	4(22.2)	3(16.7)	10(55.6)	1(5.6)	14(77.8)	18	
Paternal occupation							**0.000**
Labourer	124(24.3)	102(20)	259(50.8)	25(4.9)	386(75.7)	510	
Government / private Job	117(48.5)	47(19.5)	73(30.3)	4(1.7)	124(51.5)	241	
Farmer	58(31.7)	39(21.3)	80(43.7)	6(3.3)	125(68.3)	183	
Others	20(29.4)	20(29.4)	28(41.2)	0(0)	48(70.6)	68	

The table 3 shows moderate (45.9%) and severe anemia (4.6%) were more common in age ≥30 years where as mild anemia (23.1%) was more common in age18 to 23 years. However total distribution of anemia was almost equal in each age group, and the P value was found to be not statistically significant (0.35). Out of 176 illiterate woman 146 (83%) had anemia whereas out of 137 women with literacy status >12 class only 69 (50.4%) has anemia. This shows anemia decreases with increasing literacy status and this difference was found statistically significant (p value 0.001). Similar results were found in husband literacy,

122(80.8%) women with illiterate husbands had anemia and this difference was found statistically significant (p value 0.001). It is also clear from the table that illiterate husbands or wives has more chances of severe anemia. As the literacy increases chances of severity of anemia decreases.

Our study showed significant association between husband occupation and wife anemic status. Out of 510, 386(75.7%) labourer husbands had anemic wife and out of 241,124 (51.5%) government job / private job husbands had anemic wife. Whereas no significant association was found between maternal occupation and anemia.

Table-4 Association of severity of anemia with maternal characteristics (N=1002)

Variable	Normal	Mild anemia	Moderate anemia	Severe anemia	Total anemic	Total	P value
Gravida status							**0.000**
G1	158(37.2)	103(24.2)	159(37.4)	5(1.2)	267(62.8)	425	
G2	104 (31.7)	65(19.8)	147(44.8)	12(3.7)	224(68.3)	328	
G3	32(21.2)	31(20.5)	76(50.3)	12(7.9)	119(78.8)	151	
>=G4	25 (25.5)	9(9.2)	58(59.2)	6(6.1)	73(74.5)	98	
Gestational status							**0.022**
Preterm	80(27.9)	49917.1)	146(50.9)	12(4.2)	207 (72.1)	287	
Term	239(33.4)	159(22.2)	294(41.1)	23(3.2)	476(66.5)	715	
Mode of delivery							**0.002**
LSCS	198 (37.1)	99(18.6)	219(41.1)	17(3.2)	335(62.9)	533	
NVD	121 (25.8)	109(23.2)	221(47.1)	18(3.8)	348(74.2)	469	

Table 4 shows anemia increases with the increase in parity. Out of 425 primigravida 267 (62.8%) were anemic, out of 328 gravida 2, 224 (68.3%) were anemic. Out of 151 gravida 3, 119

(78.8%) were anemic and out of 98 gravida 4 and more, 73 (74.5%) were anemic. This was found statistically significant (p value 0.001). Out of 287 preterm deliveries 207(72%) were anemic whereas

out of 715 term deliveries 476(65%) were anemic. This association was found statistically significant (p value 0.022). Out of 533 patients underwent LSCS 335(62.9%) were anemic whereas out of 469

normal vagina delivery 348(74.2%) were anemic. This association was found statistically significant (p value 0.002)

Table 5 Association of severity of anemia with fetal characteristics (N= 1002)

Variable	Normal	Mild anemia	Moderate anemia	Severe anemia	Total anemic	Total	P value
Birth weight							0.437
Normal	247(33.3)	157(21.2)	315(42.5)	23(3.1)	495(66.7)	742	
Low birth weight	67(27.2)	48(19.5)	120(48.8)	11(4.5)	179(72.8)	246	
Very low birth weight	5(35.7)	3(21.4)	5(35.7)	1(7.1)	9(64.3)	14	
APGAR @1min							0.182
No depression	313 (32.2)	201(20.7)	426(43.8)	33(3.4)	660(67.8)	973	
Mild	3(16.7)	7(38.9)	7(38.9)	1(5.6)	15(83.3)	18	
Severe	3(27.3)	0(0)	7(63.6)	1(9.1)	8(72.7)	11	
APGAR @5min							0.133
No depression	316(32)	206(20.9)	432(43.8)	33(3.3)	671(68.0)	987	
Mild	3(20)	2(13.3)	8(53.3)	2(13.3)	12(80)	15	
NICU admission							0.979
Yes	70(33)	43(20.3)	92(43.4)	7(3.3)	142(67)	212	
No	249(31.5)	165(20.9)	348(44.1)	28 (3.5)	541(68.5)	790	
Fetal outcome							0.001
Discharged	312(31.9)	204(20.8)	430(43.9)	33(3.4)	667(68.1)	979	
Expired	0(0)	0(0)	2(50)	2(50)	4(100)	4	
LAMA	3(37.5)	3((37.5)	2(25)	0(0)	5(62.5)	8	
Refer	4(36.4)	1(9.1)	6(54.5)	0(0)	7(63.6)	11	

Table 5 shows out of 246 total low birth weight babies 179(72.8%) were born to anemic women where as out of 14 very low birth weight babies 9(64.3%) were born to anemic women. Out of total 742 normal birth weight babies 61.7% were born to anemic mothers. Although this was not found to be statistically significant (p value 0.437)

Mild anemic patients babies (83.3%) had mild depression at 1 minute whereas (72.7%) patient with severe anemia had severe depression. However this relation was not found to be statistically significant (p value 0.182). 67% anemic mother babies were admitted to NICU as compared to 33% nonanemic mother babies. This was not found to be statistically significant (p value 0.979). Four (100%) babies were expired after birth and 7

(63.6%) out of total 11 babies were referred to higher centre, they all were born to anemic mothers. This was found to be statistically significant (p value 0.001).

V. DISCUSSION

In our study we found that 68.2% females were anemic which is comparable with study done by Kant S et al, 2018 (12) which was also a hospital-based setting. We found overall prevalence of anemia is higher as compared to NFHS-4, Haryana (55%) report (4). Out of 68.2% anemic females, 20.8% had mild, 43.9% moderate & 3.5% severe anemia. This study showed that maximum anemic patients were belonged to category of moderate anemia, comparable with study done by Upadhyay C et al, 2017 & Maka SS et al, 2017 (13,14).

In our study the mean age of woman was 24.75 ± 3.90 which is comparable with the study done by Kant S et al, 2018 (12) which had mean age of 24 ± 3.5. Maximum participants (89.1%) were less than 30 years which is similar to study done by Pushpa O Lakare et al, 2012 and Rajamouli J et al, 2016 (15,16). In anemic group, significantly higher proportion of women were multipara as compared to nonanemic group (p value <0.001). This is similar to study done by Kant S et al 2018 (12), Awasthi A et al,2001 (17) & Maka SS et al,2017 (14). This shows that with increase in parity the prevalence of anemia (moderate & severe) increases. This could be explained on the basis of poor nutritional status, inadequate spacing & illiteracy.

Our study showed significant association between anemia and education status of both husband and wife. In our study 83% females were (16.5% mild, 58.5% moderate, 8% severe) were illiterate and 80.8% male (14.6%mild, 58.9%moderate, 7.3%severe) were illiterate. Similar association between female literacy status and anemia has been found by Pushpa O Lakare et al, 2012(15), Rai N et al, 2016 (18) and Kant S et al, 2018 (12). Among occupation category 98.2% females were housewives and out of which 68% were anemic. Similarly husband occupation showed that 75.7% anemic females were having labourer husband. This clearly shows association between socioeconomic status of patients and anemia. Similar significant association was found by Rajamouli J et al, 2016 (16) and Kant S et al, 2018 (12).

In our study out of total preterm deliveries, 72% were anemic showing relation between anemia and preterm deliveries. This is consistent with findings of Kant S et al, 2018 (12) and Kaur M et al, 2015 (19).

Our study has showed significant association between mode of delivery and anemia. Around 74% anemic females had normal vaginal delivery which differs from the study done by Upadhyay et al, 2017 (13) who observed chances of LSCS more among anemic patients.

The present study shows anemic patients had higher chances of LBW (72.8%), VLBW (64.3%) baby as compared to non anemic group but it is not significant. Similar results were shown by Kant S et al, 2018 (12) who had found no significant association between low birth weight and maternal anemia. However our results are comparable with Rangnekar et al, 1993 (66%), Khalid et al, 1997 (69.1%) (20,21).

Our study did not find any correlation between birth asphyxia and NICU admission with maternal anemia though studies done by Awasthi A et al,2001 (17) and Rangnekar et al,1993 (20) had shown significant association. In our study the foetal outcome in terms of postnatal deaths & referral was found to be associated with maternal anemia statistically significant (p value 0.001) but the number in this category were very less hence the association could not be clearly established.

VI. CONCLUSION

India is one of the countries with very high prevalence of anemia in the world. It contributes to about 80 % of the maternal deaths in south Asia. Besides significant maternal morbidity and mortality, it is also responsible for poor fetal outcome. In the present study prevalence of anemia in pregnant women was found to be high specially among illiterates, multiparous, low income group indicating lack of knowledge and nutritional deficiencies in the region. Therefore, attention should be given on prevention as well as on correction of anemia so that adverse outcomes of anemia can be prevented.

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