Maternal factors of anemia in 3rd trimester of Pregnancy and its association with fetal outcome

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Abstract—This study was aimed to find out the maternal factors and fetal outcomes associated with anemia in 3rd Trimester pregnancy. A hospital based cross sectional descriptive type of observational study was carried out in 15 to 49 years who had undergone delivery at SP Medical College Bikaner. Information about the demographic profile, ANC factors and foetal outcome data were collected. To find out associating factors appropriate test of significances were used. The magnitude of anemia 91.3% (995/1090) was found high in third trimester of pregnancy. Caste, dietary – habit, Education, Occupation, Socio-economic status, ANC Visit, Iron and folic acid supplementation were associated (P<0.05) with anemia whereas maternal-age (year) Residence Religion Number of Children Type of family Inter-Pregnancy Interval (Months) were not associated (P>0.05) with anemia. Although IUGR, premature births and still births were observed respectively 2.56 times (95% CI: 0.615 to 10.697), 1.3 times (95% CI: 0.723 to 2.351) and 0.651 times (95% CI: 0.286 to 1.481) in anemic mothers but it was not found significant with anemia status. But significantly more (35.5%) low-birth weight babies were born to anemic mothers as compared to (14.7%)among non- anemic mothers i.e. 3.181 times (Odds ratio) higher LBW babies in anemic mothers. Anemia in pregnancy may be reduce by proper Iron and folic acid supplementation which can be improved through IEC and providing proper ANC services.

Keywords— Pregnancy Related Anemia (3rd Trimester), Maternal Factors , Fetal Outcome.

I.   INTRODUCTION

Anemia is a major public health throughout the world specially in developing country like India. Anemia in pregnancy is commonly considered as risk factor for poor pregnancy outcome and can threaten the maternal and fetal life also. WHO has estimated that Prevalence of anemia in pregnant women in developed countries is 14 % and in developing countries is 51%.[1]

In India, prevalence ranges from 33% to 89%. ICMR district nutrition survey 1999-2000 also reported prevalence of anemia as 84.2% with 13.1% with severe anemia in pregnancy.[2] Anemia is associated with 22% maternal deaths around the world [2].India contributes to about 80% of maternal deaths due to anemia in south Asia.[3] In India anemia is second most common cause of maternal death, accounting for 20% of the total maternal death.[4]

Iron deficiency is principal cause of anemia.[5] Only 22.3% pregnant women consumed Iron and folic acid tablets for 100 days. (NFHS 2005-06). National Nutrition Monitoring Bureau (NNMB-2003) and RCH surveys have shown that coverage under IFA supplementation was low and even among those who received the tablets, only one-third of them were regularly taking.[6]

Pregnancy related complications affect mainly the women and infant with unfavorable health conditions and lower socioeconomic status. Maternal mortality rates are higher in women with Hb below 8gm/dl. Premature births are more common in women with moderate anemia. Infection, maternal deaths due ante partum and post-partum hemorrhage, pregnancy induced hypertension and sepsis occur in women with moderate anemia. Severe Anemia leads to cardiac decomposition when Hb falls below 5.0 g/dl.

Anemia during pregnancy is associated with IUGR, low birth weight, preterm delivery, increased perinatal mortality, lowered childhood intellectual ability[7] neonatal anemia due to poor reserve. Infants with anemia have higher prevalence of failure to thrive, poorer intellectual developmental milestones, and higher rates of morbidities and neonatal ,mortalities than infants without anemia.

High prevalence of anemia among pregnant women persists in India despite the availability of effective and low cost interventions for prevention and treatment. And knowledge of socio-demographic factors associated with anemia will help to formulate strategies to attack this important health problem.

Keeping all of these facts in the mind with the paucity of data regarding anemia in pregnancy and its effect on fetal outcome in Bikaner District, it was decided to assess the magnitude of anemia among pregnant women and its associating factors and fetal outcome at P. B. M .Hospital, Bikaner District.

II.   METHODOLOGY

This hospital based descriptive observational study was conducted at maternity ward of PBM hospital , SP medical college , Bikaner from August to October 2013. The women aged 15 to 49 years, who had undergone delivery and admitted were included .Women who had not ANC record were excluded from the study.

Sample size was calculated 1257 pregnant women at 5% allowable error and 95% confidence interval assuming the 56% prevalence of anemia among pregnant women of 15 to 49 years (NFHS 05-06) total 1260 pregnant women were studied.[6]

Direct interviewing and record analysis methods were used for data collection. Pre structured and pretested protocol and antenatal and delivery record was used for collection . To find association between maternal factors and anemia , only anemic women at third trimester was considered. Updated B.G Prasad classification 2013 was used to determine the socioeconomic status of mother.

Statistical analysis

Statistical analysis was done on Microsoft Excel and Primer software. Categorical variables were analyzed using Chi Square test. Odds ratio was additionally calculated. Comparison of means was done using Student's *t*-test. P value<0.05 was considered significant.

III.   RESULTS

This study was conducted on twelve hundred and sixty women at maternity ward of PBM Hospital, Bikaner District. Out of these total 1260 cases , anemia 91.3%(995/1090) was found in third trimester of pregnancy. Anemia was higher (83.62%) in 20-29 years age group, however this variation in proportion of anemia as per age not found significant. Likewise, no significant association was observed between residence and anemia in pregnancy. Similarly Hindus were in majority (83.21%) but no association was observed between religion and anemia in pregnancy. But SC/ST women were significantly higher in anemic group as compared to non anemic groups (28.04% vs 13.68%)

(P<0.001S). Significantly more proportion of anemia was found among non-vegetarian than vegetarian women. although 46.6% women having ≥2 children were more anemic than women with ≤1 children(37.89%) but this difference was not significant.(P=0.12NS). Likewise anemia was observed more in women belong to nuclear family as compared to joint family (21.11%Vs 12.63%) but not found significant.

Upto primary educated women were having maximum prevalence (62.71%) of anemia (P<0.05). Cultivator and laborer women were significantly higher prevalence of anemia than women with other occupation, suggesting that occupation was associated with anemia in pregnancy. Likewise 50.26% among socio-economic status IV and V women were significantly more anemic as compared other group. It depicted that anemia in pregnancy is significantly decreasing with rising socio-economic status. (Table 1)

Table 1

Association of Socio-Demographic Variable with Anemia at third trimester

Demographic Variables		Total (1090)		Anemic (N=995)		Non-anemic(N=95)		*P Value
		No	%	No	%	No	%	
Maternal-age (year)	15-19	57	5.23	52	5.23	5	5.26	0.37NS
	20 - 24	635	58.26	585	58.79	50	52.63	
	25 - 29	279	25.6	247	24.82	32	33.68	
	30 - 34 plus	119	10.92	111	11.16	8	8.42	
	35-39 Plus							
Residence	Urban	460	42.2	422	42.41	38	40	0.729NS
	Rural	630	57.8	573	57.59	57	60	
Caste	OBC	368	33.76	320	32.16	48	50.53	
	SC/ST	292	26.79	279	28.04	13	13.68	
	Other	430	39.45	396	39.8	34	35.79	<0.001S
Religion	Hindu	907	83.21	822	82.61	85	89.47	
	Muslim n others	183	16.79	173	17.39	10	10.53	0.117NS
Dietary - habit	Vegetarian	791	72.57	711	71.46	80	84.21	
	Non-vegetarian	299	27.43	284	28.54	15	15.79	P < .01S
Number of Children	≤ 1	590	54.13	531	53.37	59	62.11	
	≥2	500	45.87	464	46.63	36	37.89	P=0.12NS
Education	Illiterate	456	41.83	439	44.12	17	17.89	
	Primary	196	17.98	185	18.59	11	11.58	
	Middle	209	19.17	179	17.99	30	31.58	
	Secondary	91	8.35	80	8.04	11	11.58	
	Higher-Secondary	54	4.95	44	4.42	10	10.53	
	Under-graduate	58	5.32	46	4.62	12	12.63	
	Post-graduate	26	2.39	22	2.21	4	4.21	P <.001S
Type of family	Nuclear	222	20.37	210	21.11	12	12.63	
	Joint	868	79.63	785	78.89	83	87.37	0.068NS
Occupation	Service	16	1.47	12	1.21	4	4.21	
	Skilled - worker	60	5.5	59	5.93	1	1.05	
	Business	6	0.55	6	0.6	0	0	
	Cultivator	246	22.57	232	23.32	14	14.74	P < .01S

	Laborer	22	2.02	22	2.21	0	0	
	House-wife	740	67.89	664	66.73	76	80	
Socio-economic status	I	48	4.4	35	3.52	13	13.68	
	II	183	16.79	162	16.28	21	22.11	
	III	308	28.26	278	27.94	30	31.58	
	IV	338	31.01	319	32.06	19	20	
	V	213	19.54	201	20.2	12	12.63	P < .001S

*P value with Chi-square Test

When association of ANC variable with anemia in 3rd trimester of pregnancy was observed it was found that although no association was revealed in inter-pregnancy interval but number of ANC visits and consumption of IFA tablets were found to have association with anemia in 3rd trimester pregnancy. Less than three antenatal visits mothers were having significantly more anemia in pregnancy. Likewise prevalence was significantly higher among women who didn't take iron and folic acid supplementation during pregnancy(27.44% vs 13.68%).

Although prevalence was higher among women with any medical illness associated, we concluded that diseases associated with pregnancy were not having association with anemia in pregnancy. (Table 2)

Table 2

Association of ANC Variable with Anemia at third trimester

| ANC Variable		Total ANC (N=1090)		Anemic (N=995)		Non-anemic(N=95)		*P Value
		No	%	No	%	No	%	
Inter-Pregnancy Interval (Months)	< 18	36	3.30	34	3.42	2	2.11	P 0.92NS
	18 - 23	79	7.25	73	7.34	6	6.32	
	> 23	435	39.91	404	40.60	31	32.63	
ANC Visit	< 3	424	38.90	404	40.60	20	21.05	P < .001
	≥ 3	666	61.10	591	59.40	75	78.95	
Medical Illness	Diseased	231	21.19	217	21.81	14	14.74	P =0.1
	Not-diseased	859	78.81	778	78.19	81	85.26	
Iron and folic acid supplementation	Adequate	570	52.29	518	52.06	52	54.74	P < .02
	Inadequate	234	21.47	204	20.50	30	31.58	
	Not taken	286	26.24	273	27.44	13	13.68	

*P value with Chi-square Test

When fetal outcomes were seen in both the groups i.e. women with and without anemia during 3rd trimester of anemia, it was found that intra-uterine growth retardation, premature birth and still-birth were not found to be associated with anemia during 3rd trimester of anemia. however significantly more (35.5%) low-birth weight babies were born to anemic mothers as compared to (14.7%) among non- anemic mothers with Odds ratio of having LBW babies were 3.181 (95% CI: 1.778 to 5.693)with P(<0.001S). (Table 3)

Table 3

Association of Fetal and Newborn Outcomes with Anemia at third trimester

Fetal and Newborn Outcomes		Anemia-status						*P Value	Odds ratio
		Total (1090)		Anemic (N=995)		Non-anemic(N=95)			
Fetal Outcome	IUGR	54	4.95	52	5.23	2	2.11	0.275 NS	2.564 (95% CI: 0.615 to 10.697)
	Normal	1036	95.05	943	94.77	93	97.89		
Birth weight	<2.5kg	367	33.67	353	35.48	14	14.74	<0.001S	3.181 (95% CI: 1.778 to 5.693)
	>2.5 kg	723	66.33	642	64.52	81	85.26		
Premature birth	Present	197	18.07	183	18.39	14	14.74	0.456NS	1.304 (95% Cl: 0.723 to 2.351)
	Absent	893	81.93	812	81.61	81	85.26		
Still birth	Present	56	5.14	49	4.92	7	7.37	0.43NS	0.651 (95% CI: 0.286 to 1.481)
	Absent	1034	94.86	946	95.08	88	92.63		

*P value with Chi-square Test

Association of fetal outcome with 3rd trimester anemia
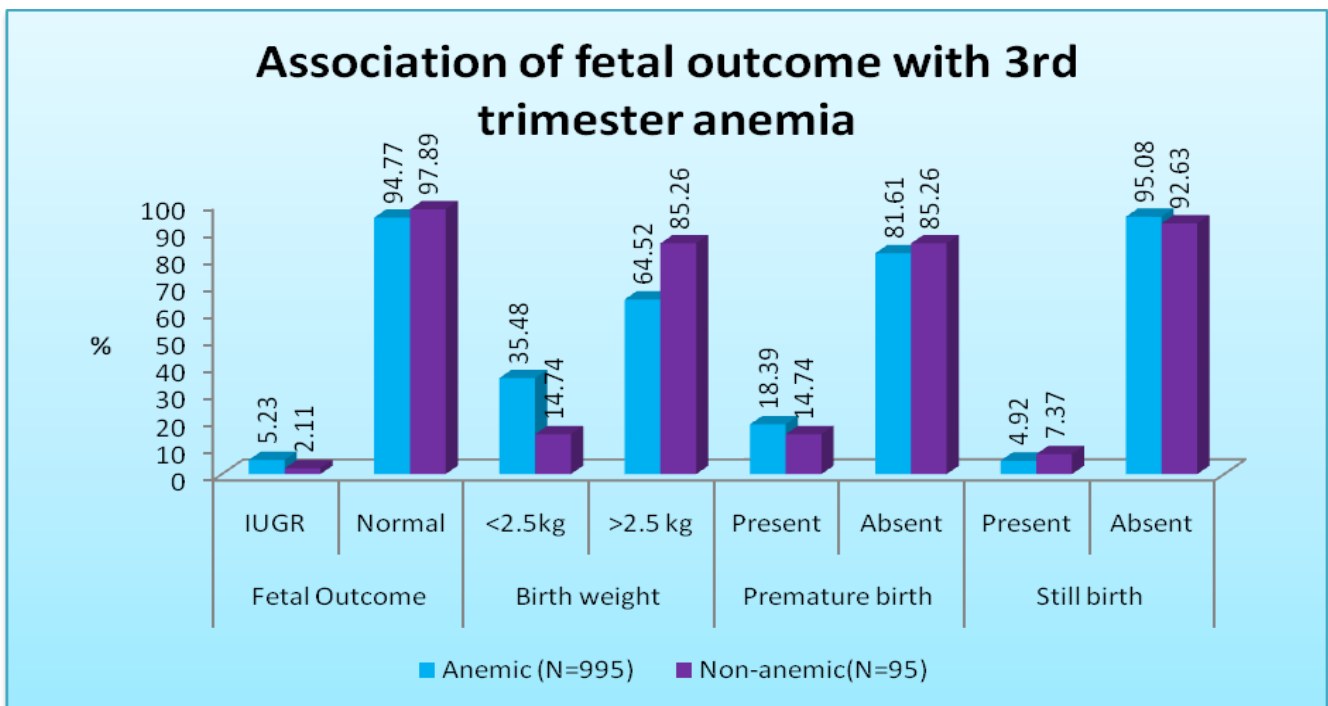
IV.   DISCUSSION

Prevalence of anemia in third trimester of pregnancy was found to be 91.3%. Such a higher prevalence (88%) was also recorded in studies conducted by Babita Bansal (2013)[8] and even Abel and Rajaratnam (2001) [6] found quite high (69.5%) prevalence of anemia in pregnancy. In this study such a higher prevalence may be due to that study was conducted in a Government Hospital where usually lower SES ANCs attend which was further supported with the fact in this study only that lower SES mothers had higher prevalence of anemia.

In this study, Hindus were in majority (83.21%) in the 3rd trimester women but no association was observed between religion and anemia in pregnancy. These findings were in accordance with a study conducted by Priyanka Sharma et all.[9] But in the present study SC/ST women were significantly

higher in anemic group as compared to non anemic groups (28.04% vs 13.68%).(P<0.001S). RS Balgir et al(2004-2005) [10] at Bhubaneswar, Odissa also reported similar observations. It may be due to lower socio-economic status, poor literacy status and poor knowledge and about utilization of ANC services in these reserved classes. In this study no association was observed between residence and anemia in pregnancy. Ahmad et al[11] and Kiran Agarwal et al(2010) [12] also made similar observations.

No significant effect of inter-pregnancy interval was observed on anemia in 3rd trimester pregnancy in this study. But Sanjivani D Langare (2010) [13] et al found a significant association between inter-pregnancy interval was observed on anemia in 3rd trimester pregnancy. They observed higher prevallance with shorter inter-pregnancy interval (< 1 year) than the counterpart. Viveki et al[14] also pointed out that inter-pregnancy interval of < 2 years was responsible for high prevalence of anemia in pregnancy (90.9%).

Likewise mother who had < 3 antenatal visits were significantly more anemic in this study. This may be due to lack of proper ante-natal care during pregnancy. As regular check-up during pregnancy can detect anemia during pregnancy and other associated diseases.

Although prevalence was higher among women with any medical illness associated, but status of presence or absence of medical illness was not found to be associated with anemia in pregnancy. But study conducted by E Ugwuja[15] at Nigeria wherein prevalence of anemia was high among URTI, dyspepsis and diabetes mellitus, but this difference was not statistically significant, it shows that beside disease during pregnancy other causes play a role in manifestation of anemia. Immune depression due to anemia and consequent increased morbidity due to infection, especially urinary tract infection, might be one of the factors responsible for low birth weight among pregnant women. this difference may be due to quite high (91%) prevalence of anemia in study population.

In this study, upto primary educated women were having maximum prevalence of anemia (62.71%) as compared to others. almost similar finding were observed by Pushpa Lokare et al[16] and L. H. Madhvi [17]This result was not in accordance with Viveki et al at(2010) [14] where prevalence was high among women studied upto secondary level (89.3%). But observations of present study could be explained by the fact that less educated women has lack of knowledge about nutritious food, inadequate use of health services, lack of awareness regarding anemia and its effect on pregnancy and its outcome.

In this study, occupation was associated with anemia in pregnancy, which may be explained that labourer women usually have lower socio-economic status, poor literacy level and they have to do hard work during pregnancy and attendance at ante-natal clinic means loss of daily wages for them.

Anemia was observed more in women belong to nuclear family as compared to joint family (21.11%Vs 12.63%). Virendra p Gautam et al(2000)[18] and Ahmad et al[11] also reported that family has its effect on maternal health due to family environment, income, knowledge, attitude and practice of family members regarding anemia in pregnancy.

Socioeconomic status was significantly decreasing with rising SES associated with anemia in pregnancy. This study's observation were in accordance with a study conducted by Pushpa Lokare et al[16] and Viveki et al(2010)[14] in this regards. The mothers belonging to lower socio-economic status are having poor nourishment, short birth spacing, inadequate ante-natal care, low literacy level and prolonged physical work during pregnancy all factors facilitate anemia status.

In this study, prevalence was significantly higher among women who didn't take iron and folic acid supplementation during pregnancy (27.44% vs 13.68%).Similar finding was found in a study conducted by Pankaj Kumar et al(2011) [19] L.H. Madhavi[17] and Viveki et al(2010).[14] Effect of iron and folic acid supplementation is explained by fact that iron supplementation increase hemoglobin, serum

ferritin, mean cell volume, serum iron, and transferring saturation. Supplementation can reduce the extent of iron depletion in third trimester.

Although anemia during pregnancy was not associated with intra-uterine growth retardation, premature birth and still-birth in this study but significantly more (35.5%) low-birth weight babies were born to anemic mothers with Odds ratio 3.181. Well comparable observations were made by Pankaj Kumar et al(2011) [19] and K Jagadish Kumar (2013) [20]. This could well suggest that third trimester Hb is an important factor in determining birth weight. It is well known that rapid growth of fetus occurs in the third trimester

In this study anemia during pregnancy was not associated with premature births but study conducted by E Ugwuja (2007-08) [15] at Nigeria reported that anemia in pregnancy was found to be significantly related with preterm deliveries in Anemia has its effect on duration of gestation. A relation between infection and anemia is also proposed as corticotrophin releasing hormone play a role in causing preterm labor.

V.   CONCLUSION

Factors associated with anemia in 3rd trimester of pregnancy were Caste, dietary – habit, Education, Occupation, Socio-economic status, ANC Visit, Iron and folic acid supplementation whereas Residence Religion Number of Children Type of family Inter-Pregnancy Interval (Months) were not associated. These should be improved through IEC and providing proper ANC services. More low-birth weight (LBW) babies were born to anemic mothers. Anemia in pregnancy may be reduce by proper Iron and folic acid supplementation which can be improved through IEC and providing proper ANC services. has also recognizable association with fetal outcome.

CONFLICT OF INTEREST

None declared till now.

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