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ORIGINAL ARTICLE

Prevalence of Anaemia and Its Epidemiological Determinants in Pregnant Women

R.G. Viveki[1*], A.B. Halappanavar[1], P.R. Viveki[2], S.B. Halki[1], V.S. Maled[1] and P.S. Deshpande[1]

[1]Department of Community Medicine, Belgaum Institute of Medical Sciences, Belgaum, Karnataka, India and [2]Department of Anatomy, J.N. Medical College, Belgaum, Karnataka, India

Abstract: *Background:* Nutritional anaemia in pregnant women is one of the India's major public health problems, despite the fact that this problem is largely preventable & easily treatable. *Objectives:* 1.To determine the prevalence of anaemia in pregnant women. 2. To assess the epidemiological determinants of anaemia in pregnancy. *Methodology:* A descriptive case series study was conducted among the pregnant women from second trimester onwards from urban field practice area from 1st March 2010 to 31st July 2010 by using pre-designed, pre-tested, structured schedule. Haemoglobin estimation was done by Sahli's method & anaemia was graded according to WHO criteria. Statistical analyses were done by percentages and proportions, Mean and Standard Deviation (S.D), Chi-square test. *Results:* A high prevalence (82.9%) of anaemia (Haemoglobin - < 11.0gm/dl) was observed among 228 pregnant women. Majority (50.4%) had moderate degree of anaemia (Haemoglobin - 7.0 to 10.0 gm/dl) and 7.0% had severe anaemia (Haemoglobin - < 7.0 gm/dl). Severity of anaemia was more in 26 years of age, from nuclear families, educated upto secondary level, having vegetarian diet, parity two or more & those in third trimester with two or more abortions, although statistically not significant. However, anaemia prevalence was significantly higher among those subjects from below Class IV socio-economic status, those with less than two years of spacing between previous and index pregnancies & with less than two months IFA tablet consumption. *Conclusion:* A very high prevalence of anaemia in pregnancy needs mandatory regular supply of IFA tablets to adolescent and pregnant women from 4th month onwards till 3-6 months post-partum along with correction of other nutritional deficiencies and timely intervention for reducing the burden of related diseases.

Keywords: Pregnant women, Anaemia, Prevalence, India

Introduction

Anaemia during pregnancy is a major public health problem throughout the world, particularly the developing countries. Despite the fact that most of the anaemia's seen in pregnancy is largely preventable and easily treatable if detected in time, anaemia still continues to be a common cause of mortality and morbidity in India. Diminished intake and increased demands of iron, disturbed metabolism, pre-pregnant health status and excess iron demands as in multiple pregnancies, women with rapidly recurring pregnancies, blood loss during labour, heavy menstrual blood flow, inflammation and infectious diseases are important factors which lead to development of anaemia during pregnancy [1-2].

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Anaemia is directly responsible for 20% maternal death and is an associated cause in another 20% [1]. Current knowledge indicates that iron deficiency anaemia in pregnancy is a risk factor for preterm delivery and subsequent low birth weight and possibly for inferior neonatal health. In World Health Organization / World Bank rankings, iron deficiency anaemia is the third leading cause of disability-adjusted life years lost for females aged 15- 44 years [2]. Margaret Balfour was credited as the first to draw the attention of anaemia in pregnancy in India [3]. The weight of evidence supports advisability of routine iron supplementation during pregnancy [4]. Distribution of Iron - Folic Acid (IFA) tablets from 4th month onwards to 3 months [5] (or even 6 months [6]) of delivery will help in preventing anaemia. In view of its public health importance, the Government of India sponsored National Nutritional Anemia Prophylaxis Programme during 4th Five Year Plan in 1970 with the aim to reduce the prevalence of anaemia to 25% [7]. This programme consists of distribution of IFA tablets containing 100 mg of Ferrous Iron and 500 mcg of Folic Acid to pregnant women through Urban Family Welfare Centers in urban areas and Primary Health Centers in rural areas. ICDS Projects are engaged in implementation of this programme [5]. Under this programme, the expectant mother is given a pack of 100 IFA tablets with an instruction to take one tablet a day after food as a prophylactic measure and if mother has visible signs of anaemia, she is advised two tablets a day as a therapeutic measure [8]. The optimum dose of elemental iron is 120mg daily for better response [3].

Prevalence of anaemia in pregnancy shows great variations in different parts of the world. Studies from industrialized countries show that 2.0% - 45.0% of pregnant women are having anaemia which is generally higher in developing countries (5.0% - 90.0%) [9]. According to WHO report, the global prevalence of anaemia among pregnant women is 55.9%. In India, this prevalence has been reported to be in the range of 33.0% - 89.0 % [10]. The present descriptive case series study is an attempt to determine the prevalence and to explore the epidemiological determinants of anaemia in pregnant women from urban field practice area of department of Community Medicine, Belgaum Institute of Medical Sciences, Belgaum, Karnataka, India.

Material and Methods

The present descriptive case series study was conducted among the pregnant women from field practice area of Urban Health Training Centre (catering services to 54,993 population) of Department of Community Medicine, Belgaum Institute of Medical Sciences, Belgaum, Karnataka, India from 1st March 2010 to 31st July 2010. All the pregnant women from second trimester onwards from this area who attended the centre for ANC check up for the first time during the study period were included. The information like age, age at marriage, dietary habits, type of family, average per capita income per month, educational status, age at first pregnancy, parity, gestational age, interval between previous & index pregnancies, number of abortions, Iron-Folic Acid tablets supplementation etc was collected by interviewing the subjects by using pre-designed, pre-tested structured schedule.

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Their weight (Kilograms) and height (Centimeters) were recorded. After thorough clinical examination, Haemoglobin estimation was done by Sahli's method. Typing of anaemia was done as per standard peripheral blood smear examination method. [11]. Anaemia was classified according to WHO criteria [12]. Haemoglobin concentration of less than 11.0 gm/dl was considered as an indication of anaemia. Haemoglobin concentration of 10.0-10.9 gm/dl, 7.0-10.0 gm/dl and less than 7.0gm/dl were considered to indicate mild, moderate and severe anaemia respectively. All those pregnant women with clinical infections, haemoglobinopathies, chronic diseases and multiple pregnancies were excluded from the study. For convenience, age group was divided into < 18, 18-21, 22-25, 26-29 and ≥ 30 years. Socio-economic status of the study subjects was classified into Class I (₹ ≥ 3239), Class II (₹ 1620-3239), Class III (₹ 972-1620), Class IV (₹ 486-972) and Class V (₹ < 486) by using modified B.G. Prasad Classification based on Consumer Price Index of December 2009 of 657 [13] (Correction Factor = 32.39).

Sample size: All the pregnant women (228) from second trimester onwards who attended Urban Health Training Centre for ANC check up for the first time during the study period i.e. 1st march to 31st July 2010 were included in the present study. (A minimum sample size of 100 pregnant women would provide an estimate of prevalence with ±10% allowable error within 95% confidence limits, based on the knowledge that about 50% of the pregnant women in the country are anaemic).

Statistical Analysis: The collected data was compiled, tabulated and analyzed. Descriptive statistics were computed with percentages and proportions, Mean and Standard Deviation (S.D). Group comparisons were done by Chi-square test. P values less than 0.05 were considered statistically significant.

Results

Table 1: General Profile of Study Subjects

Sl. No.	Variable / Characteristics	Minimum	Maximum	Mean	S.D.
1	Age (years)	18	34	23.44	03.35
2	Age at marriage (years)	16	27	19.25	04.18
3	Age at first pregnancy (years)	17	29	21.27	02.60
4	Parity	00	04	0 0.82	00.89
5	Gestational age (weeks)	13	39	28.01	06.38
6	Interval between previous & index pregnancy (months)	06	120	30.68	16.54
7	No. of abortions	00	02	00.17	00.45
8	Weight (Kilograms)	34	84	47.19	06.09
9	Height (Centimeters)	129	169	151.88	05.64
10	Haemoglobin %	05.1	12.4	09.62	01.62

SD = Standard Deviation

The general profile of study subjects is shown in Table1. The present study included 228 pregnant women having an average age of 23.44 ± 3.35 years ranging from 18 to 34 years.

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More than half (53.1%) of the study subjects were from nuclear families and 109 (47.8%) were studied up to primary level only. 162 (71.1%) were housewives and majority (83.3%) were having mixed dietary habits. As per modified B G Prasad classification based on Consumer Price Index of December 2009, 47.4% were from below Class IV socio- economic status. The mean age at marriage was 19.25 ± 4.18 years and that at first pregnancy was 21.27 ± 2.60 years. The mean gestational age at the time of examination was 28.01 ± 6.38 weeks. Average interval between previous and index pregnancies was 30.68 ± 16.54 months. Mean weight and height observed were 47.19 ± 6.09 Kgs and 151.88 ± 5.64 Cms respectively. Majority (44.7%) had consumed Iron–Folic Acid tablets for less than two months. Mean haemoglobin level was found to be 9.62 ± 1.62 gm/dl. A very high prevalence (82.9%) of anaemia was observed among pregnant women. Normocytic hypochromic and microcytic hypochromic type of blood picture, a classical picture of iron deficiency anaemia were commonly observed types of anaemia.

Table 2: Distribution of study subjects by Socio-demographic profile and Severity of Anaemia

Particulars		Degree of Anaemia					
		Normal N=39(%)	**Mild N=58(%)**	**Moderate N=115(%)**	**Severe N=16(%)**	**Total N=228(%)**	**P value**
Age in Years:	18-21	18 (46.1)	30 (51.7)	33 (28.7)	02 (12.5)	83 (36.4)	P < 0.01
	22-25	20 (51.3)	14 (24.1)	58 (50.4)	10 (62.5)	102 (44.7)	
	≥ 26	01 (02.6)	14 (24.1)	24 (20.9)	04 (25.0)	43 (18.9)	
Type of Family:	Nuclear	19 (48.7)	32 (55.2)	61 (53.0)	09 (56.3)	121 (53.1)	P > 0.5
	Joint	20 (51.3)	26 (44.8)	54 (47.0)	07 (43.7)	107 (46.9)	
Education:	Illiterate	03 (07.8)	08 (13.8)	09 (07.8)	03 (18.7)	23 (10.1)	P > 0.5
	Primary	20 (51.3)	29 (50.0)	54 (46.9)	06 (37.5)	109 (47.8)	
	Secondary	06 (15.4)	12 (20.7)	33 (28.8)	05 (31.3)	56 (24.6)	
	Higher Secondary	07 (43.8)	05 (08.6)	13 (11.3)	02 (12.5)	27 (11.8)	
	≥ Graduate	03 (07.7)	04 (06.9)	06 (05.2)	00	13 (05.7)	
Occupation:	House Wife	22 (56.4)	41 (70.8)	88 (76.5)	11 (68.7)	162 (71.1)	P > 0.5
	Labor	03 (07.7)	03 (05.2)	09 (07.8)	01 (06.3)	16 (07.0)	
	Service	05(12.8)	03 (05.2)	00	00	08 (03.5)	
	House Maid	08 (20.5)	08 (08.6)	13 (11.3)	04 (25.0)	33 (14.5)	
	Others	01 (02.6)	03 (05.2)	05 (04.4)	00	09 (03.9)	
Dietary Habits:	Vegetarian	05 (12.8)	06 (10.3)	26 (22.6)	01 (06.2)	38 (16.7)	P > 0.05
	Mixed diet	34 (87.2)	52 (89.7)	89 (77.4)	15 (93.8)	190 (83.3)	
Socio-Economic Status	Class – I	06 (15.4)	02 (03.4)	01 (00.9)	00	09 (03.9)	P < 0.01
	Class – II	12 (30.8)	05 (08.6)	04 (03.5)	01 (06.3)	22 (09.6)	
	Class – III	11 (28.2)	28 (48.3)	42 (36.5)	08 (50.0)	89 (39.1)	
	Class – IV	09 (23.1)	20 (34.5)	39 (33.9)	06 (37.6)	74 (32.5)	
	Class – V	01 (02.6)	03 (05.2)	29 (25.2)	01 (06.3)	34 (14.9)	

Table 2 shows correlation between different socio-demographic parameters and severity of anaemia. The study observed significantly higher prevalence of anaemia among those pregnant women above 26 years of age (97.7%), & those from below Class IV socio-economic status (90.7%) (P< 0.01). The prevalence of anaemia was relatively more in those from nuclear families (84.3%), those who studied upto secondary level (89.3%), housewives (86.4%), having vegetarian diet (86.8%). However, this observed difference was statistically not significant.

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Table 3: Distribution of study subjects by Obstetric Profile and Severity of Anaemia							
Particulars		**Degree of Anaemia**					
		Normal N=39(%)	**Mild N=58(%)**	**Moderate N=115(%)**	**Severe N=16(%)**	**Total N=228(%)**	**P value**
Age at marriage (in Years):	<18	08 (20.5)	16 (27.6)	30 (26.1)	05 (31.2)	59 (25.9)	P > 0.5
	18-21	23 (59.0)	34 (58.6)	62 (53.9)	09 (56.3)	128 (56.1)	
	≥ 22	08 (20.5)	08 (13.8)	23 (20.0)	02 (12.5)	41 (18.0)	
Age at first pregnancy (in Years) :	<18	02 (05.1)	02 (03.4)	06 (05.2)	03 (18.8)	13 (05.7)	P > 0.05
	18-21	17 (43.6)	35 (60.4)	77 (67.0)	07 (43.7)	136 (59.6)	
	22-25	12 (30.8)	15 (25.7)	22 (19.1)	05 (31.3)	54 (23.7)	
	≥ 26	08 (20.5)	06 (10.3)	10 (08.7)	01 (06.2)	25 (11.0)	
Parity	0	25 (64.1)	22 (37.9)	44 (38.3)	06 (37.5)	97 (42.5)	P > 0.1
	1	10 (25.6)	22 (37.9)	45 (39.1)	08 (50.0)	85 (37.3)	
	≥ 2	04 (07.7)	14 (24.2)	26 (22.6)	02 (12.5)	46 (20.2)	
Interval between Previous & index pregnancy (Years) :	<1	01 (02.6)	08 (13.8)	07 (06.1)	01 (06.3)	17 (07.5)	P < 0.01
	1-2	05 (12.8)	04 (06.9)	35 (30.4)	05 (31.2)	49 (21.5)	
	2-3	13 (33.3)	14 (24.1)	20 (17.4)	02 (12.5)	49 (21.5)	
	≥ 3	04 (10.2)	05 (08.6)	07 (06.1)	02 (12.5)	18 (07.8)	
	NA	16 (41.0)	27 (46.6)	46 (40.0)	06 (37.5)	95 (41.7)	
Gestational Age:	2nd Trimester	23 (59.0)	22 (37.9)	61 (53.0)	11 (68.8)	117 (51.3)	P > 0.05
	3rd Trimester	16 (41.0)	36 (62.1)	54 (47.0)	05 (31.2)	111 (48.7)	
No. of abortions:	0	30 (76.9)	49 (84.5)	106 (92.2)	14 (87.4)	199 (87.3)	P > 0.1
	1	08 (20.5)	07 (12.1)	06 (05.2)	01 (06.3)	22 (09.6)	
	≥ 2	01 (02.6)	02 (03.4)	03 (02.6)	01 (06.3)	07 (03.1)	
IFA tablets Consumption (months) :	Nil	08 (20.5)	10 (17.2)	29 (25.2)	03 (18.8)	50 (21.9)	P < 0.01
	<2	10 (25.7)	16 (27.6)	64 (55.7)	12 (75.0)	102 (44.7)	
	2-3	08 (20.5)	12 (20.7)	16 (13.9)	01 (06.2)	37 (16.3)	
	≥ 3	13 (33.3)	20 (34.5)	06 (05.2)	00	39 (17.1)	
NA: Not Applicable (Primigravida)							

As shown in Table 3, the study found higher prevalence of anaemia among those pregnant woman whose age at marriage was less than 18 years (86.4%), and age at first pregnancy was between 18-21 years (87.5%), parity two or more (91.3%), those in third trimester (85.6%) and with two or more abortions in the past (85.7%). However, this difference was statistically not significant. There was significantly higher prevalence of anaemia among those cases with less than two years of spacing between previous and index pregnancies (90.9%) and those who received IFA tablets for less than two months in the recent past (88.15%).

Discussion

The prevalence of anaemia among pregnant women in the present study was very high (82.9%), although similar to other studies like G.S.Toteja et al (84.9%) [10], V.P.Gautam et al (96.5%) [14]. Umesh Kapil et al (78.8%) [15]. However, lower prevalence of anaemia was reported by Panghal et al (51.0%) [16] National Family Health Survey -2 conducted during 1998-99 (49.7%) [17]

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Significantly lower prevalence of anaemia among pregnant women has been reported by similar studies conducted in other countries like South-east China (39.6%) [18], Venezuela (34.44%) [6], South Eastern Nigeria (40.4%) [19], Isparta Province (42.71%) [20], Tanzania (36.1%) [9] etc. The overall prevalence of severe anaemia (Haemoglobin < 7.0gm/dl) among the study subjects was 7.0%. In other similar studies in India severe anaemia was found in 13.1% by G.S Toteja et al [10] , 8.3% by Raman L et al [21], 22.8% by V.P Gautam et al [14] and only 1.6% by Umesh Kapil et al [15] and 2.5% by NFHS- 2 [17] . The prevalence of anaemia was significantly more in those above 26 years of age and those from below Class IV socio-economic status, similar to that reported by V.P Gautam et al [14]. Mean age of the subjects at the time of the study was found to be 23.44 $\pm$ 3.35 years and 53.1% were from nuclear families. In a study by Taru Agarwal et al [22], half of the study subjects were between 22-24 years of age and 58.3% were from nuclear families, while 1/3rd were educated upto primary level only. Mean haemoglobin level among the pregnant women was 9.6 $\pm$ 1.63 gm/dl ranging between 5.1 to 12.4 gm/dl. Mengi Vijay et al [23] reported 10.19 $\pm$ 1.5 gm/dl (ranging between 6.5 to 13.2gm/dl), while that in other countries was found to be 10.76 $\pm$ 1.66 gm/dl in a study at Isparta Province [20] and 11.9 $\pm$ 1.4gm/dl at Venezuela [6].

As in other studies, severity of anaemia was inversely related to educational status [14, 18, 24], socio-economic status [14]. Severity of anaemia was more often seen when first pregnancy occurred before 18 years of age and those aged more than 25 yrs, from nuclear families educated till high school or less and parity two or more [14, 24-25]. These factors could be taken care by timely health education to adolescent girls regarding importance of literacy, delaying the age at marriage, family spacing, small family norm etc. Although statistically not significant, prevalence of anaemia was seen to increase with increase in parity and advancing gestational age [18-20, 23]. Lower anaemia prevalence was observed among women taking Iron Folic Acid supplements than those not consuming the same [23]. Thus, anaemia continues to be endemic among pregnant women in India, despite the intervention measures like distribution of IFA tablets. Some of the reasons that Iron supplementation programmes are ineffective may be that the health workers engaged in peripheral health institutions are not adequately motivated for effective distribution of IFA tablets and improving compliance by pregnant women. The low compliance is particularly due to the side effects associated with Iron preparations [26].

Conclusion

A very high prevalence of anaemia (82.9%), as also found in other similar studies in India in pregnant women is an indicator of the failure of National and WHO Programmes to address this problem. The health care system should not miss any health related opportunities afforded during the important years of adolescence before marriage and child bearing and strategic shift in the programme to mandatory regular supply of IFA tablets to adolescent girls and pregnant women from 4th month onwards till 3 months [5] (or even 6 months [6]) postpartum, food fortification, along

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with correction of other nutritional deficiencies and timely interventions for reducing the burden of malaria, worm infestations and other infectious diseases. All practitioners handling obstetrics cases should be motivated for prescribing iron preparations and balanced diet with good compliance. Monitoring haemoglobin levels in pregnant women could draw attention of policy makers towards anaemia as a major public health problem; facilitate health promotion related to improve dietary practices for adolescent girls and pregnant women.

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*All correspondences to: Dr. Viveki R.G. Associate Professor, Department of Community Medicine, Belgaum Institute of Medical Sciences, Belgaum-590001, Karnataka, India. E-mail: rgviveki@gmail.com

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pregnancy OR determinants of anemia AND Ethiopiaâ€. Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guideline was strictly followed when conducting this review [17].Â Studies that provide the prevalence of anemia in pregnant women using the WHO definition (hemoglobin level less than 11 g/dl), and published in the English language were included. Studies conducted among pregnant women but who had comorbidities like; like HIV/AIDS, renal disease, and other medical or surgical conditions were excluded from this study.Â of meta-analysis were presented using forest plot and relative risk (RR) with its 95% CI. Results. Study selection This review included published studies on anemia among pregnant women in Ethiopia. Objective: To determine the prevalence of anemia and its determinants among pregnant women in Ebantu District, East Wollega zone, Ethiopia. Material: A cross-sectional study was carried out among pregnant women. A total of 625 pregnant women were screened for hemoglobin level. The test was determined using hemocue screening technique. Weight and height was measured & other determinants of anemia during pregnancy were also assessed using a structured questionnaire. Results: This study revealed that 23.7% of patients had mild anemia, and 11.9% had moderate and none with severe anemia. Prevalence of anemia among pregnant women and adolescent girls in 16 districts of India. Food Nutr Bull. 2006;27(4):311â€“315. 7. Vivek RG, Halappanavar AB, Vivek PR, Halki SB, Maled VS, Deshpande PS. Prevalence of anemia and its epidemiological. Deter Pregnant Women. 2012;5(3):216â€“223. Prevalence of severe wasting, weight for height (% of children under 5). Maternal mortality ratio (modeled estimate, per 100,000 live births). Risk of impoverishing expenditure for surgical care (% of people at risk). Mortality from CVD, cancer, diabetes or CRD between exact ages 30 and 70, female (%). Download. CSV XML EXCEL. DataBank. Online tool for visualization and analysis. WDI Tables. Thematic data tables from WDI. Pregnant women who have followed the antenatal consultation from the first trimester until the end of pregnancy and at least 3 blood samples have been taken (in the first, second and third trimesters of pregnancy) were eligible for this research. During the study period, 1102 pregnant women met the eligibility criteria, 840 were anemic among that 218 had iron deficiency anemia.Â RESULTS. Epidemiological Aspects. Prevalence of iron deficiency anemia in pregnant women. Out of a total of 1,102 pregnant women, 840 were anemic.Â Iron deficiency anemia in pregnant women in Kisangani town is a significant concern for all public health problems in the Democratic Republic of Congo. They remain one of the realities in gynecological-obstetrical practice in our area.