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A Cross Sectional Study of Prevalence of 'Anemia in Pregnancy' and Its Outcome in Urban Population of New Delhi

(Anaemia in mothers of Urban New Delhi)

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ABSTRACT

Context: *Nutritional anaemia is the most common nutritional deficiency complicating the antenatal period. As much as 87% of the Indian pregnant women in rural areas are reported anemic. Urban areas of the national capital are not spared from this medical disorder complicating pregnancy, information regarding which is grossly insufficient.*

Aims: *To study the demographic profile of the maternal population affected with anemia and its outcome among the urban population of New Delhi.*

Settings and Design: *Study conducted was cross sectional study*

Methods and Material: *All the labouring females attending Labor room of Lady Hardinge Medical College, New Delhi from June 2012 to June 2014 were included in the study after informed consent. Patients with Thallasemia and blood dyscariasis were excluded.*

Statistical analysis used: *Student 't'test, 'chi square' test.*

Results: *Total 1400 antenatal females comprising 1054 non anemic and 346 anemic mothers were studied. All mothers in both group, belonging to urban New Delhi, were literate and above poverty line. Dimorphic anemia was the most common pathological type. There was significantly higher rate of IUGR, Low Birth Weight, Still Birth, and abnormal Fetal Cerebral Hemodynamics and Maternal mortality rate in anemic group.*

Key Message: *Nutritional anemia affects a substantial number of Literate mothers of above poverty line families in urban part of capital with drastic impact on maternal and fetal well being. Nutritional ignorance and not the illiteracy promote the disease and needs targeting in future Maternal Health programmes.*

Key-words: *Anemia in pregnancy, literacy, Urban New Delhi.*

INTRODUCTION

Anemia is one of the most prevalent nutritional deficiency problem complicating the antenatal period[1]. Its prevalence is worldwide with highest figures observed among poorer segments of the population in the developing and under developed countries of South East Asia and Africa[2]. Data reported from Indian sub-continent is alarming with reports suggesting that as much as 87% of the Indian pregnant women are anemic[3].

Maternal anemia during pregnancy has been associated with maternal mortality and adverse fetal outcomes in terms of Intra Uterine Growth Retardation, Preterm births, Intra uterine deaths, fetal anemia and low birth weight[4, 5]. However there are conflicting reports regarding these associations[6].

This study was conducted to study the demographic profile of anemic pregnant females and its outcome among the urban population of New Delhi.

MATERIAL AND METHODS

The present cross-sectional study was carried out at Lady Hardinge Medical College and associates, New Delhi from the period, June 2012 to June 2014. Antenatal females reporting to labour room of the concerned hospital were included in the study after informed consent. A total 1400 pregnant women visiting the hospital were included in the study after meeting the inclusion and exclusion criteria.

Pregnant women with multiple pregnancies, history of high-grade fever in the last 3 months, passing worms in the stool, bleeding disorder in the previous pregnancy and mothers diagnosed with Thallasemia or other blood dyscariasis on General blood picture were excluded from the study.

Pregnant women were interviewed with the predesigned, Performa and detailed clinical examination was done. A detailed demographic profile of the cases including age, religion, type of family, family size, family monthly income, educational level, history of menorrhagia was collected. A dietary history about the predominant type of diet of the mother and also about various food items avoided, especially during pregnancy.

All mothers were subjected to following investigations:

1. Haemoglobin Levels,
2. Complete blood count with peripheral smears
3. Urine routine microscopy
4. Liver and kidney functions test
5. Per abdominal obstetrical ultrasonography with Color Doppler evaluation of fetal umbilical and cerebral vessels.

According to World Health Organization (WHO), hemoglobin level below 11 g/dL was labeled as anemia during pregnancy and classified as mild (10.0–10.99 g/dL), moderate (7.0–9.9 g/dL), and severe (<7.0 g/dL) anemia. Patients were treated for anemia as per Hospital transfusion guidelines and blood transfusions were given wherever necessary.

Data analysis was performed using SPSS software. Descriptive statistics, including mean, range, and standard deviations, were calculated for all variables. Proportions were compared using Chi- square tests. P values less than 0.05 were considered significant.

RESULTS

A total number of 1400 females were included in the study. Out of these 1054 patients belonged to non anemic group and 346 patients belonged to anemic group. Mean age in anemic group was 27.09+/-4.2 while mean age in non anemic group was 26.7+/- 3.1 (p =0.24). (Table I).

Dimorphic anemia (48%) was the most common type of anemia. The second most common type of anemia was microcytic hypochromic (45%). Normocytic normochromic anaemia was the least common type present in 6.9% of total anemic mothers. 26.01% of the anemic patients had mild degree of anemia; moderate anemia was present in

55.78% of anemic patients while 18.20% of anemic patients were severely anemic. (Table II).

In non anemic group monthly average income of family was Rs 48,000 +/-1200 which when divided by average house hold members of 6.2 gave per capita monthly house hold income of Rs 7741. In anemic group average income of family was Rs 44,000 +/-900 which when divided by average house hold members of 7.1 gave per capita monthly house hold income of Rs 6197. In non anemic group percentage of females in Illiterate group, up to class 5th group, up to class 12th group and Graduate and above group were 0%, 0.56%, 51.8% and 47.62%. While in anemic group percentage in corresponding group were 0%, 1.15%, 75.14% and 23.69%.15.37% of women in non anemic group and 19.65% of women in anemic group (p=0.062) had purely or predominantly vegetarian habits. History of menorrhagia was present in 11.57% of non anemic and 13.8% of anemic mothers (p=0.256). Percentage of Gravida 1, 2, 3,4,5,6 females in non anemic group was 9.6%. 51.23%, 34.34%, 2.94%, 1.04% and 0.75% while percentage of Gravida 1,2,3,4,5,6 females in anemic group was 4.91%, 9.82%, 30.92%, 49.42%, 2.89% and 2.02%. Average Gravida status in non anemic group was 2.36 while in anemic group was 3.41.Percentage of Hindus, Muslims, Sikhs and Christians of respective totals having anemia was 23.96%, 27.98%, 4.16% and 7.66%. (Table I)

Incidence of premature births, Intra uterine deaths and Low birth weight in non anemic group was 11.95%, 1.04% and 9.9% while in anemic group percentage was 47.97%, 4%, 60%.In non anemic group percentage of pre ecclampsia, prolonged labour, puerperal sepsis and maternal mortality per thousand deliveries were 7.96%, 9.1%, 3.98% and 15.18. Corresponding percentage for anemic group was 13.87%, 16.76%, 11.84% and 26.01. (Table III).

Table I: Showing demographic profile of antenatal females study

	Non Anaemic Group (N=1054)	Anaemic Group (N=346)	P value
Average age (years)	26.7+/-3.1	27.09+/-4.2	0.24
Average Total monthly income per family (Rs)	48,000	44,000	0.18
Average number of family members	6.2	7.1	0.16
Average Monthly Per capita Household income (Rs)	7741	6197	0.14
Educational Status			<0.001
Illiterate	0/1054 (0%)	0/346 (0%)	
Up to Class 5th	6/1054 (0.56%)	4/346 (1.15%)	
Up to class 12th	546/1054 (51.80%)	260/346 (75.14%)	
Graduate and above	502/1054 (47.62%)	82/346 (23.69%)	
Purely or predominantly vegetarian nutritional habits	162/1054 (15.37%)	68/346 (19.65%)	0.062
Previous History of Excessive menstrual bleeding	122/1054 (11.57%)	48/346 (13.8%)	0.256
Gravida status in two groups	G1= 102 (9.6%)	G1= 17 (4.91 %)	0.0058
	G2= 540 (51.23%)	G2= 34 (9.82%)	<0.0001
	G3 =362 (34.34%)	G3 = 107 (30.92%)	0.2418
	G4 =31 (2.94%)	G4 = 171 (49.42%)	<0.0001
	G5 =11 (1.04%)	G5 = 10 (2.89%)	0.0142
	G6= 8 (0.75%)	G6= 7 (2.02%)	0.046
Average Gravida status	2.36	3.41	0.0031
Religion	Hindus 549	Hindus 173 (23.96%)	0.5023
	Muslim 439	Muslim 169 (27.98%)	0.056
	Sikhs 46	Sikhs 2 (4.16%)	0.0014
	Christians 24	Christians 2 (7.69%)	0.0714
	Total cases 1054	Total cases 346	

Table II: showing morphological type and grading of anemia in our study

Morphology/Grade	Total no. of anaemic patients (N=346)	Percentage
Microcytic hypochromic	156/346	45.08%
Normocytic normochromic	17/346	4.91%
Dimorphic	166/346	47.97%
Macrocytic normochromic	7/346	2.02%
Mild (Hb10-10.9 mg/dl)	90/346	26.01 %
Moderate (Hb 7-9.9 mg/dl)	193/346	55.78 %
Severe (Hb <7 mg/dl)	63/346	18.20 %

Table III: showing Fetal and maternal outcomes in anemic and non anemic mothers.

	Non Anaemic Group (N=1054)	Anaemic Group (N=346)	P value
Incidence of premature deliveries (<37 weeks)	126 (11.95%)	166 (47.97%)	<0.0001
Birth weight Very low birth weight low birth weight Appropriate for age Large for gestational age	 11 (1.04%) 94 (8.91%) 938 (88.94%) 11 (1.04%)	 32 (9.24%) 176 (50.86%) 138 (39.88%) 0%	<0.0001
Intra Uterine Deaths	11 (1.04%)	4%	0.0003
Altered cerebral hemodynamics	0 (0%)	90 (26%)	<0.0001
Low APGAR Scores at 1 min	32 (3.03%)	38 (10.98%)	<0.0001
Pre ecclampsia	84 (7.96%)	48 (13.87%)	0.0011
Prolonged labour without CPD and abnormal foetal position	96 (9.1%)	58 (16.76%)	<0.0001
Puerperal sepsis	42 (3.98%)	41 (11.84%)	<0.0001
Maternal mortality	Total 16/1054 (15.18/1000)	Mild 2/90 (20.22/1000) Moderate 4/193 (23.63/1000) Severe 3/63 (47.6/1000) Total 9/346 (26.01/1000)	 .034

DISCUSSION

Nutritional Anaemia is the most common disorder complicating the pregnancies in Indian subcontinent. Fetal and Maternal adverse outcomes of 'anaemia in pregnancy' have been extensively studied and reported quite frequently in medical literature. Illiteracy, poverty and rural back ground have been considered since long to be the major risk factors behind the maternal anaemia complicating pregnancy. Most of the previous studies conducted in our country have reported the prevalence of maternal anemia among the illiterate, rural and poor population mostly belonging to below poverty line strata[7, 8], with insufficient information about the urban population of the national Capital.

There is no doubt that problem of anemia is much more in rural than the urban areas[9]. Census of

India (2011), defines urban area as follows: 1. All places with a municipality, corporation, cantonment board or notified town area committee, etc. 2. All other places which satisfied the following criteria: i) A minimum population of 5,000; ii) At least 75 per cent of the male main working population engaged in non-agricultural pursuits; and iii) A density of population of at least 400 persons per sq. km.

However even the Urban areas of the National capital are not spared from this medical disorder complicating pregnancy. This study was intended to report the demographic profile of comparatively literate, urban and above poverty line antenatal females presenting for antenatal visits or to labor room of centrally located Obstetrics and Gynecological centre of New Delhi.

Demographic Profile of patients in our study

In our study total 1400 antenatal females were studied. Average age in anemic group was 27.09+/-4.2 years while in non anemic group average age was 26.7+/-3.1 years. There was no significant difference in two groups in terms of age (p=0.24). Mothers in both group belonged to urban New Delhi depending upon the definition of Rural and Urban population mentioned earlier.

Average income per house hold in anemic group was 48,000 while in Non anemic group was 44,000 Rs. Dividing this monthly earning with the number of household members led to the per capita Household Income of 6197 Rs in anemic group and 7741 in non anemic group. There was no significant difference between the two groups in terms of monthly income. This concludes that poverty and resulting Low purchasing power is not the only reason for the existing maternal anemia in the Indian antenatal women. Social and gender injustice and inequalities, maternal illiteracy ignorance of healthy food habits and menstrual disorders are some of the other reported major causes of this disorder affecting the pregnant Indian females[10].

None of the patient in our study was illiterate in either of anemic or non anemic group as per WHO definition of being Literate. 98% of patients in non anemic and anemic groups had educational status 12th and above. Desalegn et al reported that the rate of anaemia was significantly higher among the illiterate population. Illiteracy leads to non acceptance for family planning practices, increased parity and poor nutritional habits leading to maternal anemia[11]. In our study anemic and non anemic group did not differ in level of senior secondary education. However there were significantly more graduates in non anemic group as compared to anemic group.

We did not found in our study significant difference among Hindus and Muslims regarding prevalence of maternal anemia (p=0.502, p=0.059). However prevalence of maternal anemia was significantly less among Sikh mothers (p=0.001). There has been conflicting reports regarding difference in the prevalence of maternal anemia among different religions. Vatika et al found that in pregnant women Muslim population shows better intake of all nutrients attributed to their practice of non vegetarian intake leading to lesser incidence of anemia in comparison to Non-muslim population[12]. We in our study observed that there was no significant difference among Hindus and Muslim mother regarding prevalence of maternal anemia. Significantly less prevalence among Christian and Sikh mothers can be attributed to higher educational standard of these females.

Purely vegetarian food habits have been reported by few authors responsible for maternal anemia in certain group of populations. Prema et al[13] reported that low dietary intake of iron, folic acid and food stuffs that promote iron absorption coupled with poor bioavailability of Iron in Indian diets are the major risk factors for high prevalence of maternal anemia in India. We did not found any significant difference among the anemic and non anemic group regarding preference for vegetarian diet or being exclusively non vegetarian. Craig et al in his study observed that although the iron

stores of vegetarians may be reduced, the incidence of iron-deficiency anemia in vegetarians is not significantly different from that in non vegetarians[14]. Excessive menstrual bleeding often contributes to anemia in Indian adolescent females[15]. In our study we observed that in anemic group 13.8% of the mother gave previous history of excessive menstrual bleeding while in the non anemic group 11.57 % gave the same history.(p=0.256)

Gravida status was the most significant factor associated in our study with anemic patients. We in our study observed that most of the patients in anemic group were either Gravida III or Gravida IV (Gravida III-31%, Gravida IV -49% p<0.0001) while in non anemic group majority were Gravida II (51%) (p<0.0001). Hemminki et al[16] found a strong correlation between Higher Gravida status and prevalence of maternal anemia. Frequent pregnancies, lack of spacing in between two births leads to loss of iron stores which cannot be replenished leading to increased chances of anemia.

Type and Grading of anaemia

In our study we observed that Dimorphic anemia (48%) was the most common type of anemia which denotes combined nutritional deficiency of iron and Vitamin B12. The second most common type of anemia in our study was microcytic hypochromic (45%) denoting pure Iron deficiency. Normocytic normochromic anaemia was the least common type present in 6.9% of total anemic mothers. 26.01% of the anemic patients had mild degree of anemia, moderate anemia was present in 55.78% of anemic patients while 18.20% of anemic patients were severely anemic.

Impact of anaemia on fetal well being

We in our study observed that 47.9 % of mothers in the anemic group delivered preterm (before 37 complete gestational weeks) compared to 11.9 % mothers in non anemic group (p<0.0001). Levy et al[6] in his study reported a difference of 10.7% and 9% among the anemic and non anemic group for the incidence of preterm births. Greater percentage of patients in severe anemic group is probably responsible for even worse outcomes in our study. Kumar et al[17]. and Monika et al[18]. have found such an association only when mothers were severely anemic. (Hb <7.0 g/dl). Zhang et al[19] has reported association of preterm delivery with anemia in all the trimesters, but with a reverse trend.

Maternal anemia in pregnancy severely affects Fetal Birth weight. Jagadish et al[20] has reported that there is 6.5% increase in the incidence of low birth weight babies and 11.5% increase in preterm deliveries in mothers who were anemic in their third trimester. We in our study observed Incidence of very low birth to be 9.2% and 1.04 % among anemic and non anemic mothers, Low birth weight to be 50.8% and 8.9% among the anemic and non anemic mothers respectively (p<0.0001). This incidence of low birth weight is far above the national figure of 20%. We in our study observed that 89% of babies born to non anemic mothers were appropriate for age while just 51% of babies born to anemic mothers were appropriate for age in terms of Birth weight (p<0.0001). Since birth weight is an important determinant of new born health and Infant mortality rate, impact of maternal anemia can be estimated with the data presented.

Further in our study we observed that incidence of Intra uterine deaths was 4% in anemic group compared to 1.04% in non anemic group (p=0.0003). 11 % of the new born had a low APGAR score at 1 minutes in anemic group compared to 3 % in non anemic group (p<0.0001). Study conducted by Lone et al[1] on a cohort of 629 pregnant women showed that Newborns of anemic mothers had 1.8 times increased risk of having an APGAR score of <5 at 1 min and the risk of IUD was 3.7 times higher for anemic women. K. Kalaivani[8] has reported that maternal anaemia contributes to intergenerational cycle of poor growth in the offspring. A doubling of low birth weight rate and IUD with 2 to 3 fold increase in the perinatal mortality rates has been reported

when the Hb < 8mg/dl. Fetal Hypoxia with anaerobic metabolism with circulatory failure was the mechanism proposed for this adverse outcome. We in our study also observed the alteration in fetal cerebral response using Doppler Indices by measuring. Significantly lower value was noted in Middle Cerebral Artery Resistance Index and Cerebral/Umbilical artery resistance ratio in maternal anemia group when compared with non anemic group ($p<0.05$) at admission. Results were surprising in the terms that all the 63 fetuses of, mothers with severe maternal anemia and 17 mothers with moderate anemia had altered cerebral vascular response. Gabriel et al[21] reported the similar changes in fetal cerebral vascular response in anemic mothers. This alteration in the fetal cerebral adaptation has been proposed by few authors responsible for fetal cerebral edema, low APGAR score and Fetal distress[21].

Impact of anemia on maternal well being

We in our study observed that incidence of Pre ecclampsia was around 7.96% in non anemic group and around 13.87% in anemic group which was significantly more in anemic group ($p=0.001$). There are mixed reports regarding association of severe maternal anaemia and pre ecclampsia in pregnancy. Abdel Aziem Ali[23] reported 3.5 times higher incidence of pre ecclampsia and perinatal mortality among mothers with severe anaemia. The susceptibility of women with severe anaemia to preeclampsia could be explained by a deficiency of micronutrients and antioxidants. Recent results indicate that reduction in serum levels of calcium, magnesium and zinc during pregnancy might be possible contributors to the development of preeclampsia[24].

Patients in our study in the anemic group had higher incidence of prolonged labour 16.7% as compared to non anemic group 9.1%($p<0.0001$). (Patients with Cephalo pelvic dissociation and abnormal fetal position were excluded from this data). Uterine atony due to nutritional deficiency is the pathology behind prolonged labour in anemic mothers. Several authors have reported increased incidence of Caesarian section in anemic mothers with an indication of prolonged labour[25].

We in our study observed a puerperial sepsis rate of 11.8 % in the anaemic group as compared to 3.98 % in non anemic group ($p<0.0001$). Singh et al[26] have reported increased puerperal sepsis rate among the anemic mothers in population of Dehradun India.

Severe maternal anaemia is an independent risk factor influencing maternal mortality rate in developing countries[27]. Maternal mortality in selected developing countries ranges from 27 to 194 deaths per 1000 live births. In a large Indonesian study, the maternal mortality rate for women with a hemoglobin concentration <100 g/L was 70.0/10000 deliveries compared with 19.7/10000 deliveries for non anemic women[28].

A detailed compilation of reports on the causes of maternal deaths attributable to anemia is published by WHO (1991)[29]. This lists 62 reports from 33 countries for which a proportion is provided for maternal deaths attributable to anemia. Anemia is listed as a direct cause of death in 26% of these reports and as an indirect cause in the remainder. The definitions of anemia vary substantially between studies and many are based on clinical assessment alone; most (88.5%) are hospital based, with a high proportion of complicated deliveries. in community studies in Asia, values vary (per 100,000 live births) from 27 in India and 54 in Bangladesh to 194 in Pakistan and in Africa from 35 in Senegal to 82 in Kenya[29].

We in our study observed that maternal mortality rate in anemic group was 26.01/1000 deliveries as compared to 15.18/1000 deliveries in non anemic group ($p=0.034$). Further maternal mortality rate in severe anemia group (47.6/1000) was significantly higher than mild anemia group. (20.22/1000).

CONCLUSION

We at the end of the study conclude that Nutritional anemia affects a substantial number of Literate mothers of above poverty line families in

urban part of capital with drastic impact on maternal and fetal well being. Nutritional ignorance and not the illiteracy promote the disease and needs targeting in future Maternal Health programmes.

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