IOSR Journal of Nursing and Health Science (IOSR-JNHS)
e-ISSN: 2320–1959.p- ISSN: 2320–1940 Volume 4, Issue 1 Ver. II (Jan.-Feb. 2015), PP 12-17
www.iosrjournals.org

Prevalence of Anamiea and Its Predictors in Pregnant Women Attending Antenatal Clinic: A Hospital Based Cross-Sectional Study

Dr. Kasturi B. Hunshikatti [1], Dr. Pranita R .Viveki[2]
Professor, Dept of Physiology[1,] Tutor, Dept of anatomy,[2] Belagavi Institute of Medical Sciences, Belagavi 59001, Karnataka, India.

Abstract:
Background: *Anemia impairs cognitive development, reduces physical work capacity and in severe cases increases risk of mortality particularly during prenatal period. In India, 16% of maternal deaths are attributed to anemia. However, high prevalence of anemia among pregnant women persists in India despite the availability of effective, low-cost interventions for prevention and treatment. Aknowledge of them sociodemographic factors associated with anemia will help to formulate multipronged strategies to attack this important public health problem in pregnancy.*
Objective: *To assess the prevalence of anaemia and its predicting factors among pregnant women attending antenatal clinic at Tertiary care center.*
Study Design: *Descriptive cross-sectional study*
Methods: *A hospital based cross-sectional study design was conducted from January 2014 – September 2014 among 5788 pregnant womens who had been attending antenatal clinic. Red blood cell morphology and Hgb level determination were assessed following the standard procedures. Socio-demographic data was collected by using a structured questionnaire. The data entered and analyzed by using the SPSS version 16.0 statistical software. P<0.05 was considered as statistically significant.*
Result: *Overall prevalence of anemia among the pregnant women was found to be 86.37%. Factors such as diet, level of education of women and their husbands and socioeconomic status were found to be significantly associated with the prevalence of anemia in pregnancy.*
Conclusion: *The present study showed high prevalence of anemia and the majority of them were of the moderate type (hemoglobin: 10-10.9 g/dl). Low socioeconomic class, illiteracy, Multiparous were significantly associated with high prevalence of anemia during pregnancy in Indian women.*
Keywords: *Anemia; Pregnancy; Prevalence; Hemoglobin.*

I. Introduction

Anemia in pregnancy is defined by the World Health Organization (WHO) as a hemoglobin concentration below 11 g/dL.[1]. WHO further divides anemia in pregnancy into: mild anemia (hemoglobin 10-10.9 g/dL), moderate anemia (hemoglobin7.0-9.9 g/dL) and severe anemia (hemoglobin <7 g/dL [2]. The most common cause of anemia in pregnancy worldwide is iron deficiency.[4] It continues to be a major health problem in many developing countries and is associated with increased rates of maternal and perinatal mortality, premature delivery, low birth weight, and other adverse outcomes.[3,4] The predisposing factors include grandmultiparity, low socioeconomic status, malaria infestation, late booking, HIV infection, and inadequate child spacing – among others.[5-8] In 1993, WHO ranked anemia as the 8th leading cause of disease in girls and women in the developing world [2]. Estimates from the World Health Organization report that 35% to 75% of pregnant women in developing countries, and 18% in developed countries are anemic [2].

India became the first developing country to take up a National Nutritional Anemia Prophylaxis Program (NNAP) to prevent anemia among pregnant women. The Government of India recommends a minimum dose of total 100 iron and folic acid tablets to be prescribed during pregnancy.[9] Public health program of distribution of the iron tablets to the pregnant women (during last trimester) and preschool children is in operation in India as part of Maternal and Child Health (MCH) services.[10] Many of the predisposing factors to anaemia in pregnancy

are controllable and may lead to women becoming pregnant with anaemia; thus there is need for basic prevalence statistics to create awareness on the magnitude of anaemia in pregnancy in our environment and also to formulate strategies to reduce its adverse health consequences in order to improve maternal health and reduce poor perinatal outcome. Information on the prevalence would also be useful for the managers of health institutions and for district, provincial, and national maternal, child, and women's health programme development [11, 12]. Hence, this study aims to determine the prevalence of anaemia and its predictors among

pregnant women visiting at the Tertiary care center, at Belagavi district, Karnataka. The results from this study will reveal the magnitude of this problem in our environment and also provide relevant data to strengthen planning on the prevention of anaemia in pregnancy, thus helping to reduce the prevalence of anaemia in pregnancy and the morbidity and mortality associated with it.

II. Materials And Methods

Study design, area, and period

A cross sectional study was conducted at Belagavi District Hospital visiting antenatal clinic from January 2014 to September 2014 . Belgavi district is a district in the state of Karnataka, India .According to census of India it has a population of 4,778,439 of which 24.03%live in urban areas.The city is nearly 2,500ft above sea level.

Study population

The study participants were pregnant women who visited for antenatal clinic. Those pregnant that fulfill the inclusion criteria were enrolled in the study.

Sample size and sampling procedures

Considering 95% confidence interval, 5% margin of error and 50% proportion 5788 patients was included in the study. Those women who self reported to the health center were included until the required sample size was obtained.

Inclusion and exclusion criteria

Pregnant women, who were greater than 20 year old, gave informed consent and sufficient sample was included in the study. Those pregnant women who were received medication for helminthes for the last 3 weeks and those who were seriously sick (unable to gave socio demographic data) at time of data collection were excluded from the study.

Socio-demographic data collection procedures

Socio-demographic information like age, marital status, educational status, residence and occupation and other relevant possible risk factors like number of children, parasitic infections, gestational period, history of malaria attack, pregnancy gap and iron supplement of the study participants were collected by using structured and pre-tested questionnaire.

Specimen collection and processing

By using heparinized capillary tube, blood sample was taken from the study participants, a drop of blood was placed on a clean slide and thick and thin smear was prepared. After being air- dried, labeled with identification number, the thin smear portion of the slide was fixed with methanol alcohol and the whole smear was stained with giemsa solution based on the standard operational procedures (SOPs). Using light microscope, examination of the smear was done with high power magnification (40 x objectives) and oil immersion (100 x objectives) to investigate type of anemia based on the morphology of red blood cell. For Hgb determination Sahli-Hellige method was used. Using micropipette, 20 µL of blood was taken and poured into a tube containing 0.1mol/l HCl. After 10 minutes, distilled water was added drop by drop, followed by mixing until the color of the solution matched the color of the glass standard positioned along side the dilution tube. The concentration of hemoglobin was read from the graduated scale on the dilution tube.

Data Analysis

The data was cleaned, edited, checked for completeness before entering into a computer. After overall data arrangement, analysis was carried out using SPSS version 16 statistical software. Descriptive statistics were used to give a clear picture of dependent and independent variables. The frequency distributions of the variables were worked out. Frequency tables and charts were used to present the summarized data. Logistic regression analysis had been used to check for association between dependent and independent variables. In all cases P-value, less than 0.05 was considered statistically significant.

Ethical Consideration

The study was approved by the ethical review committee of Institute. Individual consent was obtained before the questionnaires were administered and blood were collected. The consent form was read in the local language and a copy was given to the women upon request. Participants were informed of the general purpose, possible risks, and benefits of the study.

III. Result

Socio-demographic characteristics

A total of 5788 pregnant women were included in the study. The mean age of the study participants was 26.4 ± 0.12 year. The ages of participants ranged from 18 to 40 years. The overall prevalence of anemia (Hgb<11g/dl) was 5000 (86.39%). Out of 5788 participants, 3213(55.52%) lived in rural areas and the rest 2575 (44.48%) were urban dwellers. Half, (44.05%) of the study participants were housewife followed by 42.98% others, 12.95% governmental employee. (**Table 1**).

Obstetric and medical history

Majority, 3450 (59.61%) of the women were in the third trimester (gestational age greater than 28 weeks), while1255 (21.68%) of the pregnant women were in their second trimester (between 13 and 28 weeks of gestation). 1083 (18.71%) of the participants were in the first trimester (gestational age less than 13 weeks). Women without a previous pregnancy (no child) were 25.5%. More than a quarter (65.13%) of the participants had three child and 26.77% had two children. Nearly half, 2267(43.5%) of the pregnant women were on iron supplement at the time of the study.

Laboratory findings

Among 5788 study participants, 5000(21%) were anemic (hemoglobin level <11gm/dl). Most 2138 (42.76%) of pregnant women had normocytic normochromic red cell morphology. 1757 (35.14%) of them had macrocytic hypochromic red cell morphology and only 850 (17%) had macrocytic normochromic red cell morphology. The majority of anemic cases 46.72 % showed moderate type of anemia followed by mild 27.48% and 25.80% severe anemia (**Fig 1**).

Association of sociodemographic factors and anemia

Logistic regression was carried out to assess possible relationship between anemia and socio demographic characteristics. Anemia was significantly associated with age groups ranged from 26-34 years old [p=0.001] and age groups greater than 34 year. Urban residence were significantly associated with reduced anemic cases . (**Table 1**).

IV. Discussion

The current study attempted to asses anemia prevalence and predictor factors in pregnant women. The overall prevalence of anemia was 22%, which is low compared to other similar studies**.** A study carried out among 7 states by Nutrition Foundation of India had observed the overall prevalence of anemia as 84% among pregnant women .[13] "Indian Council of Medical Research (ICMR) Task Force Multicenter Study" revealed that the overall prevalence of anemia among pregnant women from 16 districts was 84.9% (range 61.0% – 96.8%).[14] The prevalence observed is similar to that reported for pregnant women (60%–77%) in Dar es Salaam- Tanzania,[15-17] Sudan,[18,19] and Nigeria.[20] In developed countries, the prevalence of anemia was only 18% among pregnant women as reported by WHO (1998).[21] The socioeconomic developments, higher standard of living, better utilization of health care facilities along with increasing literacy rate are associated with the low prevalence of anemia in developed countries. Low socioeconomic status was associated with a higher prevalence of anemia in pregnancy. A cross-sectional study in New Delhi had revealed that there was a trend of decreasing severity of anemia with higher per capita income as found in the present study.[$_{22}$] In the present study, it was found that anemia increases steadily with decrease in the level of educational attainment. One study found that anemia was most common in illiterate women (53.7%) as compared with 37.1% in literate women. [$_{15}$] A study conducted in 7 states with similar sample used in National Family Health Survey (NFHS) - 2 had observed an association between the literacy status of husband with anemia in pregnant women.[$_{13}$]

Tenth Plan strategy for combating anaemia in pregnant women

The Tenth Five Year Plan[23] suggested multipronged strategies for the control of anaemia in pregnancy. These include: (i) fortification of common food items like salt with iron to increase the dietary intake of iron and improve the haemoglobin status of the entire population, including girls and women prior to pregnancy; nutrition education for dietary diversification to improve the iron and folate intake; (ii) screening of all pregnant women for anaemia using a reliable method of haemoglobin estimation; (iii) oral iron folate prophylactic therapy for all non-anaemic pregnant women (with haemoglobin more than 11 g/ dl); (iv) iron folate oral medication at the maximum tolerable dose throughout pregnancy for women with haemoglobin level between 8 and 11 g/dl; (v) parenteral iron therapy for women with haemoglobin level between 5 and 8 g/dl if they do not have any obstetric or systemic complication; (vi) hospital admission and intensive personalised care for women with haemoglobin less than 5 g/dl; (vii) screening and effective management of obstetric and

systemic problems in all anaemic pregnant women; and (viii) improvement in health care delivery systems and health education to the community to promote utilization of available care.

V. Conclusion

The diagnosis of anaemia during booking among pregnant women is essential as it affords one the opportunity to institute interventions to prevent the complication of anaemia may have impact on their nutritional status and health seeking behavior In conclusion, the prevalence of anemia among pregnant women was high especially at third trimester. Moderate type of anemia was the commonest one. Morphologically the predominant type of anemia was normocytic normochromic, followed by microcytic hypochromic anemia. Low family income, high family size, hookworm infection, and living with HIV/AIDS were the main predictors of maternal anemia.There is a need to encourage family planning, and design policies and strategies pertinent to reduction of anemia in low income groups. Besides, further studies using micronutrient assay techniques which are sensitive for the detection of latent anemia before the change of RBC morphology and indices takes place have to be conducted. Effective implementation of the Tenth Plan strategies for combating anaemia can go a long way in reducing the short- and long- term adverse consequenees of anaemia.

Conflict of Interests

The authors declare that there is no conflict of interests regarding the publication of this paper.

Authors' contributions

Authors participated in the design of the study, perfomed the data collection, performed the statistical analysis and served as the lead author of the manuscript. All authors read and approved the final manuscript.

Acknowledgments

The authors thank all midwives and laboratory staffs who heartfully participated during data collection and laboratory analysis activities. The authors are also grateful to thank pregnant women for their voluntary participation in our study. Lastly, they would like to thank the Department of Obstrectic And Gyanaecology of this hospital.

References

[1]. World Health Organization (WHO) The prevalence of Anaemia in women: a tabulation of available information. Geneva, Switzerland: WHO; 1992. WHO/MCH/MSM/92.2.
[2]. World Health Organization (1993-2005) Worldwide prevalence of anemia, 49- 84.
[3]. Mahomed K. Iron and folate supplementation in pregnancy. Cochrane Database Syst Rev. 2000;(2)CD001135: World Health Organization Reproductive Health Library CD-ROM. 2004;7. [PubMed]
[4]. Nyuke RB, Letsky EA. Etiology of anaemia in pregnancy in South Malawi. Am J Clin Nutr.2000;72:247–256. [PubMed]
[5]. van den Broek NR, Rogerson SJ, Mhango CG, et al. Anaemia in pregnancy in southern Malawi: prevalence and risk factors. BJOG. 2000;107:437–438. [PubMed]
[6]. Amadi AN, Onwere S, Kamanu CI, Njoku OO, Aluka C. Study on the association between maternal malaria infection and anaemia. J Med Invest Pract (JOMIP) 2000;1:23–25.
[7]. Aluka C, Amadi AN, Kamanu CI, Feyi-Waboso PA. Anaemia in pregnancy in Abia State University Teaching Hospital Aba. J Med Invest Pract (JOMIP) 2001;2:58–61.
[8]. Adinma JIB, Ikechebelu JI, Onyejimbe UN, Amilo G, Adinma E. Influence of antenatal care on the haematocrit value of pregnant Nigerian Igbo women. Trop J Obstet Gynaecol. 2002;19:68–70.
[9]. Agarwal DK, Agarwal KN, Roychaudhary S. Targets in national anaemia prophylaxis programme for pregnant women. Indian Pediatr 1988;25:319-22.
[10]. Nutritional anaemia. National Family Health Survey (NFHS-3) 2005- 2006. Volume 1. Ministry of Healthy and Family Welfare, Government of India, New Delhi; 2007. p. 308-9.
[11]. M.Hogue, S. B. Kader, and E.Hogue, "Prevalence of anaemia in pregnancy in the Uthungulu health district of KwaZulu-Natal, South Africa," South African Family Practice, vol. 49, no. 6, p. 16, 2007.
[12]. A. K. M. Hogue, S. B. Kadar, E. Hogue, and C. Mugero, "Prevalence of anaemia in pregnancy at Greytown, South Africa," Tropical Journal of Obstetrics and Gynaecology, vol. 23, no. 1, pp. 3–7, 2006.
[13]. Agarwal KN, Agarwal DK. Prevalence of anaemia in pregnant and lactating women in India. Indian J Med Res 2006;124:173-84.
[14]. Toteja GS, Singh P, Dhillon BS, Saxena BN. Micronutrient deficiency disorders in 16 districts of India –Part 1 Report of ICMR task force study. District Nutrition Project. Ansari nagar, New Delhi: Indian Council of Medical Research; 2001.
[15]. Desalegn S. Prevalence of anaemia in pregnancy in Jima town, southwestern Ethiopia. Ethiop Med J 1993;31:251-8.
[16]. Kidanto HL, Morgen I, Lindmark G, Massawe S, Nystrom L. Risk for preterm delivery and low birth weight are independently increased by severity of maternal anaemia. S Afr Med J 2006;99:98-102.
[17]. Massawe S, Urassa E, Lindmark G, Moller B, Nystrom L. Anaemia in pregnancy: A major health problem with implications for maternal health care. Afr J Health Sci 1996;3:126-32.
[18]. Adam I, Khamis AH, Elbashir MI. Prevalence and risk factors for anaemia in pregnant women of eastern Sudan. Trans R Soc Trop Med Hyg 2005;99:739-43.
[19]. Haggaz AD, Radi EA, Adam I. Anaemia and low birth weight in Western Sudan. Trans R Soc Trop Med Hyg 2010;104: 234-6.
[20]. Uneke CJ, Duhlinska DD, Igbinedion EB. Prevalence and public health significance of HIV infection and anaemia among pregnant women attending antenatal clinics in south eastern Nigeria. J Health Popul Nutr 2007;25:328-35.

[21]. World Health Organization. The prevalence of anaemia in women: A tabulation of available information. 2nd ed. Geneva: WHO; 1992.
[22]. Gautam VP, Bansal Y, Taneja DK, Renuka S. Prevalence of anaemia amongst pregnant women and its socio-demographic associates in rural area of Delhi. Indian J Community Med 2002;27:157-60.
[23]. Planning Commission. GOI. Tenth Five-Year Plan2002-2007. Sectoral Policies and Programmes. Nutrition. Government of India, New Delhi; 2002.

Table 1: Association of Anemia with various demographic characters (n=5788)

Demographic characters and Haemoglobin Level									
Demographic characters		Mild (10-10.9 g/dL),		Moderate (7-9.9 g/dL),		Severe (<7 g/dL),		Non anaemic (>11g/dL)	
Age in years	Total(%)	Total	%	Total	%	Total	%	Total	%
<20	538 (9.29%)	150	27.89%	225	41.83%	123	22.86%	40	7.43%
21-25	3250 (56.16%)	502	15.44%	1405	43.23%	785	24.16%	558	17.16%
25-30	1225 (21.16%)	494	40.32%	352	28.73%	254	20.73%	125	10.20%
>30	775 (13.38%)	228	29.41%	354	45.67%	128	16.51%	65	8.38%
Parity									
1	468 (8.08%)	60	12.82%	78	16.67%	10	2.13%	320	68.37%
2	1550 (26.77%)	464	29.94%	756	48.77%	49	3.17%	281	18.12%
3	3770 (65.13%)	667	17.69%	2458	65.19%	458	12.14%	187	4.96%
Gestation period									
First trimester	1083 (18.71%)	452	41.73%	355	32.77%	151	13.94%	125	11.54%
Second trimester	1255 (21.68%)	302	24.06%	642	51.15%	74	5.89%	237	18.89%
Third trimester	3450 (59.61%)	954	27.65%	1643	47.62%	427	12.37%	426	12.34%
Residence									
Rual	3213 (55.52%)	722	22.47%	758	23.59%	1425	44.36%	308	9.58%
urban	2575 (44.48%)	845	32.82%	892	34.65%	358	13.91%	480	18.64%
Marrital status									
Married	5548 (95.85%)	1483	26.73%	2457	44.28%	848	15.28%	760	13.69%
Others	240 (4.14%)	95	39.58%	72	30%	45	18.75%	28	11.67%
Maternal education status									
Illiterate	1158 (20%)	158	13.64%	209	18.04%	456	39.37%	335	28.92%
Primary school	2580 (44.57%)	1063	41.2%	580	22.48%	712	27.59%	225	8.72%
Secondary school	1455 (25.13%)	652	44.81%	203	13.95%	425	29.21%	175	12.02%
Tertiary	595 (10.28%)	256	43.02%	165	27.73%	121	20.33%	53	8.90%
Occupation									
House wife	2550 (44.05%)	426	16.71%	756	29.64%	1023	40.11%	345	13.52%
Government employee	750 (12.95%)	236	31.46%	197	26.26%	52	6.93%	265	35.33%
Others	2488 (42.98%)	1025	41.19%	540	21.70%	745	29.94%	178	7.15%
Family monthly income									
<ETB	1560 (31.21%)	242	15.51%	258	16.53%	890	57.07%	170	10.89%
1000-2575ETB	2457 (49.14%	962	39.15%	756	30.76%	581	23.64%	158	6.43%
>ETB	1771 (35.42%)	302	17.05%	755	42.63%	254	14.34%	460	25.97%
Family size									
<2	1275 (25.51%)	427	33.49%	460	36.07%	203	15.92%	185	14.5%
3-4	2965 (59.31%)	1123	37.87%	856	28.87%	728	24.55%	258	8.71%

>5	1548 (30.96%)	203	13.11%	452	29.19%	548	35.41%	345	22.28%
Body mass index									
Underweight	2485 (49.71%)	738	29.69%	654	26.31%	758	30.51%	335	13.48%
Normal and above	3303 (66.06%)	1249	37.81%	1468	44.45%	196	5.93%	453	13.71%
Dietary habit									
vegetarian	3450 (69%)	1256	36.4%	1754	50.84%	122	3.53%	322	9.33%
Nonvegeteria n	2338 (49.76%)	1138	48.67%	656	28.05%	78	3.36%	466	19.93%

Table 2: Distribution of morphologic type anemia among study participants.

Morphologic type of cells	Anaemic status		
	Anaemic (n%)	Not anemic(n%)	Total (n%)
Microcytic hypochromic (MCV < 80 fl, MCH < 27 pg)	1757 (35.14%)	250 (31.72%)	2007 (34.67%)
Normocytic Normochromic (MCV and MCH within the normal value)	2138 (42.76%)	305 (38.70%)	2443 (42.20%)
Macrocytic normochromic (MCV > 100 fl, MCH (27 pg < MCH < 33.5 pg))	850 (17%)	178 (22.58%)	1028 (17.76%)
Other combinations	255 (0.51%)	55 (6.97%)	310 (5.35%)
Total	5000 (86.38%)	788 (13.62%)	5788 (100%)

Figure 1: Percentage of anemia by severity among anemic pregnant women (n = 5000).