WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 6.805
Volume 5, Issue 2, 1690-1703. Research Article ISSN 2277– 7105

ANAEMIA AMONG PREGNANCY WOMEN IN SEBHA, LIBYA

Darling B. Jiji*

Lecturer in College of Nursing, Sebha University, Sebha.

Article Received on
21 Dec 2015,

Revised on 10 Jan 2016,
Accepted on 31 Jan 2016

***Correspondence for Author**
Darling B. Jiji
Lecturer in College of Nursing, Sebha University, Sebha.

ABSTRACT

Aim of the Study: Anaemia is the most common disorder of blood in the world. About 20% of maternal deaths occur due to anaemia. Anaemia in pregnancy is associated with adverse consequences both for the mother and the foetus. The WHO report in 2006, the prevalence of anaemia is highest in Africa. The aim of the study were to determine the prevalence of anaemia, to determine the degree of anaemia and find out the association between anaemia and selected demographic variables among pregnant women. **Materials and Methods:** A descriptive study was conducted to assess the prevalence of anaemia, to determine the degree of anaemia among pregnant woman attending selected health care facilities in Sebha - Libya. Purposive sampling technique was employed to select sample and it consisted of 700 pregnant women. Data was collected using structured interview schedule. **Results:** Findings of the study showed that out of 700 pregnant women only 442(63.14%) were non-anaemic pregnant women; and other 258 pregnant women anaemic. Out of 258 anaemic pregnant women, majority 118 had mild anaemia; 122 had moderate anaemia and only 18 severe anaemia. The prevalence anaemia among pregnant women were 36.86%. There was significant association between anaemia and selected variables like age, literacy, occupation, income, type of family, diet habits, residence, parity, gestational age, age at menarche, interval between labour, age at marriage (at $p<0.05$). **Conclusion:** Findings of the study indicated the need to conduct frequent assessment of knowledge and risk factors of anaemia among the pregnant women. Awareness programmes should be conducted among the pregnant women for their promotion of health. It is recommended that the socio-economic status of women should be enhanced in line with the Millennium Development Goals to prevent anaemia and to enhance pregnancy outcomes.

KEYWORDS: Pregnant women, Anaemia, Prevalence, Haemoglobin.

INTRODUCTION

Maternal anaemia results in morbidity and mortality in both the mother and the unborn child.[1] According to the World Health Organization the estimates of the global burden of deaths that is attributable to anaemia in women of reproductive age ranges from 16800 to 28000 annually with a greater risk of anaemia-related death in younger women.[2] Anaemia in pregnancy remains one of the most intractable public health problem in developing countries. Worldwide it is estimated that 58.27 million women are anaemic during pregnancy, of whom 55.75 million (95.7%) live in developing countries.[3] Recent estimates suggest that up to 60% pregnant women in developing countries including Nigeria may be anaemic and nearly 7% of pregnant women are severely anaemic. The deleterious effects of anaemia in pregnancy include increased risk of maternal and foetal morbidity and mortality.[4]

The reported principal causes of anaemia in Sub-Saharan Africa include nutritional deficiencies, malaria, other parasitic infestation and recently infection with human immunodeficiency virus. Knowledge of the different causes of anaemia is essential for effective control of anaemia.[5] Studies estimated that anaemia may be responsible for as much as 20% of all maternal deaths in Sub –Saharan Africa through three main mechanisms. Firstly anaemia makes women more susceptible to deaths from haemorrhage by lowering their haematological reserves for blood loss especially at birth. Severe anaemia is associated with increased susceptibility to infection due to lowered resistance to disease and Hb<4g/dl is also associated high risk of cardiac failure, particularly during delivery or soon after, making the women likely to die if unable to reach good health facilities immediately.[6,7,8,9]

National institute of informatics report, specify that Africa and South Asia have the highest overall incidence of anaemia followed by Latin America and East Asia. The global burden of maternal deaths due to anaemia is over five lakh every year.[10]

The impact of anaemia among pregnant women can be drastically reduced through simple interventions, including iron supplementation for pregnant women, malaria and hookworm control and efforts to ensure optimal birth spacing. It is hoped that the outcome of this study will help to improve the quality of antenatal care in developing countries.[11,12,13]

Anaemia is the most common nutritional deficiency disorder in the world. WHO has estimated that prevalence of anaemia in developed and developing countries in pregnant women is 14 per cent in developed and 51 per cent in developing countries. About one third

of the global population (over 2 billion) are anaemic.[8,14,15] Thus maternal anaemia contributes to intergenerational cycle of poor growth in the offspring. Early detection and effective management of anaemia in pregnancy can lead to substantial reduction in undernutrition in childhood, adolescence and improvement in adult height. Worldwide 41.8% of pregnant women are anaemic as compared with 30.2% non-pregnant women; the most severely affected areas are South-East Asia (48.2%) and Africa (57.1%). A large proportion of the 17.2 million anaemic pregnant women in Africa live in the west African sub-region.[16,17]

In developing countries, the cause of anaemia is multi-factorial and varies greatly by geographical location, season and dietary intake.[18,19] The most common causes of anaemia include nutritional deficiencies of iron and folate, parasitic diseases such as malaria and hookworm, haemoglobinopathies such as sickle cell disease and recently human immunodeficiency virus infection.[20]

Hookworm infection is among the major causes of anaemia in poor communities, but its importance in causing maternal anaemia is poorly understood and this has hampered effective lobbying for the inclusion of anthelmintic treatment in maternal health packages. The impact of anaemia in pregnancy affects both mother and foetus.[4–13] Anaemia in pregnancy is one of the predisposing factors for preterm delivery[5,12–15], low birth weight[6–16], stillbirth and neonatal death.[7,8] and maternal deaths.[17,18] Anaemia is one of the most prevalent nutritional deficiency problems affecting pregnant women.[19] The prevalence of anaemia in pregnancy varies considerably because of differences in socioeconomic conditions, lifestyles, and health-seeking behaviours across different cultures.[20–32] The World Health Organization estimates that 52% of pregnant women in developing countries are anaemic compared with 23% in the developed world.[3]

Factors associated with anaemia among pregnant women identified in past studies included parasite infestation[13–1], season[18], dietary habits[10–13], gestational age[13–1], parity[15, 17, 19], gravidity[22], age at the time of marriage, geographic location[16,18], interval between pregnancies[15,17], educational level[1,10] and smoking.[19] Because anaemia is the most frequent maternal complication of pregnancy, antenatal care should be concerned with its early detection and management.[15]

Objectives of this study were to

1. Determine the haemoglobin level in pregnant women in terms of calorimetric method.
2. To determine the prevalence of anaemia among pregnant women.
3. To determine the degree of anaemia among pregnant women.
4. To determine the association between the haemoglobin and selected variables of pregnant mothers such a age, religion, marital status, education, occupation, family monthly income, residential area, dietary habit, type of family, sources of health information, BMI, parity, gestational age and inter pregnancy interval .

MATERIALS AND METHODS

To achieve the objectives a descriptive research design was adopted. Thus 700 pregnant women were selected using purposive sampling technique. The study was conducted at selected health care facilities in Sebha, Libya. A structured interview schedule was used to collect the data. It consisted of two parts, viz. Part –I that helped to collect the demographic data of pregnant women; it was not scored, but used for descriptive analysis. Part – II that was aimed for haemoglobin estimation record to determine the pregnant women's anaemic state. The scoring key was as follows:- Hb above11g% non- anaemic, Hb 9-11 g% mild anaemia, Hb7-9 g% moderate anaemia and Hb below 7 g% severe anaemia.

The prepared tool was validated by experts. The reliability of the tool was found to be r=0.98. Interview schedule was used to collect the data.

RESULTS

The study sample consisted of 700 pregnant women. Table 1 shows that majority of the pregnant women under 20 years of age are anaemic (65%) and only 25% anaemic prevalent in the age group of41 and above. Recording marital status divorced women are more anaemic (65.6) comparing married women (35.9). In educational status higher the education the anaemic rate is reducing. Anaemic is less women with graduate (15.5) and more in women having primary education only (61.6). Unemployed pregnant women are more anaemic (45%) than that of employed (34.4%). Anaemia is much prevalent among poor people (91.1%). Anaemic is prevalent 39.3% living in joined family on bar with 36% in nuclear family. 50% of Antennal mothers with the habit of vegetarian diet is anaemic where as in mixed group only 36.7% have anaemia. Anaemia is much prevalent among residence of rural area (53.3) than that of resident of urban area (22.2%). In BMI categories under -weight covers 50.4% of anaemic. It is wonder to note 50.4% anaemia present in primi. In gestational

age first trimester have 62.77 anaemic rate. 57.5% of anaemic pregnant women had interval between previous pregnancy was less than one year. Regarding age at menarche all below the age of 10 are anaemic and 65% in the age 10-12 are anaemic. 75% Late married women were anaemic. Table 3 shows that out of 700 pregnant women only 442(63.14%) were non-anaemic pregnant women; and other 258 pregnant women anaemic. Out of 258 anaemic pregnant women, majority 118 had mild anaemia; 122 had moderate anaemia and only 18 severe anaemia. Table - 4 shows that there is significant association between anaemia and selected variables like age, literacy, occupation, income, type of family, diet habits, residence, gestational age, age at menarche, interval between labour, age at marriage at $p<0.05$.

Table 1: Distribution of pregnant women according to their socio demographic variables. N = 700.

S.No	Variables	Frequency	Percentage
1.	Age (in years) 20 and Below 21 - 30 31 - 40 41 and above	 119 269 232 80	 17.00 38.43 33.14 11.43
2.	Marital status Married Divorced	 677 23	 96.71 3.29
3.	Educational status Illiterates Primary Secondary Higher secondary Degree	 23 112 232 230 103	 3.29 16.00 33.14 32.86 14.71
4.	Occupation Employed Unemployed	 507 193	 72.43 27.57
5.	Monthly family income (in dinar) 200 and below 201 – 400 401 – 600 601 and above	 124 230 237 109	 17.71 32.86 33.86 15.57
6.	Type of family Joint family Nuclear family Extended family	 305 344 51	 43.57 49.14 7.29
7.	Dietary habits Vegetarian Mixed	 10 690	 1.43 98.57
8.	Residential area		

	Urban Rural	391 309	55.86 44.14
9.	BMI categories Under weight Normal weight Over weight Obesity	 113 322 145 120	 16.15 46.00 20.71 17.14
10.	Parity (Order of birth) 0 (Primi) 1 – 2 3 – 4 5 and above	 144 141 198 217	 20.57 20.14 28.29 31.00
11.	Gestational age First trimester Second trimester Third trimester	 126 331 243	 18.00 47.29 34.71
12.	Interval between pregnancies First pregnancy Below 1 year Between 1 – 2 years Between 2 – 4 years 4 and above	 144 226 257 60 13	 20.57 32.29 36.71 8.57 1.86
13.	Age at menarche (in years) 10 and Below Between 10 – 12 Between 13-15 16 and above	 37 208 455 -	 5.29 29.71 65.00 -
14.	Age at marriage (in years) 20 and Below 21 – 24 25 – 28 29 – 32 33 and above	 131 419 146 4 -	 18.71 59.86 20.86 0.57 -

Table 1 shows that most of the 269(38.43%) pregnant women were between the age group of 21 to 30 years; maximum 677(96.71%) were married; majority of the 232(33.14%) pregnant women had secondary education; more than half 507(72.43%) of the pregnant women were employed; 237(33.86%) pregnant women were had monthly family income between 401 to 600 dinars; most of the 344(49.14%) pregnant women were belongs to nuclear family; about their dietary habits majority 690(98.57%) pregnant women were taking mixed diet; near about 391(55.86%) pregnant women were from urban residential area. Out of 700 pregnant women, only 322(46%) pregnant women had normal body weight; about their parity 217(31%) pregnant women had 5 and above time of pregnancy; majority of 331(47.29%) pregnant women were belongs to second trimester; about 257(36.71%) pregnant women had pregnancies interval between 1 to 2 years; more than half 455(65%) pregnant women had

menarche between the age group of 13 to 15 years and majority 419(59.86%) pregnant women got marriage at the age group between 21 to 24 years.

Table 2: Distribution of socio demographic variables of pregnant women according to their haemoglobin level. N = 700.

S.No	Variables	Anaemic 258		Non –anaemic 442	
		F	%	F	%
1.	Age (in years)				
	20 and Below	78	65.55	41	34.45
	21 - 30	84	31	185	69
	31- 40	79	34.06	153	65.94
	41 and above	17	21.25	63	78.75
2.	Marital status				
	Married	243	36	434	64
	Divorced	15	65	8	35
3.	Educational status				
	Illiterates	12	4.65	11	2.49
	Primary	69	26.74	43	9.73
	Secondary	110	42.64	122	27.60
	Higher secondary	51	19.77	179	40.50
	Degree	16	6.20	87	19.68
4.	Occupation				
	Employed	173	67.05	334	75.57
	Unemployed	85	32.95	108	24.43
5.	Monthly family income (in dinar)				
	200 and below	113	43.80	11	2.49
	201 – 400	91	35.27	139	31.45
	401 – 600	42	16.28	195	44.12
	601 and above	12	4.65	97	21.95
6.	Type of family				
	Joint family	120	46.51	185	41.86
	Nuclear family	125	48.45	219	49.54
	Extended family	13	5.04	38	8.60

7.	Dietary habits Vegetarian Mixed	 5 253	 1.94 98.06	 5 437	 1.13 98.87
8.	Residential area Urban Rural	 87 171	 33.72 66.28	 304 138	 68.78 31.22
9.	BMI categories Under weight Normal weight Over weight Obesity	 57 107 52 42	 22.09 41.47 20.16 16.28	 56 215 93 78	 12.67 48.64 21.04 17.65
10.	Parity (Order of birth) 0 (Primi) 1 – 2 3 – 4 5 and above	 95 69 55 39	 36.82 26.74 21.32 15.12	 49 72 143 178	 11.09 16.29 32.35 40.27
11.	Gestational age First trimester Second trimester Third trimester	 79 100 79	 30.62 38.76 30.62	 47 231 164	 10.63 52.26 37.11
12.	Interval between pregnancies First pregnancy Below 1 year Between 1 – 2 years Between 2 – 4 years 4 and above	 95 130 29 2 2	 36.82 50.38 11.24 0.78 0.78	 49 96 228 58 11	 11.09 21.72 51.58 13.12 2.49
13.	Age at menarche (in years) 10 and Below Between 10 – 12 Between 13-15 16 and above	 37 137 84 -	 14.34 53.10 32.56 -	 - 71 371 -	 - 16.06 83.94 -
14.	Age at marriage (in years) 20 and Below	 51	 19.77	 80	 18.10

	21 – 24	136	52.71	283	64.03
	25 – 28	68	26.36	78	17.65
	29 – 32	3	1.16	1	0.22
	33 and above	-	-	-	-

Data depicted in Table 2 indicates that majority of the pregnant women under 20 years of age are anaemic (65%) and only 25% anaemic prevalent in the age group of41 and above. Recording marital status divorced women are more anaemic (65.6%) comparing married women (35.9%). In educational status higher the education the anaemic rate is reducing. Anaemic is less women with graduate (15.5) and more in women having primary education only (61.6). Unemployed pregnant women are more anaemic (45%) than that of employed (34.4%). Anaemia is much prevalent among poor people (91.1%). Anaemic is prevalent 39.3% living in joined family on bar with 36% in nuclear family. 50% of Antennal mothers with the habit of vegetarian diet is anaemic where as in mixed group only 36.7% have anaemia. Anaemia is much prevalent among residence of rural area (53.3) than that of resident of urban area (22.2%). In BMI categories under- weight covers 50.4% of anaemic. It is wonder to note 50.4% anaemia present in primi. In gestational age first trimester have 62.77 anaemic rate. Majority 130(50.38%) anaemic pregnant women had below one year interval between each pregnancies. Regarding age at menarche all below the age of 10 are anaemic and 65% in the age 10-12 are anaemic and 75% late married women were anaemic.

Table 3: Distribution of subjects according to the degrees of anaemia N=700.

Degrees of anaemia	Frequency	Percentage
Non - anaemic (above 11gm/dl)	442	63.14
Mild anaemia (10 -11gm/dl)	118	16.86
Moderate anaemia (8 -9 gm/dl)	122	17.43
Severe anaemia (below 7 gm/dl)	18	2.57

As shown in Table 3, out of 700 pregnant women only 442(63.14%) were non-anaemic pregnant women; and other 258 pregnant women anaemic. Out of 258 anaemic pregnant women, majority 118 had mild anaemia; 122 had moderate anaemia and only 18 severe anaemia.

Table 4. Association between degrees of anaemia and selected Variables N=258.

S.no	Variables	Grade of anaemia Mild 118	Moderate 122	Severe 18	Total	χ^2	Df	P-value
1.	Age in years							
	20 and below	3	65	10	78			
	21 - 30	83	1	-	84	159.48	3	2.37309E-34 ***
	31 - 40	28	46	5	79			
	41 and above	4	10	3	17			
2.	Marital status							
	Married	110	16	17	243	0.3820	1	0.54
	Divorced	8	6	1	15			
3.	Educational status							
	Non – formal							
	primary	4	5	3	12			
	Secondary	14	43	12	69	45.05	4	3.88117E-09 ***
	Higher -	65	44	1	110			
	secondary	25	25	1	51			
	Degree	10	5	1	16			
4.	Occupation							
	Employed	108	61	4	173	64.43	1	1.00276E-15 **
	Un employed	10	61	14	85			
5.	Family monthly income							
	200 and below	24	74	15	113	77.11	3	1.27726E-16 ***
	201 – 400	73	16	2	91			
	401 – 600	16	25	1	42			
	601 and above	5	7	-	12			
6.	Type of family							
	Joint family	19	88	13	120	99.44	2	2.55754E-22 ***
	Nuclear family	97	24	4	125			
	Extended family	2	10	1	13			
7.	Dietary habits							
	Vegetarian diet	3	2	-	5	0.6398	1	0.423784809 **
	Mixed diet	115	120	18	253			
8.	Residential area							
	Urban	41	33	13	87	14.42	1	0.0001459 **
	Rural	77	89	5	171			
9.	BMI categories							
	Underweight	18	27	12	57			
	Normal weight	57	48	2	107	36.72	3	5.27388E-08 ***
	Over weight	30	18	4	52			
	Obesity	13	29	-	42			
10.	Parity (Order of birth)							
	0 (Primi)	29	57	9	95	44.32	3	1.28958E-08 **
	1 – 2	50	17	2	69			
	3 – 4	31	23	1	55			
	5 and above	8	25	6	39			

11.	Gestational age First trimester Second trimester Third trimester	 21 66 31	 46 31 45	 12 3 3	 79 100 79	36.27	2	1.33291E-08 **
12.	Interval between pregnancies First pregnancy Below 1 yr Between 1–2yrs Between 2–4yrs 4 and above	 29 62 23 2 2	 57 59 6 - -	 9 9 - - -	 95 130 29 2 2	27.36	4	1.67727E-05 ***
13.	Age at menarche (in years) 10 and Below Between 10–12 Between 13-15 16 and above	 10 44 64 -	 14 90 18 -	 13 3 2 -	 37 37 84 -	96.91	3	7.18649E-21 ***
14.	Age at marriage (in years) 20 and Below 21–24 25–28 29–32 33 and above	 33 61 24 - -	 10 72 39 1 -	 8 3 5 2 -	 51 136 68 3 0	43.17	4	9.82635E-09 ***

(* - significant at $p<0.05$.).

Table 4 shows that there is significant association between anaemia and selected variables like age, literacy, occupation, income, type of family, diet habits, residence, parity, gestational age, age at menarche, interval between labour, age at marriage at $p<0.05$.

DISCUSSION

Anaemia is one of the world's leading causes of haemorrhage and disability and thus is one of the most serious global public health problems. Anaemia is one of the most prevalent nutritional deficiency problems affecting pregnant women. This study shows that anaemia is associated with young age, lower education, occupation, income, residential area, parity, interval between each pregnancy, trimester, age at marriage and age at menarche. Factors associated with anaemia among pregnant women identified in past studies included parasite infestation[13–1], season[18], dietary habits[10–13], gestational age[13–1], parity[15,17,19], gravidity[22], age at the time of marriage, geographic location[16,18], interval between pregnancies[15,17], educational level[1,10] and smoking[19] Because anaemia is the most frequent

maternal complication of pregnancy, antenatal care should be concerned with its early detection and management.[15]

CONCLUSION

Findings of the study showed that out of 700 pregnant women only 442(63.14%) were non-anaemic pregnant women; and other 258 pregnant women anaemic. Out of 258 anaemic pregnant women, majority 118 had mild anaemia; 122 had moderate anaemia and only 18 severe anaemia. The prevalence anaemia among pregnant women were 36.86%. There was significant association between anaemia and selected variables like age, literacy, occupation, income, type of family, diet habits, residence, parity, gestational age, age at menarche, interval between labour, age at marriage (at $p<0.05$).

RECOMMENDATION

Findings of the study indicated the need to conduct frequent assessment of knowledge and risk factors of anaemia among the pregnant women. Awareness programmes should be conducted among the pregnant women for their promotion of health. It is recommended that the socio-economic status of women should be enhanced in line with the Millennium Development Goals to prevent anaemia and to enhance pregnancy outcomes. This finding suggests the need for strengthening of interventions related to child spacing and raising awareness about family planning methods. All ANC attendants should be screened for anaemia and hookworm infection at first visit and those anaemic mothers and infected with hookworm should be treated appropriately. Health education should be given to pregnant mothers on family planning and the need to gynaecologic evaluation before pregnancy and the importance of wearing shoes to decrease hook worm infection and subsequent anaemia. Most of these causes of anaemia in pregnancy are preventable. However, despite the use of iron and folate supplementation and anti-malarial prophylaxis, which are prescribed for pregnant women in ante-natal clinics for the prevention of anaemia, the prevalence of anaemia is still high in the country.

ACKNOWLEDGEMENT

I am extremely grateful to all the pregnant women who took part in this study. I am also thankful to the management and staff of the health care facilities for allowing me to carry out this research in their health facility.

REFERENCES

1. Nwizu EN, Ilivasu Z, Ibrahim SA and Galadanci HS. Socio-Demographic and maternal factors in anaemia in pregnancy. African Journal of reproductive Health December, 2011; 15(4): 33-49.
2. Batool, Zahira (2010) Socio-cultural factors affecting anaemia and its effects on mother child health in the rural areas of district Faisalabad, Punjab, Pakistan. J. Obstet Gynaecol, 2010; 107-110.
3. Hoque M. Prevalence of anaemia in pregnancy at Greytown, South Africa. Trop. J. Obstet Gynaecol, 2006; 23(1): 3-7.
4. Belachew T1, Legesse Y. Risk factors for anemia among pregnant women attending antenatal clinic at Jimma University Hospital, southwest Ethiopia. Ethiop Med J., 2006 Jul; 44(3): 211-20.
5. Mbule MA, Byaruhanga YB, Kabahenda M, Lubowa A, Determinants of anaemia among pregnant women in rural Uganda. Rural and Remote Health, 2013; 13: 2259.
6. Q. Zhang, C. V. Ananth, Z. Li and J. C. Smulian, "Maternal anaemia and preterm birth: a prospective cohort study," International Journal of Epidemiology, 2009; 38(5): 1380–1389.
7. F. W. Lone, R. N. Qureshi and F. Emanuel, "Maternal anaemia and its impact on perinatal outcome," Tropical Medicine and International Health, 2004; 9(4): 486–490.
8. T. Marchant, J. A. Schellenberg, R. Nathan et al., "Anaemia in pregnancy and infant mortality in Tanzania," Tropical Medicine and International Health, 2004; 9(2): 262–266.
9. Anorlu RI, Oluwole AA, Audu OO. Sociodemographic factors in anaemia in pregnancy at booking in Lagos Nigeria. Journal of Obstetrics and Gynaecology., 2006; 268: 773–776.
10. De Benoist B, Mclean E, Egli I, Cogswell M, Worldwide prevalence of Anaemia 1993–2005: WHO global database on anaemia. 1–51.
11. Lee M, Truma JI. Anaemia, Acute. eMedicine Journal 2007 September 05; 2(11).
12. Iman TJ, Yahaya A. Pack cell volume of pregnant women attending Dawakin Kudu general hospital, Kano State. Nigeria. Int. Jor. P. App. Scs., 2008; 2(2): 46–50.
13. Vanderjagt DJ, Brock HS, Melah GS, El-Nafaty AU, Crossey MJ, Glew RH. Nutritional Factors Associated with Anaemia in Pregnant Women in Northern Nigeria. J Health Popul Nutr., 2007; 25(1): 75–81.
14. Mora JO, Nestel PS. Improving prenatal nutrition in developing countries: Strategies, prospects and challenges. Am J clin Nutr., 2000; 71: 1353–1363.

15. F. W. Lone, R. N. Qureshi and F. Emmanuel, "Maternal anaemia and its impact on perinatal outcome in a tertiary care hospital in Pakistan," Eastern Mediterranean Health Journal, 2004; 10(6): 801–807.
16. H. S. Lee, M. S. Kim, M. H. Kim, Y. J. Kim and W. Y. Kim, "Iron status and its association with pregnancy outcome in Korean pregnant women," European Journal of Clinical Nutrition, 2006; 60(9): 1130–1135.
17. Ouma P, Van eijk AM, Hamel MJ, Parise M. Malaria and anaemia among pregnant women at first antenatal clinic visit in Kisumu, Western Kenya. Tropical Medicine and international health, 2009; 12(12): 1515–23.
18. Anorlu RI, Oluwole AA, Abudu OO. Socio demographic factors in anaemia in pregnancy at booking in Lagos, Nigeria. J. Obstet Gynaecol, 2006; 26(8): 773-776.
19. F.I. Buseri, E.K. Uko, Z.A. Jeremiah. Prevalence and risk factors of anaemia among pregnant women in Nigeria. The open haematology journal, 2008; (2): 14-19.
20. Akinyinka OO. Recent trends in the management of anaemia in pregnancy. Trop J. Obstet Gynaecol, 2004; 21(1): 1–3.
21. Van den Broek NR, Anaemia and micro nutrient deficiencies. British Medical Bulletin, 2003; 67: 149–160.