The prevalence of anaemia and associated factors in pregnant women in a rural Indian community.

Nadeem Ahmad[1], Piyush Kalakoti[2], Rubeena Bano[1], Syed M.M.Aarif [2]

1-Rohilkhand Medical College & Hospital, Bareilly, U.P., India.

2-Rural Medical College, Ahmednagar, Maharashtra, India.

RESEARCH

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Corresponding Author:
Piyush Kalakoti
Medical Student
Rural Medical College, Loni- 413736, Taluka-Rahata, District-Ahmednagar, Maharashtra, India.
drpiyushkalakoti@gmail.com

Abstract

Background
Anaemia is the most frequently observed nutritional diseases in the world. In India, anaemia is the second most common cause of maternal death, accounting for 20% of total maternal deaths. This study aims to determine the prevalence of anaemia and to explore factors associated with anaemia in one rural Indian pregnant population.

Method
The study was conducted in the Maternity Clinic of Pravara Rural Hospital (PRH), Loni, Ahmednagar, Maharashtra, India. Only pregnant women who were 12-20 weeks of gestation were eligible for inclusion. Anaemia was classified as per the World Health Organisation (WHO) grading criteria. The diagnosis of anaemia was undertaken using the standard peripheral blood smear examination. Consenting participants were interviewed using a pre- structured, pre-tested questionnaire.

Results
Three hundred and ten subjects were enrolled, of whom 232 (74.8%) were found to be anaemic. The majority (50.9%) demonstrated moderate anaemia while mild and severe anaemia were recorded in 70 (30.17%) and 44 (18.9%) respectively. A highly significant association was found with the mother's age, educational and socio-economic status, religion, parity and Body Mass Index (BMI). Other factors such as family structure and size, dietary habits and attainment of menarche were not significantly associated with anaemia.

Conclusion
Very high prevalence of anaemia (74.8%) early in pregnancy is an indicator of the failure of WHO and national programmes aimed at reducing anaemia in this group. Those pregnant for the first time are at greatest risk of developing anaemia.

Key Words
Pregnancy, Anaemia, Rural, India

Background

Anaemia is a major public health problem. It is now one of the most frequently observed nutritional diseases in the world. It is especially prevalent in women of reproductive age, particularly during pregnancy. The main causes of anaemia in developing countries include: inadequate intake and poor absorption of iron, malaria, hookworm infestation, diarrhoea, HIV/AIDS and other infections, genetic disorders (e.g., sickle cell and thalassemia), blood loss during labour and delivery, heavy menstrual blood flow and closely spaced pregnancies.[1, 2] Iron deficiency and anaemia during pregnancy are associated with low birth weight, preterm delivery, increased perinatal and neonatal mortality, inadequate iron stores for the newborn, increased risk of maternal morbidity and mortality, and lowered physical activity, mental concentration, and productivity.[3, 4, 5] In a separate analysis, iron deficiency anaemia (IDA) was an underlying risk factor for maternal and perinatal mortality and morbidity, and was estimated to be associated with 115,000 of the 510,000 maternal deaths (22%) and 591,000 of the 2,464,000 perinatal deaths (24%) occurring annually around the world.[6] In the World Health Organization (WHO)/World Bank rankings, IDA is the third leading cause of disability-adjusted life years lost for females' aged 15–44 years.[1, 7] In 1993, the World Health Organization instituted its Safe Motherhood Initiative with a goal of reducing the number of maternal deaths by half before the year 2000.[8] A key component was to eradicate anaemia in pregnancy, focusing on the greater risk in younger women. Little progress has been made in reducing iron-deficiency anaemia among women in developing countries, in spite of the introduction of iron-supplementation programmes in many of them.

In India, anaemia is the second most common cause of maternal death, accounting for 20% of total maternal deaths.[9] The prevalence of anaemia ranges from 33% to 89% among pregnant women and is more than 60% among

adolescent girls with wide variations in different regions of the country. [10] Pregnant women from rural Maharashtra, one of the developed states of India registered a prevalence of 56.4%.[11] The National Nutritional Anaemia Prophylaxis Programme (NNAPP) was initiated in 1970 with the aim to reduce the prevalence of anaemia to 25 percent.[12] Since 1992, the daily dosage of elemental iron for prophylaxis and therapy has been increased to 100 mg and 200 mg, respectively under Child Survival and Safe Motherhood (CSSM) Programme. This research investigates the prevalence and determinants of anaemia among rural women in Maharashtra. We hypothesised that anaemia is associated with social class, educational status, family type, BMI, parity and occupation.

Method

The study was conducted in the Maternity Clinic of Pravara Rural Hospital (PRH), Loni, Ahmednagar, Maharashtra, India. Loni is a small village, 25 kilometres from Shirdi, the world famous pilgrimage site. PRH is a tertiary level health care centre that caters to the needs of the Ahmednagar district. The majority of the patients come from rural areas. In addition, it serves a large number of patients from the adjoining districts of Aurangabad, Dhule, Jalgaon, Nashik and Pune. Pregnant women from rural areas, attending the Maternity Clinic of PRH, formed the study population. Purposive sampling was applied. Based on previous findings that 56.4% pregnant women in rural Maharashtra are anaemic, taking $P = 0.34$, allowable error (d) = 10% of P, and using this in the formula of sample size $n = P\ (1\text{-}P)\ /d^2$, sample size was estimated to be 310. [11] Out of the 338 pregnant women approached, 28 did not consent.

Only pregnant women of 12-20 weeks of gestation were considered for study as maximum haemodilution occurs after this period. Women with bleeding disorders were excluded from the study. Haemoglobin estimation was done by Cell Counter Method. Anaemia was classified as per the WHO severity grading criteria. [13] Thus anaemia in pregnancy ranges from mild (≥10.0g/dl), moderate (7.0-9.9g/dl) to severe (<7.0g/dl).The typing of anaemia was done as per standard peripheral blood smear examination method.[14] Socio-economic status was assessed according to modified BG Prasad classification based on Consumer Price Index of April 2006.[15, 16] Consenting participants were interviewed using a pre- structured, pre-tested questionnaire. Ethical clearance was obtained from the Institutional Ethical Committee of Pravara Institute of Medical Sciences. Statistical analyses were undertaken using Chi-square test, mean, percentages and proportions. P values less than 0.05 were considered significant.

Results

The demographic profile of the study population is shown in Table 1.

Table 1 Demographic Characteristics

	No.	Percentage (%)
Female (Total)	310	
< 20 years	142	45.8
20-24 years	96	30.9
25-29 years	65	20.9
>30 years	7	2.36
Age (in years), Mean (SD)	21.62 (1.45)	
Education		
Illiterate	148	47.78
Primary	102	32.9
Middle	49	15.8
Matriculation or above	11	3.5
Occupation		
Landless Labourers	105	33.98
Cultivators	86	27.85
Housewife	77	24.8
Service (Pvt. /Govt.)	32	10.3
Others	10	3.2
Religion		
Hindu	208	67.1
Muslim	68	21.9
Christian	20	6.55
Sikh	4	1.39
Others	10	3.2
Family Type		
Nuclear	175	56.55
Joint	113	36.56
Extended	22	7.1
Parity		
1	168	54.29
2	72	23.2
3	32	10.3
>3	38	12.35
Dietary Habit		
Vegetarian	83	26.8
Non vegetarian	32	10.3
Mixed	195	62.9
Pregnancy Characteristic		
Singleton	302	97.4
Multiple	8	2.6

Overall, 310 subjects were enrolled for study, out of which 232 (74.84%) subjects were found to be anaemic. The majority (50.86%) of anaemic women demonstrated moderate anaemia while mild and severe anaemia were recorded in 70 (30.17%) and 44 (18.97%) pregnant women respectively. The severity of anaemia according to age groups is shown in Table 2. The peripheral blood smear (PBS) identified normocytic hypochromic and microcytic hypochromic blood picture to be most common morphological variant of anaemia. These two pictures of PBS are characteristic of iron deficiency anaemia.

Table 2: Age-wise distribution of degree of anaemia.

Age (in years)	Anaemic status				
	Normal	Mild	Moderate	Severe	Total
	No. (%)	No. %)	No. (%)	No. (%)	
<20	16 (11.3)	17 (11.9)	87 (61.3)	22 (15.59)	142
20-24	32 (33.3)	30 (31.3)	19 (19.8)	15 (15.6)	96
25-29	27 (41.5)	21 (32.3)	10 (15.4)	7 (10.8)	65
≥30	3 (42.9)	2 (28.6)	2 (28.6)	00 (0.0)	7
Total	78 (25.2)	70 (22.6)	118 (38.1)	44 (14.2)	310

A highly significant association of anaemia was found with the mother's age group ($\chi2=28.38$, $p<0.001$) educational ($\chi2=19.58$, $p<0.001$) and socio-economic status ($\chi2=32.09$, $p<0.001$) and religion ($\chi2=68.03$, $p<0.001$). Other factors such as family structure ($\chi2=1.46$, $p>0.05$) and size ($\chi2=1.87$, $p>0.05$), dietary habits ($\chi2=2.37$, $p>0.05$) and attainment of menarche ($\chi2=1.95$, $p>0.05$) were not significantly associated with anaemia. All the women with multiple pregnancies were found to be anaemic, though it was only moderate in nature.

Table 3: Association of anaemia with socio-demographic factors.

Characteristic	Anaemia	Normal	Total	p value
Educational status	**No. (%)**	**No. (%)**	**No.**	**p<0.001**
Illiterate	122 (82.4)	26 (17.6)	148	
Primary	77 (75.5)	25 (24.5)	102	
Middle school	29 (59.2)	20 (40.8)	49	
Matric or more	4 (36.4)	7 (63.6)	11	
Total	232 (74.8)	78 (25.2)	310	
Socio-economic status	**(%)**	**(%)**		
Upper Class	0 (0.0)	0 (0.0)	0	
Upper Middle	4 (36.4)	7 (63.6)	11	
Middle	19 (54.39)	16 (45.7)	35	
Lower Middle	42 (62.7)	25 (37.3)	67	
Lower	167 (84.8)	30 (15.2)	197	
Total	232 (74.8)	78 (25.2)	310	
Religion	**No. (%)**	**No. (%)**	**No.**	**p<0.001**
Hindu	171 (85.9)	28 (14.1)	199	
Muslim	13 (28.36)	33 (71.7)	46	
Christian	33 (78.67)	9 (21.4)	42	
Sikh	13 (68.4)	6 (31.6)	19	
Others	2 (50.00)	2 (50.0)	4	
Total	232 (74.8)	78 (25.2)	310	
Family structure	**No. (%)**	**No. (%)**	**No.**	**p>0.05**
Nuclear	165 (76.7)	50 (23.36)	215	
Joint	57 (73.18)	21 (26.9)	78	
Extended	11 (64.7)	6 (35.39)	17	
Total	232 (74.8)	78 (25.2)	310	

Table 4 Association of anaemia with BMI, Parity & Abortion

	Normal	Mild	Moderate	Severe	Total (n)
BMI(kg/m^2)					
<18.5	39	57	106	40	242
18.5-24.9	35	10	11	3	59
≥25	4	3	1	1	9
Total	78	70	118	44	310
Parity					
1	23	45	91	8	167
2	29	3	13	1	46
≥3	26	22	14	35	97
Total	78	70	118	44	310

Abortions					
0	44	56	109	31	240
1	23	7	6	3	39
≥2	11	7	3	10	31
Total	78	70	118	44	310
p<0.001					

Women with lower BMIs had the highest prevalence of any degree of anaemia. There was a significant relationship of parity ($\chi 2=46.69$, $p<0.001$) with anaemia. Among the primigravida, 86.22% were found to be anaemic with 59.3% showing moderate or severe form of the ailment. All the pregnant women with past history of abnormal vaginal bleeding (11.4%) were anaemic and 76.9% had moderate or severe anaemia. The association of anaemia with number of abortions ($\chi 2=31.38$, $p<0.001$) is shown in Table 4. In this study 77.4% pregnant women had no history of abortions, however 81.7% were anaemic.

Discussion

In this study a high prevalence of anaemia (74.80%) among pregnant women was observed. The majority had moderate anaemia. Most of the anaemic pregnant women were in the younger age group. This result was in contrast to the results obtained by similar study in the rural area of Delhi where patients in the age group (20-24 years) showed maximum prevalence of anaemia.[17] Hindus showed a higher prevalence of anaemia (91.2%) as compared to Muslims, followed by patients of other faiths. A previous study also suggested that being of Muslim religion and higher socio economic status were protective factors in the development of anaemia. [17]The prevalence of anaemia was not significantly related with structure of family, birth interval and number of abortions. Statistically significant association of anaemia was seen with low BMI. The prevalence was minimal among overweight patients. This result corresponds well with those of Bentley/Griffiths. [18]There was a trend of low severity of anaemia with high per capita income. Women with first ever pregnancy more often had severe anaemia. The observed very high prevalence of anaemia and its severity in the current study is similar to earlier studies.[19, 20] As in other studies the severity of anaemia was inversely related to educational status and income. [21, 22] These findings are suggestive of nutritional deficiency (dietary factors) as the major cause of anaemia. However further investigations would confirm IDA or reveal other causes of anaemia. The failure of various nutritional programmes to tackle the problem warrants a review and the development of strategies to improve the overall health and nutrition status of adolescent girls before they enter their reproductive years.

Conclusion

Very high prevalence of anaemia (74.84%) early in pregnancy is an indicator of the failure of national and WHO programmes to address this problem. Primigavid women are at most risk of developing anaemia. As normocytic hypochromic and microcytic hypochromic blood pictures were predominant, it indicates deficient iron intake/absorption irrespective of age, type of family, caste, religion or number of children as the prevalence was equally high in all groups in this population.

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CONFLICTS OF INTEREST

The authors declare that they have no competing interests.