

# Prevalence of anemia among pregnant women in rural population of Kolar district

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## Abstract

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**Background:** Anemia is the most common hematological disorder during pregnancy. According to the reports of World Health Organization reports, from 35% to 75% (56% on average) of the pregnant women in developing countries are anemic. Prevalence of anemia in South Asian countries is among the highest in the world. India has the highest prevalence of anemia (87%).

**Objective:** To determine the prevalence of anemia and factors influencing its causation among pregnant women.

**Materials and Methods:** A community-based cross-sectional study was carried out among 446 pregnant women from July 2013 to June 2014 in the rural population of Kolar district, Karnataka, India. The study participants were selected by using multistage sampling method. The hemoglobin estimation was done by using HemoCue method, and data were collected in a pretested questionnaire. Data were analyzed with SPSS version 22. The  $\chi^2$ -test and correlation coefficient was used to test the degree of significance.

**Result:** A high prevalence (64%) of anemia was observed among pregnant women. The mean hemoglobin level was found to be  $10.3 \pm 1.53$  g%, ranging from 5 to 15 g%. Anemia was predominantly observed among below poverty line families (59.4%) compared with above poverty line families (5.4%). The prevalence of anemia increased with increase in gestational age and gravida and decreased with increase in birth interval.

**Conclusion:** High prevalence of anemia among pregnant women indicates anemia to be a major public health problem in the rural community. Factors such as socioeconomic status, birth interval, and gravida contribute to this high prevalence.

**KEY WORDS:** Anemia, prevalence, hemoglobin level, gestational age, gravida

## Introduction

Anemia is the most common hematological disorder during pregnancy. Prevalence of anemia in South Asian countries is among the highest in the world, and India has the highest

prevalence of anemia (87%). According to the reports of World Health Organization, in developing countries, 35% to 75% (56% on average) of pregnant women and, in industrialized countries, 18% of women are anemic. National Family and Health Survey (NFHS)-3 reported that 56.4% of pregnant women in rural Maharashtra were anemic. Several Indian studies from various regions have shown the prevalence of anemia to be between 33% and 100%. Nonetheless, the data of prevalence of anemia among pregnant women from remote areas are at scant.<sup>[1-7]</sup>

Anemia is known to be associated with multiple factors, such as poor socioeconomic status, high parity, short birth interval, poor diet both in quantity and quality, lack of health and nutrition awareness, and a high rate of infectious diseases

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and parasitic infestations. In developing countries, underprivileged people have often limited access to medical care and preventive measures, increasing their risk of becoming anemic and contributing to high maternal mortality.<sup>[5,8]</sup>

Studies highlighting the problem of anemia among pregnant women in this region are very indecisive, and, hence, this study was undertaken with an objective to determine the prevalence of anemia and factors influencing its causation among pregnant women.

## Materials and Methods

A cross-sectional, community-based study of 446 pregnant women was conducted in a rural population of Kolar district, Karnataka, India, from July 2013 to June 2014. The sample size was estimated based on 56.4% prevalence of anemia reported among pregnant women in Karnataka.<sup>[9,10]</sup>

The total sample estimated was 446 adding the expected noncompliance of 15% and considering an absolute error of 5%. Multistage sampling technique was used to select the study subjects. The data were recorded in a pretested and semi structured questionnaire by the interview technique.

The hemoglobin level was estimated by using HemoCue method, accepted as a standard method for hemoglobin measurement by the International Committee for Standardization in Hematology and World Health Organization for field studies.<sup>[11,12]</sup> The hemoglobin levels of >11 mg/dL was considered as normal, 10–11 mg/dL as mild, 7–9.9 mg/dL as moderate, and <7 mg/dL as severe anemia.<sup>[13]</sup>

The data were analyzed by using SPSS, version 22. Correlation among continuous variables by correlation coefficient and  $\chi^2$ -tests were used as a test of significance. A *p* value of 0.05 was considered as statistically significant.

## Results

A total of 446 pregnant women participated in the study. The average age of pregnant women was 22.36 years ranging between 18 and 33 years; 16.4% of women belonged to first, 42.2% to second, and 41.5% to third trimesters. Most of the women belonged to below poverty line (BPL) families (94.8%) and Hindu religion (98%). Regarding education, 36.3% were illiterates and 40% had completed matriculation or PUC. More than half (57%) of the study subjects belonged to joint families and 34% to nuclear families. Regarding gravidity, 37.5% pregnancies were of primigravida, 48% second gravida, and 14% multigravida [Table 1].

Anemic condition prevailed in 64% of pregnant women. Among them, 3% were severely, 34% moderately, and 27% mildly anemic. Table 2 indicated that anemia is the most prevalent in the age group of 20–24 years. Almost 92% of anemic women belonged to BPL families compared with APL families. The difference observed between socioeconomic status and anemic was statistically significant (*p* = 0.015). A significant increase in the prevalence of anemia was observed with the

**Table 1:** Sociodemographic profile of pregnant women

	N (n = 446)	Percentage
Age (years)		
15–20	65	14.6
21–25	215	48.2
26–35	120	26.9
>35	46	11.3
Pregnancy duration		
≤12 months(I trimester)	73	16.4
12–24 months(II trimester)	188	42.2
≥24 months(III trimester)	185	41.5
Socioeconomic status		
APL	23	5.2
BPL	423	94.8
Caste		
SC	241	54
ST	37	8
OBC	145	32
Others	23	6
Educational status		
Illiterate	162	36.3
Primary	24	5.4
Higher secondary	69	15.5
Matriculation/PUC	176	39.5
Graduation and above	15	3.36
Type of family		
Nuclear	152	34.0
Joint	253	56.7
Extended	41	9.3
Gravida		
1	167	37.5
2	217	48.6
3 and above	62	13.9

increase in gestational age (*p* = 0.010), and 65% of the literate pregnant women were anemic in the rural population.

A significant correlation of anaemia increased with gravida (64%–74%, *r* = –0.103, *p* = 0.032) and decreased with the increase in birth interval (61.1%–46.5%, *r* = –0.111, *p* = 0.021) was observed. Anemia was predominantly seen among pregnant women belonging to BPL families (59.4%) compared with APL families (5.4%) and was statistically significant ( $\chi^2$  = 5.963, *p* = 0.015). Anemia prevalence in different educational categories showed no statistical significance ( $\chi^2$  = 5.739, *p* = 0.219) [Table 2].

## Discussion

The onset of anemia occurs in childhood, degrades in the adolescence period in girls, and gets intensified during pregnancy. It is the most common nutritional deficiency disorder in

**Table 2:** Prevalence of anaemia according to sociodemographic profile of pregnant women

	<11 g%, n (%)	>11 g%, n (%)	Total (n = 446)	$\chi^2$	P
Age of women (years)					
15–19	19 (6.7)	12 (7.4)	31	0.152	0.927
20–24	209 (73.3)	116 (72.0)	325		
Above 25	57 (20)	33 (20.6)	90		
Duration of pregnancy					
I trimester	40 (15.5)	33 (20.5)	73	9.271	0.010*
II trimester	112 (39.3)	76 (47.2)	188		
III trimester	133 (46.6)	52 (32.3)	185		
Gravida				<i>r</i>	<i>P</i>
1	107 (64.1)	60 (35.9)	167	-0.103	0.032*
2	137 (63.1)	80 (36.9)	217		
3 and above	46 (74.2)	16 (25.8)	62		
Birth interval				<i>r</i>	<i>P</i>
Less than 12 months	118 (61.1)	76 (38.9)	193	-0.111	0.021*
12–24 months	80 (68.4)	37 (31.6)	117		
>24 months	92 (46.5)	43 (53.5)	135		
Socioeconomic status				$\chi^2$	<i>P</i>
APL	24 (5.4)	4 (0.9)	28	5.963	0.015*
BPL	266 (59.4)	152 (34.1)	418		
Education of women				$\chi^2$	<i>P</i>
Illiterate	102 (35.8)	60 (37.3)	162	5.739	0.219
Primary	20 (7.0)	4 (2.5)	24		
Higher secondary	47 (16.5)	22 (13.7)	69		
Matriculation/PUC	108 (37.9)	68 (42.2)	176		
Graduation and above	8 (2.8)	7 (4.3)	15		

\*denotes  $P < 0.05$ , Statistically Significant

the world. When compared with other developing countries, India shows higher prevalence of anemia in all the groups.

In this study, the prevalence of anemia in pregnant women was 64%, as also reported by Sharma *et al.* in Rajasthan city (63%) and Bisoi *et al.* (67.8%) in West Bengal. However, the studies conducted by Ahmad *et al.* and Kaul *et al.* in their study observed a very high prevalence of anemia: 74.8% and 91%, respectively. The mean hemoglobin level of pregnant women in this study was found to be  $10.3 \pm 1.53$  g%, ranging from 5 to 15 g%, which is similar to that in the study by Bisoi *et al.* ( $10.1 \pm 0.98$  g%).<sup>[1,14–16]</sup> The high prevalence of anemia can be attributed to low dietary iron and folic acid intake or deprived bioavailability of iron or chronic blood loss owing to infections.

It is observed that the majority (73%) of the anemic pregnant women were in age group of 20–24 years. Kaul *et al.* in Kashmir valley observed a very high prevalence (93.67%) of anemia in the similar age group, and in the study by Sharma *et al.* in Rajasthan city, only 38% of women were anemic in the similar age group. Judith *et al.* in Udupi showed the prevalence of anemia to be 57.72% among antenatal women who were in the age group of 17–21 years.<sup>[1,14–17]</sup> During childhood, the low dietary intake of iron and poor bioavailability of iron result in high prevalence of anemia. Anemia gets aggravated

with increased in requirements during adolescence and pregnancy. Early marriage and early adolescent pregnancy aggravates anemia, contributing to high prevalence in this age group.

In this study, the prevalence of mild, moderate, and severe anemia were observed as 27%, 34%, and 3%, respectively, which is comparable with the studies conducted by Sharma *et al.* in Rajasthan and by Wadgav HV. Mondal *et al.* reported that majority of the anemic women belonged to moderate anemia (91.46%). Similarly, Kumar *et al.* observed a very low prevalence of severe anemia (0.6%). A study in Andhra Pradesh by Vemulapalli and Rao and that by Ahmed *et al.* observed higher rates of severe anemia: 6.28% and 18.9%, respectively.<sup>[2,4,7,14,16,18]</sup> Poverty, ignorance, and nonavailability or failure to utilize available medical facilities can be contributing to various degree of anemia. In rural India, a blood loss of even 200 mL in severe anemia will lead to shock and death, indirectly contributing to maternal deaths owing to anemia.

The proportion of women experiencing anemia increased with the increase in gestational age (I trimester, 15.5% to 46.6% in III trimester). The study conducted by Vemulapalli and Rao in Andhra Pradesh reported that pregnant women in I trimester showed higher anemia prevalence rate than in

II and III trimesters, quite different from our findings. Low antenatal-care coverage at the rural primary health center coupled with poor screening for anemia without appropriate therapy might be the contributing factors for the increased prevalence in later half of pregnancy.

Anemia was predominantly seen among pregnant women belonging to BPL families (59.4%) compared with APL families (5.4%). Similar observation was made in a study conducted by Lokare *et al.*<sup>[19]</sup> in Aurangabad city, the proportion of pregnant women experiencing anemia in classes I and II were less (47.61% and 71.42%, respectively) when compared with the lower socioeconomic status (93.51%, 94.49%, and 94.11% in classes III, IV, and V respectively). Khan *et al.*<sup>[20]</sup> in Uttar Pradesh made similar observation endorsing that anemia in pregnancy was inversely proportional to the socioeconomic class. Improvement in health-care delivery system with health education targeting improved utilization of availability of health-care facilities at the beneficiary door steps will help in reducing anemia prevalence.

Hemoglobin level of pregnant women seemed to have a negative correlation with gravida, and it was found to be statistically significant ( $r = -0.103$ ,  $p = 0.032$ ). Gatea *et al.*<sup>[21]</sup> reported similar observation among pregnant women in Ibn-Albaldy hospital in Baghdad. Increased requirement of iron with repeated pregnancy had contributed to the decreased hemoglobin levels.

Hemoglobin level of pregnant women seemed to have a negative correlation with birth interval and it was found to be statistically significant ( $r = -0.111$ ,  $p = 0.021$ ). Similar observation made by Teja *et al.* However, a study by Swarnlatha conveyed that prevalence of anemia was significantly associated with birth interval. In this study, age of the women showed a negative correlation with hemoglobin levels ( $r = -0.048$ ,  $p = 0.311$ ). In a study conducted by in Gatea *et al.*, in a hospital-based study in Bagdad, similar negative correlation was observed between the age of mother and hemoglobin levels.<sup>[21–23]</sup>

## Conclusion

A high prevalence of anemia (64%) indicates that the anemia continues to be a major public health problem in rural area. Socioeconomic status, literacy of women, gravida, and birth interval are the major determinants that contribute to the problem of anemia. Anaemia was high in III trimester, and this can be prevented by advocating proper antenatal services in the early stage of pregnancy. Therefore, strategic efforts are needed to broaden the coverage of iron and folic acid distribution and its consumption. Public health education on reproductive health, monitoring the compliance of women with antenatal-care services and strengthening of their health-care-seeking behavior are important health-care measures to be undertaken at the community level. In addition, it is time for realization that health system should focus on various factors that contribute to the occurrence of anemia and include them as important indicators in the National Health Policy.

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