Prevalence and Some Associated Risk Factors of Anemia among Pregnant Women in an Urban Field Practice Area of a Medical College - A Community Based Cross Sectional Study

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Abstract: *Introduction: Anaemia is a global public health problem affecting both developing and developed countries with major consequences for human health as well as social and economic development which results in a loss of billions of dollars annually. According to a World Health Organization (WHO) report the global prevalence of anaemia among pregnant women is 55.9%. So present study aim to find out the prevalence and some associated risk factors of anemia and its outcome among antenatal mothers in urban field practice area of a medical college. Material and Methods: Present Cross Sectional Observational study was conducted in urban field practice area of a medical college during February 2021 - January 2023. A total sample size of 869 participants was included in the present studyAll antenatal mothers of all ages in urban field practice area of a medical college. Those who are willing to participate in study. Those antenatal mothers who are already diagnosed and taking some medicines for anaemia. Results: In present study the prevalence of anaemia in antenatal mothers was reported to be 79.0%. Out of 672, 51.79% antenatal mothers were having mildanaemiaand48.21%ofmoderateanaemia. There was statistical significant association between Pretermlabour, hypertensive disorder of pregnancy, Postpartum haemorrhage & LSCS andanaemia status. It was observed that anaemia was common in the age group of 21–30 years (54.6%), Hindu (65.3%), and housewife (99.5%). There was a significant association of anaemia status with Age - group (p<0.0001) educational status (p<0.0001), Type of family (p<0.0001) and BMI (p<0.0001). But there was not significant association of anaemia status with Religion, Occupation and Socio economic status. Conclusions: The high prevalence of anaemia in antenatal mothers was indicates that anaemia continues to be a major public health problem in India. Mild type of anaemia was the commonest one. Anaemia in pregnancy increases the maternal and foetal risks. To reduce the prevalence of anaemia health education on reproductive health, monitoring the consumption of iron folic acid tablets, early diagnosis of high - risk pregnancy, and appropriate management and strengthening of their healthcare - seeking behaviour are important health - care measures to be undertaken at the community level.*

Keywords: Anaemia in Pregnancy, Iron, Foetal morbidity, maternal morbidity

1. Introduction

Anaemia is defined as a haemoglobin level <11.0g/dl. It is a global public health problem affecting both developing and developed countries with major consequences for human health as well as social and economic development which results in a loss of billions of dollars annually [1, 2]. Anaemia is a pathophysiological condition in which there is a marked reduction in the haemoglobin content of blood from the reference concentrations or in the number of red blood cells or defective maturation of red blood cells [3]. It affects all age groups, but pregnant women and children are more vulnerable. Anaemia, during pregnancy, is a commonly encountered medical disorder associated with adverse effects on the mother and the foetus [4].

Several studies shows that estimated the anaemia is currently affecting over 1.62 billion people of the world, a population of which 56 million are pregnant women [5]. According to a World Health Organization (WHO) report [6], the global prevalence of anaemia among pregnant women is 55.9%. In India, the prevalence of anaemia in pregnant women has been reported to be in the range of 33% to 89% [7]. Stevens et al. reported that the global prevalence of anaemia in pregnant women was 38% [8]. The significant burden of anaemia is born in Asia and Africa were estimated that 60% and 52% of pregnant women, respectively, are anaemic, and between 1% and 5% are severely anaemic [9]. Anaemia during pregnancy is more prevalent at 43% developing countries compared with 9% in developed countries [5].

Among them iron deficiency is the cause of 75% of anaemia cases globally [10]. Poverty is one of the risk factors for iron deficiency in pregnant women. Insufficient intake and poor bioavailability of iron - rich foods also have significant contributions to the onset of anaemia during pregnancy [10]. Poor income leads to limited access to nutritious diets and is associated with poor eating habits that might lead to anaemia. About 1000 mg of iron is required during per - pregnancy [11]. Anaemia in pregnancy is considered a risk factor for poor pregnancy outcomes such as preterm birth,

low birth weight, foetal impairment and maternal and foetal deaths.

Aim: To find out the prevalence and associated some risk factors of anaemia and its outcome among antenatal mothers in urban field practice area of a medical college.

Objectives:
1) To study prevalence of anaemia
2) To study some associated risks factors of Anaemia.
3) To study the maternal and perinatal outcomes of antenatal mothers with Anaemia.
4) To study the socio demographic profile among antenatal mothers in urban field practice area of a medical college

2. Material and Methods

The present cross - sectional study was carried out in the department of community medicine of a medical college to study prevalence and some associated risk factors of anaemia and its outcome of among antenatal mother's residing in urban field practice area of a Medical College.
Type of Study: Cross Sectional observational study.
Study Design: Community based cross - sectional study
Place of Study: The present study was conducted in urban field practice area of a medical college.
Study Duration: February 2021 - January 2023.
Study Population: Antenatal mothers fulfilling inclusion criteria in urban field practice area of a medical college.
Sampling: Simple random sampling method

Inclusion criteria:
- All antenatal mothers of all ages in urban field practice area of a medical
- Those who are willing to participate in study
- Those antenatal mothers who are already diagnosed and taking some medicines for anaemia.

Exclusion criteria:
- All antenatal mothers who are admitted in hospital
- Those who are not willing to participate in this study
- The pregnant women who will not respond even after three consecutive home visits.

Sample Size: A total sample size of 869 participants was included in the present study.

Ethical Approval and Data Collection: All ethical considerations and necessary approvals were taken. The synopsis of the study was presented before Institutional Ethical Committee. After the approval, the entire antenatal mother was interviewed and tested for HB at urban health centre was done. These findings were recorded in the case record form and the same were entered in the Microsoft excel 2019

Methods

It was community based cross sectional study was used for enrolment of antenatal mothers. The city of Maharashtra having total population 5, 50, 439 according to Census 2011. The municipal corporation area of the city has 79 zones. The

study area of the present study is zone 8 with a population of 54, 000 and 10, 000 houses. After obtaining ethical committee approval, we used simple random sampling of antenatal mother residing in urban field practice area of a medical college. Zone - 8 is study area, there were total 20 areas. We randomly selected one ward (ward - 1) out of 20 wards by lottery methods, which consisted of 6834 population and 1366 houses, for our study.

Using a detailed area map we identified all houses to select 869 antenatal mothers for our study. After random selection of ward, we visited house to house from each house we included the entire antenatal mothers of the inclusion criteria. In the house, when there were multiple eligible participants, we selected all participants which were available in that house. If there were no eligible participants in the selected house or selected participants denied to participate, we selected another house or moved to the next house and so on, interviewing from one ward to another, all the areas were covered until we got the desired number of 869 eligible antenatal mothers were reached. During study period, we could not follow 19 antenatal mothers in our study area, out of which 11 women had gone to their in - laws place.5 antenatal mothers had migrated and the rest were not ready to give interview. Hence 850 were included in the final analysis after explaining the purpose of the study. Written informed consent was obtained from these pregnant mothers. Pilot study was carried out among 50 pregnant women to assess the feasibility in terms of collecting the baseline information of antenatal mothers, time taken per participant, appropriateness of questionnaire and subject cooperation. Required modifications were incorporated in the proforma. Information on these modifications was again collected from the subjects included in the pilot study. After explaining the purpose of study, written informed consent was obtained from antenatal mothers. These mothers were interviewed face to face in local language (Marathi/Hindi) using predesigned and pretested semi - structured proforma the data was collected. The questionnaire includes details about socio demographic characteristics like age, sex, religion, education, occupation type of family, and total income of family etc.

Anthropometric measurements, medical history, family and obstetric history, maternal perinatal outcomes, brief dietary details, regular physical exercise, habits etc The clinical examination includes general examination, systemic examinations. Information about the presenting complaints was also recorded if any, at the time of examination. The laboratory investigation such as HB, VDRL, HIV, HBS Ag and Urine routine was done.

Vancouver style was used for reference

Data analysis: Data will be recorded in Excel sheet and descriptive analysis will be performed and results will be expressed in numbers and percentages.

3. Results and Observations

Out of 850 study participants 428 (50.35%) were between 21 to 25 yrs. followed by 209 (24.58%) between 26 to 30yrs, 145 (17.05%) between 16 to 20yrs. The study includes 18

yrs. as minimum and 38 yrs. as maximum age. Mean age of the study was 24.61yrs with standard deviation of 4.05 yrs. Majority of participants 548 (64.5%) were Hindu, 300 (35.3%) Muslim, Christian 02 (0.2%). Maximum participants 842 (99.1%) were housewife and 8 (0.9%) were in service.

Majority of participants 506 (59.50%) were having secondary education followed by144 (16.90%) were higher secondary, 108 (12.70%) were primary education, 54 (6.40%) graduate, 27 (3.20%) post graduate, 11 (1.94%) were illiterate.603 (70.9%) were from joint family followed by 241 (28.4%) from nuclear family and 06 (0.7%) from extended joint. Maximum participants 692 (81.4%) were from upper class and 158 (18.6%) were from upper middle class according to modified B. G. Prasad classification 2021.

Out of 850 study participants 567 (66.70%) having normal BMI followed by 232 (27.29%) were in pre - obesity class,

27 (3.17%) were under weight, 20 (2.35%) were in obesity class I and 04 (0.47%) were in obesity class II according to WHOBMI classification.

Table 1: Prevalence of Anemia in antenatal mothers

		Frequency (N=850)	Percentage (%)
Prevalence of Anemia	Anemic	672	79.0
	Non - Anemic	178	21.0
Classification of Anemia [n=672]	Mild	348	51.79
	Moderate	324	48.21
	Severe	00	00

In present study the prevalence of anaemia in antenatal mothers was reported to be 79.0%and 21.0% non - anaemic. Out of 672, 51.79% antenatal mothers were having mild anaemia and 48.21% of moderate anaemia, cases of severe anaemia not found in this study.

Table 2: Association between Demographic profile of antenatal mothers and Anaemia

		Anemia		Total	p - value
		Anemic [n=672]	Non – Anemic [n=178]	(N=850)	
Age - Group [In years]	16to20	97 (14.4%)	48 (26.9%)	145	P<0.00001 S
	21to25	366 (54.5%)	62 (34.8%)	428	
	26to30	178 (26.5%)	31 (17.4%)	209	
	31to35	28 (4.2%)	30 (16.8%)	58	
	36to40	03 (0.5%)	07 (3.9%)	10	
	Mean±SD	24.61±4.05yrs			
Religion	Hindu	439 (65.3%)	109 (61.2%)	548	P=0.453 NS
	Muslim	231 (34.4%)	69 (38.8%)	300	
	Christian	02 (0.3%)	00	002	
	Sikh	00	00	000	
Occupation	Skilled	00	00	00	P=0.841 NS
	Unskilled	00	00	00	
	Semiskilled	00	00	00	
	Unemployed	00	00	00	
	Housewife	669 (99.5%)	173 (97.2%)	842	
	Professional	03 (0.5%)	05 (2.8%)	008	
Education	Illiterate	08 (1.2%)	03 (1.7%)	11	P<0.0001 S
	Primary	82 (12.2%)	26 (14.6%)	108	
	Secondary	433 (64.4%)	73 (41.0%)	506	
	Higher secondary	113 (16.8%)	31 (17.4%)	144	
	Graduate	30 (4.5%)	24 (13.5%)	54	
	Postgraduate	07 (1.0%)	21 (11.8%)	27	
Type of family	Nuclear	169 (25.1%)	72 (40.4%)	241	P<0.0001 S
	Joint	559 (83.2%)	44 (24.7%)	603	
	Extended joint	04 (0.6%)	02 (1.1%)	06	
Socioeconomic status	Upper class	540 (80.3%)	152 (85.4%)	692	P=0.124 NS
	Upper Middle	132 (19.6%)	26 (14.6%)	158	
	Middle	00	00	00	
	Lower middle	00	00	00	
	Lower	00	00	00	
BMI	<18.5 (Underweight)	21 (3.1%)	06	27	P<0.0001 S
	18.5 to 24.9 (Normal)	490 (72.9%)	77 (43.2%)	567	
	25.0to29.9 (Preobesity)	152 (22.6%)	80 (44.9%)	232	
	30.0 to 34.9 (Obesity I)	07 (1.0%)	13 (7.3%)	20	
	35to39.9 (Obesity II)	02 (0.3%)	02 (1.1%)	04	
	≥40 (Obesity III)	00	00	00	
Gravida	Primigravida	250 (37.2%)	123 (69.1%)	373	P<0.0001 S
	Multigravida	422 (62.8%)	55 (30.9%)	477	

It was observed that anaemia was common in the age group of 21–30 years (54.6%), Hindu (65.3%), and housewife (99.5%). There was a significant association of anaemia status with Age - group (p<0.0001) educational status (p<0.0001), Type of family (p<0.0001) and BMI (p<0.0001). But there was not significant association of

anaemia status with Religion, Occupation and Socio-economic status.

The above table shows the association between gravid status of study participants and anaemia status in pregnancy.

Majority 62.8% of multigravida antenatal mothers were having anaemia and maximum 69.1% of primigravida were not having anaemia.

Table 3: Association between Present maternal outcome and anaemia status

Present maternal outcome	Anaemia		Total	P value
	Anaemic [n=672]	Non - Anaemic [n=178]		
Preterm labour	77 (90.5%)	08 (9.5%)	85 (10.0%)	P=0.005 S
hypertensive disorder of pregnancy	80 (76.9%)	24 (23.1%)	104 (12.2%)	P=0.805 NS
Post partum haemorrhage	27 (93.1%)	02 (6.9%)	29 (3.4%)	P=0.043 S
LSCS	173 (84.8%)	31 (15.2%)	204 (24.0%)	P=0.024 S
Maternal mortality	00	00	00	

Statistically highly significant (P≤0.001)

There was statistical significant association between Pretermlabour, hypertensive disorder of pregnancy, post partum haemorrhage & LSCS and anaemia status.

Table 4: Association between Present foetal outcome and anaemia status

Present fetal outcome	Anaemia		Total	P value
	Anaemic [n=672]	Non – Anaemic [n=178]		
Low birth weight	40 (81.6%)	9 (28.4%)	49	P=0.024 S
ARDS	08 (72.7%)	03 (27.3%)	11	P=0.604 NS
IUD	02 (66.7%)	01 (33.3%)	03	P=0.582 NS
IUGR	04 (100%)	00	04	P=0.304 NS
Stillbirth	01 (100%)	00 (00.00)	01	P=0.608 NS

There was significant statistical association between present fetal outcome i. e low birth weight and Anemia status in antenatal mothers and no significant association was found between present fetal outcome i. e. ARDS, IUD, IUGR and anemia status.

4. Discussion

In present study the prevalence of anaemia in antenatal mothers was reported to be 79.0%. Whereas Indian Council of Medical Research surveys showed that over 70% of pregnant women in India were anaemic [12]. Similarly very high prevalence was observed by Viveki et al [13]., (82.9%) Totega [14] (84.9%,), Agarwal et al. [15] (84%), and Gautam et al [16] (96.5%). However, lower prevalence was reported from Haryana (51%) and NFHS - 2 and 3 (49.7%) [12, 13]. The possible reason for the difference in prevalence may be resulted from geographical variation of factors across different areas.

In present study, Out of 672, 51.79%antenatalmotherswere reported mildanaemiaand48.21%ofmoderateanaemia and severe anaemia was noted in present study women's. Whereas contrast findings were reported (2.3%) of severe anaemia was reported by Suryanarayana R et al [17]. Also NHFS - 2 (2.5%) [13]. Whereas other studies reported higher prevalence; Totega [14] (13.1%), Agarwal et al [15] (9.2%), Vivek et al. [13] (7%), and Gautam et al. [16] (22.8%). In a study by BhargaviVemulapalli et Al., 40.97% had a moderate degree of anaemia and 6.28% of the population had a severe degree of anaemia [18]. The high

prevalence of anaemia can be attributed to low dietary intake of iron and folic acid, deprived bioavailability of iron or chronic blood loss due to infections.

Maternal anaemia is considered as risk factor for poor pregnancy outcomes, and it threatens the life of foetus. Available data from India indicate that maternal morbidity rates are higher in anaemic women [19]. Present study also reported there was statistical significant association between Pretermlabour, hypertensive disorder of pregnancy, postpartum haemorrhage & LSCS with anaemia status of mothers. Also there was significant statistical association found between present foetal outcome i. e low birth weight and Anaemia status in antenatal mothers.

There is a substantial amount of evidence showing that maternal iron deficiency anaemia early in pregnancy can result in LBW subsequent to preterm delivery [10] In the present study, 49 of women delivered low birth babies, majority 81.6% were women's were having anaemia.

In present study, there were no maternal deaths whereas IyengarK [20] in India demonstrated that the high proportion of maternal deaths are due to anaemia in pregnant women, whereas Marahatta in Nepal reported 3% preterm deliveries in anaemic women [21].

It was observed that anaemia was common in the age group of 21–30 years (54.6%), Hindu (65.3%), and housewife (99.5%). There was a significant association of anaemia status with Age - group (p<0.0001) educational status (p<0.0001), Type of family (p<0.0001), BMI (p<0.0001) & gravid status (p<0.0001). But there was not significant association of anaemia status with Religion, Occupation and Socioeconomic status.

Also similar association were reported by Suryanarayana R et al [17] that gravida, education of pregnant women, and bad obstetric history were significantly associated with anaemia. Also a study by Chowdhury et al. in Bangladesh also found that education of women was significantly associated with anaemia in pregnancy, [22] whereas in a study by Singh et al. observed an insignificant association between anaemia and gravida [23].

5. Conclusions

In present study, the prevalence of anaemia in antenatal mothers was (79%) indicates that anaemia continues to be a major public health problem in India. Mild type of anaemia was the commonest one. Anaemia in pregnancy increases the maternal and foetal risks. There was statistical significant association were found between Pretermlabour, hypertensive disorder of pregnancy, Postpartum haemorrhage & LSCS with anaemia status of women. Age - group, Education, Type of family, Gravida status, and bad obstetric history were important risk factors contributing for anaemia in pregnant women. Maternal anaemia is considered as risk factor for poor pregnancy outcomes, and it threatens the life of foetus.

To reduce the prevalence of anaemia health education on reproductive health, monitoring the consumption of iron folic acid tablets, early diagnosis of high - risk pregnancy, and appropriate management and strengthening of their healthcare - seeking behaviour are important health - care measures to be undertaken at the community level. There is also a need to encourage family planning, and design policies and strategies pertinent to reduction of anaemia in low income groups.

A large community based study needs to be done to determine the prevalence and predictors of anaemia in the general population of pregnant women.

References

[1] WHO, Worldwide Prevalence of Anaemia 1993–2005: WHO Global Database on Anaemia, WHO, Geneva, Switzerland, 2008

[2] E. McLean, M. Cogswell, I. Egli, D. Wojdyla, and B. De Benoist. Worldwide prevalence of anaemia, WHO Vitamin and Mineral Nutrition Information System, 1993–2005. Public Health Nutrition.2009; 12 (4): 444–454.

[3] Lin L, Wei Y, Zhu W, Wang C, Su R, Feng H and Yang H. Prevalence, risk factors and associated adverse pregnancy outcomes of Anaemia in Chinese pregnant women: a multicentre retrospective study. BMC Pregnancy and Childbirth.2018; 18, 111.

[4] Sharma JB and Shankar M. Anemia in pregnancy. JIMSA.2010; 23, 4.

[5] Balarajan Y, Ramakrishnan U, Ozaltin E, Shankar AH and Subramanian SV. Anaemia in low - income and middle - income countries. Lancet.2011; 378,: 2123–2135.

[6] World Health Organization. The prevalence of anaemia in women. WHO/MCH/MSM/92.2. Geneva: WHO, 1992.

[7] Seshadri S, Sharma K, Raj AE, Thekore B, Saiyed F. Iron supplementation to control pregnancy anaemia. ProcNutrSoc India.1994; 41: 131–40.

[8] Stevens GA, Finucane MM, De - Regil LM, Paciorek CJ, Flaxman SR, Branca F, Pena Rosas JP, Bhutta ZA and Ezzati M. Global, regional, and national trends in haemoglobin concentration and prevalence of total and severe Anaemia in children and pregnant and non - pregnant women for 1995–2011: a systematic analysis of population representative data. Lancet Glob Health.2011; 1: e16–e25.

[9] Leenstra T, Kariuki SK, Kurtis JD, Oloo AJ, Kager PA and TerKuile FO. Prevalence and severity of anemia and iron deficiency: cross - sectional studies in adolescent schoolgirls in western Kenya. European Journal of Clinical Nutrition.2004; 58: 681–91.

[10] Shams S, Ahmad Z and Wadood A. Prevalence of iron deficiency anemia in pregnant women of district Mardan, Pakistan. Journal of Pregnancy and Child Health.2017: 4: 356.

[11] Milman N, Bergholt T, Byg KE, Erikson L and Gradual N. Iron status and balance during pregnancy. A critical reappraisal of iron supplementation. ActaObstetriciaGynaecologicaScandinavica.1999; 78: 749–75.

[12] Kalaivani K. Prevalence and consequences of anaemia in pregnancy. Indian J Med Res 2009; 130: 627 - 33.

[13] Viveki RG, Halappanavar AB, Viveki PR, Halki SB, Maled VS. Prevalence of anaemia and its epidemiological determinants in pregnant women. Al Ameen J Med Sci 2012; 5: 216 - 23.

[14] Totega GS. Prevalence of anaemia among pregnant women and adolescent girls in 16 districts of India. Food Nut Bull 2006; 27: 311 - 5.

[15] Agarwal KN, Agarwal DK, Sharma A, Sharma K, Prasad K, Kalita MC, et al. Prevalence of anaemia in pregnant &lactating women in India. Indian J Med Res 2006; 124: 173 - 84.

[16] Gautam VP, Bansal Y, Taneja DK, Saha R, Shah B, Marg Z, et al. Prevalence of anaemia amongst pregnant women and its socio - demographic associates in a rural area of Delhi. IJCM 2002; 27: 157 - 60.

[17] Suryanarayana R, Chandrappa M, Santhuram AN, Prathima S, Sheela SR. Prospective study on prevalence of anemia of pregnant women and its outcome: A community based study. J Family Med Prim Care 2017; 6: 739 - 43.

[18] Vemulapalli B, Rao KK. Prevalence of anaemia among pregnant women of rural community in Vizianagaram, North Coastal Andhra Pradesh, India. Asian J Med Sci 2013; 5: 21 - 5.

[19] SinghR, ChauhanR, NandanD, SinghH, GupataSC, BhatnagarM. Morbidity profile of women during pregnancy: A hospital record based study in Western UP. IJCH 2012; 24: 342 - 6.

[20] Iyengar K. Early postpartum maternal morbidity among rural women of Rajasthan, India: A community - based study. J Health PopulNutr 2012; 30: 213 - 25.

[21] Marahatta R. Study of anaemia in pregnancy and its outcome in Nepal medical college teaching hospital, Kathmandu, Nepal. Nepal Med Coll J 2007; 9: 270 - 4.

[22] Chowdhury HA, Ahmed KR, Jebunessa F, Akter J, Hossain S, Shahjahan M. Factors associated with maternal anaemia among pregnant women in Dhaka city. BMC Women Health 2015; 15: 77.

[23] Singh R, Singh AK, Gupta SC, Singh HK. Correlates of anemia in pregnant women. Indian J Community Health 2015; 27: 351 - 5.

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