Risk Factors of Severe Anaemia Among Pregnant Women Attending a Government Maternity Hospital in Tirupati, India – A Multivariate Analysis

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INTRODUCTION

Anaemia in pregnancy is a very common problem in most developing countries. According to World Health Organization Iron deficiency was present in 40-99% of pregnant women studied and was undoubtedly responsible for the major proportion of anemia (World Health Organization, Nutritional anaemias, 1968). Published rates of prevalence for developing countries range from 35% to 56% in Africa, 37% to 75% for Asia and 37% to 52% for Latin America (World Health Organization, Prevalence of anaemia in women, 1992). Not only is anaemia common, it is often severe. Almost 20% of cases have [Hb] < 8g/dl (Jackson et al., 1991) and between 2% and 7% have values < 7 g/dl (World Health Organization, Prevention and management of severe anaemia in pregnancy, WHO/FHE/MSM/93.5). In a hospital-based analysis, it was found that severe anaemia contributed to 34.5% of all maternal deaths (Sarin et al., 1995). The Indian Council of Medical Research estimated the prevalence of anaemia among the pregnant women to be 88% (Indian Council of Medical Research, 1989). In this study conducted by ICMR it was found that 13.1% of pregnant women were severely anaemic whereas 33.6% and 40.8% were moderately and mildly anaemic respectively. The etiology of severe anaemia in pregnancy is multifactorial and can be expected to vary by geographical region. For many developing countries little effort has been made to establish local pattern of etiology of severe anaemia in pregnancy. It is time to reexamine the problem of severe anaemia in pregnancy, to assess more carefully the local etiological factors that are responsible and then to design new strategies for prevention and treatment. This would help to identify and target community based interventions directed to prevention of severe anaemia in pregnant women. In India, very few studies have been conducted addressing the risk factors of severe anaemia in pregnancy in India (Sarin et al., 1995; Sood et al., 1989). A study was therefore conducted to examine risk factors of severe anaemia among pregnant women attending Government Maternity Hospital, Tirupati in India.

METHODS

A descriptive study was carried out at Government Maternity Hospital in Tirupati town of Chittoor district, Andhra Pradesh during the period extending from 1st September 1999 to 31st November 1999. Government Maternity Hospital is a referral hospital for Chittoor district whose population is 34,83,738 (as per 1991 census) and other neighboring districts. Chittoor district has 79 primary health centres, 548 subcentres and 11 Government hospitals.

All the women who have delivered singleton newborn and were admitted in the postnatal ward after delivery in the Government Maternity Hospital, Tirupati during the study period formed our study group. Our study group included 201 mothers.Information related to socio-demographic factors, maternal factors and obstetric history (including status of anaemia by Hb levels) was obtained by personal interview and from antenatal records and was recorded in standardized and pre-tested schedule.

Socio-demographic factors included in the study were maternal age, parity, birth interval, maternal education, husband's education, socio-economic status, consanguinity of marriage and work during pregnancy. Maternal and obstetric factors, which were examined, included maternal height, maternal weight, presence of maternal diseases, history of abortion, number of antenatal checkups, status of receiving IFA tablets. Hemoglobin levels were measured by Cyanmethemoglobin method in the third trimester of pregnancy. Anaemia in pregnancy in our study was classified as mild anaemia (haemoglobin 9 – 10.9 g/dl), moderate anaemia (haemoglobin 7 – 8.9 g/dl) and

severe anaemia (haemoglobin < 7.0 g/dl) (Stoltzfus et al., 1997; World Health Organization, prevention and management of severe anaemia ., WHO/FHE/MSM/93.5). Women in the study group were divided into severe anaemic women and not severe anaemic women based on hemoglobin levels measured in last trimester of pregnancy. Not severe anaemic women included women with mild anaemia, moderate anaemia and no anaemia. Women who were classified as doing work during pregnancy were those women who did any type of labour work other than household work during pregnancy.

Data was analyzed using the statistical package SPSS/PC++. Percentages in categories and chi-square test for association were calculated. Severe anaemia (Yes or No) was considered as dependant variable in the study. Unadjusted Odds ratios and 95% confidence intervals were calculated for all study variables by univariate analysis. Significant risk factors identified in univariate analysis were subjected to stepwise multiple logistic regression analysis in which adjusted odds ratio's and 95% confidence intervals were calculated.

RESULTS

The distribution of haemoglobin values is presented in Figure 1. The range of haemoglobin values was 3.64 – 12.6 g/dl with a mean of 7.53 (S.E = 0.072, S.D = 1.02) and a median (25th, 75th

centiles) of 7.28 (7.00, 7.84). In a study population of 201 women, 98.5% were anaemic (haemoglobin < 11g/dl). It was found that 11.44% of pregnant women were having severe anaemia whereas 78.10% and 8.96% were having moderate and mild anaemia respectively.

Table 1 and table 2 presents univariate analysis of various risk factors of severe anaemia. Among the socio-demographic risk factors shown in Table 1, illiteracy of the husband had strong and significant association with severe anaemia [OR = 2.83 (1.17 – 6.85), p value = 0.017]. Though severe anaemia was more common among
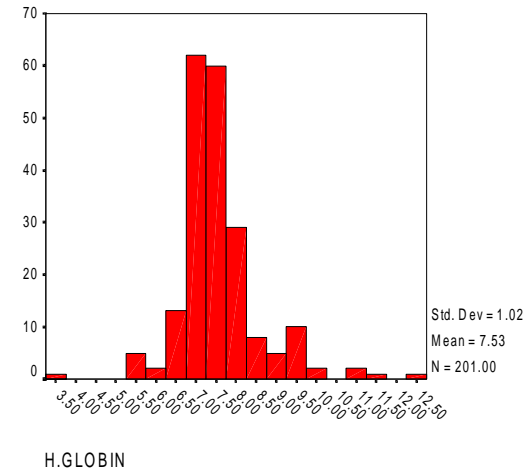

Fig. 1. Freuency distribution of haemoglobin values [n=201]

Table 1: Univariate analysis of socio-demographic risk factors of severe anaemia

Factors	Category	Severe anaemia		No severe anaemia		Odds Ratios (95% CI)	P Value
		No.	%	No.	%		
1. Maternal age	<19 years	04	10.8	33	89.2	0.93 (0.30-2.9)	0.894
	³19 years	19	11.6	145	88.4		
2. Parity	= 1	10	12.2	72	87.8	1.13 (0.47-2.72)	0.781
	> 1	13	10.9	106	89.1		
3. Birth interval	< 24 months	12	9.1	120	90.9	0.82 (0.34-1.98)	0.663
	³ 24 months	11	15.9	58	84.1		
4. Maternal Illiteracy	Yes	11	13.9	68	86.1	1.48 (0.62-3.55)	0.374
	No	12	9.8	110	90.2		
5. Illiteracy of the Husband	Yes	13	18.8	56	81.2	2.83 (1.17-6.85)	0.017
	No	10	7.6	122	92.4		
6. Socio-Economic Status	Low	14	10.5	120	89.5	0.75 (0.31-1.84)	0.531
	Not Low	09	13.4	58	86.6		
7. Consanguinity of marriage	yes	07	8.5	75	91.5	0.60 (0.24-1.53)	0.283
	No	16	13.4	103	86.6		
8. Heavy work during pregnancy	Yes	03	8.3	33	91.7	0.66 (0.19-2.35)	0.518
	No	20	12.1	145	87.9		

Table 2. Univariate analysis of maternal and obestric risk factors of severe anaemia

Factors	Category	Severe anaemia		No severe anaemia		Odds Ratios (95% CI)	P Value
		No.	%	No.	%		
1. Maternal height	< 145 cms	01	3.7	26	96.3	0.27 (0.03-2.06)	0.175
	³ 145 cms	22	14.5	152	85.5		
2. Maternal weight	< 40 kgs	03	16.7	15	83.3	1.63 (0.43-6.12)	0.466
	³ 40 kgs	20	10.9	163	89.1		
3. Maternal diseases	Yes	11	27.5	29	72.5	4.71 (1.90-11.70)	<0.01
	No	12	7.5	149	92.5		
4. History of abortion	Yes	05	17.2	24	82.8	1.78 (0.61-5.25)	0.289
	No	18	10.5	154	89.5		
5. No. of antenatal checkups	< 3	04	26.7	11	73.3	3.20 (0.93-11.03)	0.054
	³ 3	19	10.2	167	89.8		
6. Received iron and folic acid tablets (100 tablets)	Not received	16	10.4	138	89.6	0.66 (0.26-1.72)	0.396
	Received	07	14.9	40	85.1		

primiparae (primiparae compared to multiparae), illiterate mothers (illiterate compared to literate mothers), and women with birth interval < 24 months (birth interval < 24 months compared to birth interval ³ 24 months) the association between these risk factors and severe anaemia was not statistically significant.

Table 2 presents the maternal and obstetric risk factors that influence severe anaemia in pregnancy. Among the obstetric risk factors, presence of maternal diseases had strong and significant association with severe anaemia [OR = 4.71 (1.90 - 11.70), p < 0.01]. Severe anaemia was high among unbooked cases (< 3 ANC's) as compared to booked cases but the association was not statistically significant at 5% level but significant at 10% level (p = 0.054). Severe anaemia was more common among mothers whose weight is less than 40 kgs (maternal weight < 40 kgs as compared to ³ 40 kgs) and women with history of abortion (yes vs no) but the association were not statistically significant.

The risk factors, which had significant association with severe anaemia at 10% level of significance on univariate analysis, are husband's educational status (p=0.017), presence of maternal diseases (p< 0.001) and number of antenatal checkups (p=0.054). These factors were subjected to stepwise multiple logistic regression analysis. Multiple logistic regression analysis presented in table 3 reveals that presence of maternal diseases and illiteracy of the husband were the two risk factors which had strong and significant association with severe anaemia.

DISCUSSION

The study aimed to examine the risk factors associated with severe anaemia. In our study, young maternal age had no significant association with severe anaemia. Similar findings were observed in a study conducted in Southern

Table 3. Significant risk factors of severe anaemia-Results of step-wise multiple logistic regression analysis

Factors	Adjusted Odds ratio (95% CI)[a]	95% confidence interval	P value
1. Maternal diseases			
Yes	5.21	2.03-13.31	0.0006
No	1.00		
2. Illiteracy of husband			
Yes	3.20	1.26-8.09	0.0141
No	1.00		

Malawi in which there was no significant association between young maternal age and severe anaemia (Vanden broek et al., 2000).

Primiparity and birth interval (< 24 months) did not have significant association with severe anaemia. This was in contrast with other studies in which there was significant association of primiparity and birth interval (< 24 months) with severe anaemia in pregnancy and anaemia in pregnancy (Vandenbroek et al., 2000; Selo. Ojeme., 1997).

In our study, maternal illiteracy and low socio-economic status did not have significant association with severe anaemia. But D.O. Selo. Ojeme in his study has observed low social class had

strong and significant association with anaemia in pregnancy (Selo.Ojeme, 1997). The classification of socio-economic status of study subjects was based on colour of the card given to the families by the governmental agency. As the criteria used to classify socio-economic status are not comprehensive and accurate, the true association between socioeconomic status may not have been found. In univariate analysis, illiteracy of the husband had strong and significant association with severe anaemia [OR (95% CI) = 2.83 (1.17-6.85), P=0.017]

Among the maternal and obstetric risk factors shown in Table 2, presence of maternal diseases had strong and significant association with severe anaemia [OR= 4.71 (1.90-11.7), p=0.01]. In our study maternal diseases included maternal infections, hemorrhage, toxaemias of pregnancy and others. Maternal height, maternal weight and past history of abortion did not have any significant association with severe anaemia. There was no significant association between status of receiving Iron and folic acid tablets and severe anaemia (p=0.396).

In conclusion, the significant risk factors of severe anaemia identified by univariate analysis were illiteracy of the husband, presence of maternal disease and number of antenatal checkups (<3 vs ³ 3 ANC's). The significant risk factors of severe anaemia identified after stepwise multiple logistic regression analysis were presence of maternal disease and illiteracy of the husband. To reduce the problem of severe anaemia in pregnancy, community based interventions need to be undertaken and existing ones strengthened to reduce maternal morbidity and improve educational status of the people in the community.

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KEY WORDS Risk Factors. Anaemia. Pregnancy

ABSTRACT A descriptive study was conducted to examine risk factors of severe anaemia among pregnant women attending Government Maternity Hospital, Tirupati, India. Out of 201 pregnant women who have delivered during the study period, 98.5% were found to have anaemia (severe anaemia – 11.4%, moderate anaemia – 86.6% and mild anaemia – 0.5%) and 1.5% were not found to have anaemia. The socio-demographic and obstetric risk factors examined were subjected to univariate and multivariate analysis. Step-wise multiple logistic regression analysis has revealed that presence of maternal diseases [OR= 5.21 (2.03 – 13.39)] and husbands educational status [illiterate Vs literate, OR = 3.20 (1.26 – 8.09)] were the two risk factors which had strong and significant association with severe anaemia in pregnancy. To reduce the problem of severe anaemia in pregnancy, community based interventions need to be undertaken and existing ones strengthened to reduce maternal morbidity and improve educational status of people in the community

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