International Journal of Community Medicine and Public Health
Gopinath A et al. Int J Community Med Public Health. 2016 Apr;3(4):968-972
http://www.ijcmph.com
pISSN 2394-6032 | eISSN 2394-6040

DOI: http://dx.doi.org/10.18203/2394-6040.ijcmph20160938

Research Article

Prevalence and factors influencing anaemia among pregnant women in rural Mysuru, India

Anup Gopinath*, N. C. Ashok, Praveen Kulkarni, Renuka Manjunath

Department of Community Medicine, JSS Medical College, JSS University, Mysuru, India

Received: 12 February 2016
Accepted: 14 March 2016

***Correspondence:**
Dr. Anup Gopinath,
Email: dr.anup.gopinath@gmail.com

ABSTRACT

Background: Anaemia in pregnancy is one of the major causes of maternal morbidity and mortality in India and the world. Determining the status and factors influencing anaemia among pregnant women in rural areas is essential to treat as well as prevent the same. The objective was to estimate the prevalence of anaemia among pregnant women of rural areas of Mysuru, India and to determine the factors influencing anaemia among the study participants.
Methods: A cross-sectional study was conducted in the villages under PHCs of Hadinaru and Suttur of Nanjangud Taluk, Mysuru district, India for a period of 18 months. A total of 300 pregnant women residing in these villages, and consenting to participate were included in the study. A structured proforma was used to collect sociodemographic details. Haemoglobin was estimated using Sahli's haemoglobinometer and type of anaemia was determined by peripheral blood smear. The data was entered using Epi Data v3.1 software, and analyzed using R statistical Software v3.0.2.
Results: The prevalence of anaemia was 51%, majority had mild anaemia (37%). 79% of the study participants were aged 20-29 years, 85% studied upto High school, 83% belonged to lower Socioeconomic class and 66% lived in joint families. The important factors influencing anaemia were poor nutrition (49%), low socioeconomic status (39%) and open defecation (51%).
Conclusions: More than half of the pregnant women were anaemic. Also, majority of the anaemic women had mild anaemia, which showed the positive impact of MCH services. The factors influencing anaemia which have been identified in this study need to be addressed to reduce the burden of anaemia among pregnant women in our country.

Key words: Anemia, Pregnant women, Rural health

INTRODUCTION

Anaemia in pregnancy is one of the major causes of maternal morbidity and mortality in the world including India.[1] Many factors predispose to develop anaemia during pregnancy. Most important factors are nutritional (i.e., inhibitors of iron absorption, dietary deficiency of iron, folic acid and vitamin B_{12} in diet), pre-pregnancy iron deficiency anaemia, teenage pregnancy, lack of appropriate spacing between pregnancies, parasitic infestations (e.g. malaria, hookworm), open defecation, poor environmental and personal hygiene.[2] Anaemia during pregnancy can cause premature labour, postpartum haemorrhage, puerperial sepsis and thromboembolic phenomena in the mother, and can cause prematurity, IUGR, perinatal death and decreased iron stores in the foetus and subsequently in the neonate.[3]

The status of anaemia can be assessed by haemoglobin (Hb) levels in blood. The World Health Organization (WHO) has defined anaemia when the Hb levels are less than 12 g/dL in non-pregnant women and less than 11

g/dL in pregnant women. Peripheral blood smear helps to determine the type of anaemia.[3]

According to a WHO report, the global prevalence of anaemia among pregnant women is 41.8%.[4] In India, the prevalence of anaemia among pregnant women ranges from 58.7% to 87%.[5-7] The prevalence of anaemia at national level or state level cannot be generalised.[1] This study intends to assess the prevalence of anaemia and the factors influencing anaemia among pregnant women residing in villages under the primary health centres of Hadinaru and Suttur, and to suggest measures to prevent anaemia among these pregnant women.

METHODS

A community based rural cross-sectional study was conducted over a period of 18 months (November 2013 – April 2015) among the pregnant women residing in the villages under Primary Health Centres at Hadinaru and Suttur of Nanjangud Taluk, Mysuru District, India which comprise the rural field practice areas of Department of Community Medicine, JSS Medical College, Mysuru. Institutional ethics committee approval was obtained.

The prevalence of anaemia among pregnant women in India varies from 58.7% to 87%.[5-7] The lowest prevalence was considered (58.7%) for calculating sample size (as the lowest prevalence must be considered when it is more than 50% and highest prevalence be considered when it is less than 50%).[5,8] Using the formula $n=(Z\_\alpha^2.p.q)/d^2$ (where n is required sample size, $Z\alpha^2=3.84$ at 95% Confidence level, p=prevalence, q=1 - p, and d=relative allowable error), and substituting p=0.587, q=0.413, and d=(10% of p)=0.0587 and adding non-response rate of 10%, we got total sample size to be included in the study, n=300.

Snow ball sampling technique was used for gathering the information on pregnant women by house-to-house visits in each of the villages till desired sample size was attained. Those pregnant women in the gestation period of 24 to 32 weeks at the time of interview and investigations were excluded, as they will have physiological hemodilution. Written informed consent was obtained from each study participant. A structured proforma was used to collect sociodemographic details such as age, occupation, education, income, type of family, antenatal history, dietary history. Examination was done to record the anthropometric measurements such as height and weight, and vital parameters such as pulse rate and blood pressure. Capillary blood was collected by finger prick under aseptic precautions; haemoglobin (Hb) estimation was done using Sahli's haemoglobinometer in the field. The blood drop was transferred on to a glass slide and typing of anaemia was done by peripheral blood smear examination under compound microscope at the respective primary health centre.

The data thus obtained were first entered into a master register, from which it were later transferred onto an electronic format using Epidata version 3.1 software (www.epidata.dk), which were backed up online on Google drive.[9] This data were analyzed using R Statistical Software version 3.0.1.[10]

Descriptive statistics such as mean, standard deviation, frequencies and percentages were computed under the univariate analysis. Under the bivariate analysis, cross tables were constructed, t-test and Chi-square test were applied for continuous and categorical variables respectively, and the associations with status of anaemia were tested. The results were considered statistically significant at $p<0.05$.

RESULTS

Table 1: Sociodemographic characteristics of the study participants (n=300).

Parameter	Number	Percentage
Age in years		
19 or lesser	52	17.33
20 to 29	237	79
30 or more	11	3.67
Educational status		
Non-literate	13	4.33
Primary to High school	254	84.67
PUC and above	33	11
Socioeconomic status		
Upper Middle	2	0.67
Middle	13	4.33
Lower middle	36	12
Lower	249	83
Type of Family		
Nuclear	99	33
Joint	199	66.33
Three generation	2	0.67
Gravida status		
Primigravida	178	59.33
Multigravida	122	40.67
Calories status		
Normal	18	6
Deficient	231	77
Excess	51	17
Practice open defecation		
Yes	228	76
No	72	24

In the present study, there were 300 study participants aged between 18 and 49 years, with the Mean (SD) age being 22.57(3.49) years (95% CI: 22.17-22.97). 237 study participants (79%) were aged between 20 and 29 years. Most of the study participants, i.e., 254 (84.67%) had done schooling between primary and high school and 13 (4.33%) of them were non literate. According to Modified B.G. Prasad's socio economic status

classification (updated for the period from November 2013 to April 2015), 249 (83%) of the study participants belonged to Lower SES class, while only 2 (0.67%) belonged to Upper Middle class. 199 (66.67%) of the study participants belonged to joint family. 178 (59.33%) of the study participants were primigravida, and the remaining 40.67% (122) were multigravida. Among the study participants, 231(77%) of them had diet deficient in calories. Among the 300 study participants, 228 (76%) practiced open defecation (Table 1).

Table 2: Difference in quantitative parameters between anaemic and non-anaemic subjects (N=300).

Variable	Mean(SD)			t-value	p value	95% Confidence Interval
	Anaemia	No Anaemia	Total			
Age in years	22.21 (2.93)	22.95 (3.98)	22.57 (3.49)	-1.82	0.072	-1.53 to 0.06
Per capita income in rupees	2250.47 (1670.99)	2141.71 (1675.43)	2197.54 (1671.24)	0.56	0.57	-271.58 to 489.1
Height in cm	153.97 (5.59)	154.06 (5.92)	154.01 (5.74)	-0.14	0.89	-1.4 to 1.21
Weight in kg	49.92 (9.04)	50.23 (8.77)	50.07 (8.90)	-0.30	0.76	-2.33 to 1.7
BMI in kg/m^2	21.11 (4.05)	21.18 (3.54)	21.15 (3.81)	-0.16	0.87	-0.93 to 0.79
Hb in g%	10.10 (0.74)	11.47 (0.55)	10.77 (0.95)	-18.26	0.001*	-1.52 to -1.22

Note: df= Degrees of freedom; *Significant.

Table 3: Factors influencing anaemia (N=300).

Variable	Categories	Anaemia	No anaemia	Total	Chi square value, df	P value
Age in years	Up to 19	29 (55.8)	23 (44.2)	52 (17.3)	2.96, 2	.228
	20-29	122 (51.5)	115 (48.5)	237 (79)		
	More than 30	3 (27.3)	8 (72.7)	11 (3.7)		
Education status	Not literate	5 (38.5)	8 (61.5)	13 (4.33)	1.52, 2	.466
	Primary to High school	134 (52.8)	120(47.2)	254 (84.67)		
	PUC and above	15 (45.5)	18(54.5)	33 (11)		
SES class	Lower Class	129 (51.8)	120 (48.2)	249 (83)	.30, 3	.960
	Lower Middle Class	17 (47.2)	19 (52.8)	36 (12)		
	Middle Class	7 (53.8)	6 (46.2)	13 (4.33)		
	Upper Middle Class	1 (50)	1 (50)	2 (0.67)		
Type of family	Nuclear	55 (55.6)	44 (44.4)	99 (33)	1.055, 2	.590
	Joint	98 (49.2)	101 (50.8)	199 (66.3)		
	Three generation	1 (50)	1 (50)	2 (0.7)		
Gravida status	Primigravida	86 (48.3)	92 (51.7)	178 (59.33)	1.597, 1	.206
	Multigravida	68 (55.7)	54 (44.3)	122 (40.67)		
Calories status	Normal	14 (77.8)	4 (22.2)	18 (6)	6.03, 2	0.05*
	Deficit	113 (48.9)	118 (51.1)	231 (77)		
	Excess	27 (52.9)	24 (47.1)	51 (17)		
Open defecation	Yes	117 (51.3)	111 (48.7)	228 (76)	300 , 1	1.0^
	No	37 (51.4)	35 (48.6)	72 (24)		
Pallor	Yes	152 (57.1)	114 (42.9)	266 (88.7)	31.708, 1	0.001*
	No	2 (5.9)	32 (94.1)	34 (11.3)		
Peripheral Blood Smear Picture	Microcytic hypochromic	125 (82.2)	27 (17.8)	152 (50.7)	161.849, 2	0001*
	Microcytic normochromic	28 (59.6)	19 (40.4)	47 (15.7)		
	Normal	1 (0.6)	100 (68.5)	101 (33.7)		

Note: df= Degrees of freedom; *Significant; ^Fisher's Exact Test.

The prevalence of Anaemia among the study participants was found to be 51.33%, majority of whom had mild anaemia (72.08%). The haemoglobin levels of the study participants ranged between 6.2 and 13.6 g%, with the Mean (SD) Hb% being 10.77 (0.95) g% (95% CI: 10.66-10.87). Haemoglobin levels were found to be significantly lower among anaemic and non-anaemic pregnant women (Table 2). Among the study participants, 111 (37%) had mild anaemia (Figure 1). It was observed that 152 (50.67%) of the study participants had

microcytic hypochromic picture of erythrocytes on peripheral blood smear examination, suggestive of iron deficiency anaemia. Dietary caloric deficiency, pallor and microcytic hypochromic blood picture in peripheral blood smear were significantly associated with anaemic status (Table 3).

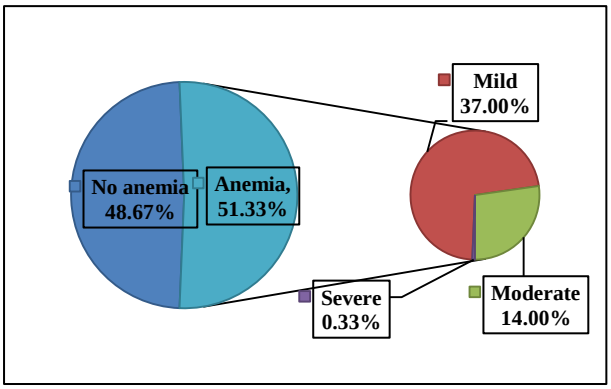

Figure 1: Distribution of study participants based on severity of anaemia (n=300).

DISCUSSION

Anaemia in pregnancy is a burning issue since a very long time in India. The present study was undertaken in a rural community to estimate the prevalence of anaemia among pregnant women, and determine the factors influencing it.

In the present study, anaemia was highest among teenage pregnancies, as high as 55.76% in women lesser than or equal to 19 years of age. This is in striking resemblance to the study done by Noronha J et al[11] which shows that 57.72% of the pregnant women in the age group of 17 to 21 years had anaemia. Similarly, a study by Ahmad N et al[12] also showed that 60% of pregnant women less than 20 years of age had anaemia. This is a serious issue as teenage pregnancy is on the rise, and as these women do not have adequate iron reserves, the foetus devours all the nutrition from the mother and renders her anaemic. 51.8% of anaemic pregnant women belonged to lower socioeconomic status class. This is similar to many studies which have found that lower SES predisposes to higher prevalence of anaemia among pregnant women. Ivan EA et al[13] in their study done in Pondicherry found that 50.66% of pregnant women belonging to lower SES class had anaemia. Similarly, Noronha et al[11] in their study conducted in Udupi found that 54.27% of pregnant women belonging to lower SES class had anaemia. This striking feature points out to the fact that poor nutrition due to poverty among women belonging to lower socioeconomic strata results in anaemia. It is worthy to note that Joint family system is the most prevalent type of family in the study population. Open defecation is a serious public health problem in India, especially in the rural areas. In the present study, a whopping 76% of the study participants were practicing open defecation, and 51.31% of them who practiced open defecation were having anaemia, which however was not found to be statistically significant. Panigrahi et al[14] in their study found a similar finding with 69.2% of anaemia among pregnant women who practised open defecation. Open defecation in the fields is definitely a burning issue as it causes hookworm infection which leads to chronic iron deficiency anaemia. Also, the privacy of the women as well as their security is at stake when they have to use the fields for defecation.

CONCLUSION

Anaemia in pregnant women is an important health indicator. Although more than half of the pregnant women are anaemic, the prevalence is lesser than the national average. Also, majority of the anaemic women have mild anaemia, which shows the positive impact of antenatal care services. The social factors like lower socioeconomic status, environmental factors like open defecation and personal factors like dietary calorie deficiency influencing anaemia which have been identified in this study need to be addressed to reduce the burden of anaemia among pregnant women in our country.

ACKNOWLEDGEMENTS

The authors would like to thank all the pregnant women and their families who were very co-operative and all the staff of PHCs Hadinaru and Suttur for extending their help in smooth conduct of this study.

Funding: None
Conflict of interest: None
Ethical approval: Obtained from the Institutional Ethics Committee, JSS Medical College, JSS University, Mysuru, India

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Cite this article as: Gopinath A, Ashok NC, Kulkarni P, Renuka M. Prevalence and factors influencing anaemia among pregnant women in rural Mysuru, India. Int J Community Med Public Health 2016;3: 968-72.