

To Study the Prevalence and Causes of Antenatal Anemia in a Tertiary Health Care Centre and its Impact on Maternal and Perinatal Outcome

Dr. Himanshu Lata¹, Dr. Kulwinder Kaur², Dr. Amritpal Kaur Dhillon³, Dr. Permeet Kaur Bagga⁴

Abstract: Anemia is a major contributor to poor pregnancy and birth outcomes in developing countries as it predisposes to premature delivery, increased perinatal morbidity & mortality and increased risk of death during delivery and postpartum. Thus, the present research was conducted to study the prevalence of anaemia among pregnant women, to study the causes of anemia and the impact of anemia on maternal and perinatal outcomes. A total of 300 patients were enrolled for the present study. For all patients, detailed history regarding age, parity, previous obstetric history, history regarding blood transfusion, iron, caloric intake was taken and complete blood tests were done. Maximum cases were of severe anemia, with microcytic hypochromic picture on PBF suggesting iron deficiency anemia. Anemia was more common in younger patients. Prevalence of urinary tract infections was more in severely and moderately anemic patients. Thus, major causes of anemia came out to be nutritional anemias, iron deficiency anemia, UTI, and multiparity. Preterm labour was most common maternal complication of anemia followed by abruptio placentae, postpartum hemorrhage and APH. There was significant improvement in hemoglobin levels on post partum day 28 with hematinics. Fetal complications include low birth weight babies, IUGR, respiratory distress and birth asphyxias.

Keywords: Hemoglobin, iron deficiency, postpartum haemorrhage, microcytic hypochromic, preterm labour

1. Introduction

Anaemia is one of the most common problems in pregnant women in developing as well as developed countries. Prevalence of anemia is 43% in developing countries and 9% in developed countries.¹ India is one of the countries with very high prevalence of anemia with 58 per cent of pregnant women who are anemic and it is estimated that anemia is the underlying cause for 20–40 per cent of maternal deaths in India. It leads to infections, cardiorespiratory problems, preterm labour, pre-eclampsia, postpartum haemorrhage, puerperal sepsis and subinvolvement.^{2, 3} Severe anaemia in pregnancy impairs oxygen delivery to the fetus resulting in intrauterine growth restriction, LBW, stillbirth and neonatal deaths. Therefore, anemia is a major contributor to poor pregnancy and birth outcomes in developing countries as it predisposes to premature delivery, increased perinatal morbidity & mortality and increased risk of death during delivery and postpartum. Thus, the present research was conducted to study the prevalence of anaemia among pregnant women, to study the causes of anemia in antenatal women and to study the impact of anemia on maternal and perinatal outcomes.

2. Materials and Methods

This is a prospective study which was conducted in the Department of Obstetrics and Gynecology, Bebe Nanaki Mother and Child Care Centre, Guru Nanak Dev Hospital, Government Medical College, Amritsar, for the pregnant women presenting with anemia on the basis of clinical data and laboratory data. A total of 300 patients were enrolled for the present study. Written informed consent was obtained from all patients. The protocol was approved by the ethics committee of the institute.

Inclusion Criteria: Antenatal women across all trimesters with anaemia, Follow up in post-partum period upto 28

days with haemoglobin estimation on day 3 and day 28 and known cases of thalassemia.

Exclusion Criteria: Immuno deficiency patients, Organic cardiac diseases and patients in heart failure.

For all patients, detailed history regarding age, parity, previous obstetric history, history regarding blood transfusion, iron and folic acid and caloric intake was taken and complete blood tests were done.

3. Results

The present study was conducted in the Department of Obstetrics and Gynecology, Bebe Nanaki Mother and Child Care Centre, Guru Nanak Dev Hospital, Government Medical College, Amritsar, for the pregnant women presenting with anaemia on the basis of clinical and laboratory data. In the present study, out of 300 patients, 126 patients (42%) were severely anaemic, 95 patients (31.6%) were moderately anaemic and 79 patients (26.3%) had mild anaemia. Out of 300 patients, 162 patients (54%) were ≤ 25 years age, 112 (37.7%) patients were between the age group of 26 to 30 years, 22 (7.3%) patients were in the age group of 31 - 35 years and 4 (1.3%) patients were > 35 years of age. In the age group of ≤ 25 years, 44 (14.67%) patients had severe anemia, 59 (19.67%) patients had moderate to mild anaemia each. In the age group of 26 - 30 years, 67 (22.33%) patients were having severe anaemia followed by 28 (9.3%) patients of moderate anemia and 17 (5.6%) patients of mild anemia. In age group of 31 - 35 years, 12 (4%) patients had severe anemia, 7 (2.3%) had moderate anemia and 3 (1%) patients had mild anemia. In age group of > 35 years, 3 (1%) patients were of severe anemia and only 1 (0.3%) patient had moderate anemia. Most cases were from young age group of ≤ 25 years which is statistically significant with Chi-square = 35.559, p-value = 0.000. In the present study, 183 (61%) patients belonged to rural areas and 117 (39%) patients belonged to urban areas.

Volume 12 Issue 5, May 2023

www.ijsr.net

Licensed Under Creative Commons Attribution CC BY

In present study, 102 (34%) patients were uneducated, 100 (33.3%) patients had elementary education, 55 (18.3%) patients had secondary education and 37 (12.3%) patients had senior secondary education and only 6 (2%) patients had done graduation and post - graduation. With increasing educational status, prevalence as well as severity of anemia decreased. This is statistically significant with p - value of 0.009. In our study, 67 (22.3%) patients were primigravidas and 233 (77.7%) patients were multigravidas. In multigravidas, 125 (41.67%) patients were of severe anemia followed by 81 (27%) patients of moderate anemia and 27 (9%) patients of mild anemia while in primigravidas, 52 (17.3%) patients were of mild anemia, 14 (4.67%) patients were of moderate anemia and 1 (0.33%) patients of severe anemia. Out of these multigravid anemic patients, maximum number of patients belonged to category of severe anemia, which is also statistically significant with p - value =0.000.

In 157 patients with microcytic hypochromic picture, 87 (29%) patients were of severe anemia followed by 53 (17.6%) patients of moderate anemia and 17 (5.67%) patients were of mild anemia. While in normocytic normochromic anemia (92), 49 (16.3%) cases were of mild anemia followed by 23 (7.67%) patients of moderate and 20 (6.67%) patients were of severe anemia. In dimorphic anemia (38), 15 (5%) patients were of moderate anemia followed by 12 (4%) patients were of severe anemia and 11 (3.67%) patients were of mild anemia. 7 (2.3%) patients of severe anemia, 4 (1.3%) of moderate anemia and 2 (0.67%) of mild anemia presented with macrocytic hypochromic picture (15). Maximum cases were of microcytic hypochromic anemia and out of these patients, maximum number of patients fall into category of severe anemia which is statistically significant with p - value=0.000. In the present study, 130 (43.3%) patients took iron and folic acid tablets regularly and 170 (56.65%) patients were non complaint. Out of 170 patients, majority of them developed severe anemia (104), moderate anemia (14) and mild anemia was present in only 14 patients. Patient taking regular iron and folic acid tablets developed anemia due to presence of other factors like UTIs, APH, PUO or multigravidity. The difference was found to be statistically significant (p=0.000). In our study, 161 (53.6%) patients consumed less than 2000 kcal which are lower than the recommended daily caloric allowance and 136 (45.3%) patients had caloric intake of 2000 to 2500 kcal and 3 (1%) patients had more than 2500 kcal per day. Maximum patients of anemia were those with caloric intake of <2000 kcal/day and in these patients, prevalence of severe anemia is more than that of mild anemia which is statistically significant with p - value=0.000.

Table 1: Showing distribution of patients according to urinary tract infections

Urinary tract infections	Total no. of patients	Severe anemia	Moderate anemia	Mild anemia
Positive	161 (53.66%)	94 (31.3%)	53 (17.67%)	14 (4.67%)
Negative	139 (46.33%)	32 (10.67%)	42 (14%)	65 (21.67%)
Total	300	126	95	79

Chi - square=63.434, df=2, p - value=0.000

Table 1: UTIs are more prevalent in patients with severe and

moderate anaemia than in mild anaemias which is statistically significant with a value of 0.000.

Table 2: Showing distribution according to maternal complications

Maternal complications	Total no. of patients	Severe anemia	Moderate anemia	Mild anemia
Preterm labour	126 (42%)	76 (25.33%)	40 (13.33%)	10 (3.33%)
APH	10 (3.33%)	7 (2.33%)	3 (1%)	0
Abruptio placenta	28 (9.30%)	20 (6.67%)	7 (2.33%)	1 (0.33%)
Postpartum haemorrhage	20 (6.60%)	15 (5%)	5 (1.67%)	0
Uncomplicated	116 (38.60%)	8 (2.67%)	40 (13.33%)	68 (22.67%)
Total	300	126	95	79

Chi - square=134.669, df=8, p - value=0.000

Table 2: Prevalence of maternal complications like preterm labour, APH, abruptio placentae and PPH is more in severely anemic patients as compared to mildly anemic patients which is statistically significant with p - value =0.000.

Out of 300 anemic mothers, (65%) 195 mothers gave birth to low - birth - weight babies and 35% (105) patients gave birth to babies weighing more than 2.5 kgs. Out of these 195 patients who gave birth to low - birth - weight babies, 100 (33.3%) patients were of severe anemia, 75 (25%) patients were of moderate anemia and 20 (6.67%) patients were of mild anemia. Out of 105 patients who gave birth to babies weighing more than 2.5 kgs, 26 (8.67%) patients were of severe anemia and 20 (6.67%) patients were of moderate anemia and 59 (19.67%) patients were of mild anemia. Maximum neonates born to anemic mothers were of low birth weight and prevalence of low - birth - weight babies is more in severely anemic mothers as compared to mildly anemic mothers which is statistically significant with p - value=0.000. In our study, 174 (58.00%) patients gave birth to term babies and 126 (42.00%) patients gave birth to preterm babies. Out of 126 anemic mothers, who went into preterm labour, maximum cases were of severe anemia in comparison to moderate and mild anemia which is statistically significant with p - value of 0.000. In our study, 84 (28.00%) babies born to anemic mothers got admitted in NICU. 61 (20.33%) babies admitted in NICU belonged to mothers with severe anemia, 17 (5.67%) babies belonged to mothers with moderate anemia and 6 (2%) babies who got admitted in NICU belonged to mildly anemic mothers. Maximum number of babies who got admitted in NICU belonged to severely anemic mothers compared to mildly anemic mother which is statistically significant with p - value =0.000.

Table 3: Showing distribution according to neonatal complications

Neonatal complications	Total no. of Patients	Severe anemia	Moderate anemia	Mild anemia
Low birth weight	195 (65.00%)	100 (79.3%)	75 (79%)	20 (25.3%)
IUGR	27 (9.00%)	12 (9.5%)	9 (10%)	6 (7.6%)
Birth asphyxias	2 (0.60%)	2 (1.58%)	0	0
Respiratory distress	16 (5.30%)	7 (5.55%)	5 (5%)	4 (5%)

Uncomplicated	60 (20.00%)	5 (3.96%)	6 (6%)	49 (62%)
Total	300	126	95	79

Chi - square=123.85, df=8, p - value=0.000

Table 3: Prevalence of the complications were more in severely anemic mothers as compared to moderately and mildly anemic mothers with p - value of 0.000. Prevalence of neonatal complications like low birth weight, IUGR, birth asphyxias and respiratory distress is more in severely anemic mothers which is statistically significant with p - value=0.000.

In our study, 48 had severe anaemia on day 3 and 7 had severe anaemia on day 28 post - delivery. Similarly, 8 had moderate anaemia on day 3 and 32 had moderate anaemia on day 28 post - delivery. 126 patients had mild anaemia on day 3 and 93 patients had mild anaemia on day 28 post - delivery. Haemoglobin levels improved and patient improved from severe to moderate, moderate to mild and from mild to non - anaemic categories.

4. Discussion

The aim of the present research was to study the prevalence and cause of antenatal anemia in tertiary care center and its impact on maternal and perinatal outcome. All patients who presented with anemia underwent a thorough physical examination and clinical assessment. In the present study, it was observed anemia is most prevalent in younger age group of ≤ 25 years (p - value=0.000) which is in accordance with study conducted by Suryanarayana R et al in 2016, majority of anemic pregnant women were of age < 24 years. Another study by Judith et al⁵ showed maximum prevalence of anemia (47.85%) were in the age group of ≤ 25 years. In our study, there is no significant difference in severity and prevalence of anemia due to residency of patient (p=0.159). In contrast to this, Ayensu J et al in 2020⁶ conducted a study showing that anemia was more prevalent in rural areas (67.1%) than in urban areas (49.1%). Another study conducted by Hunshikatti KB and Viveki PR in 2015⁷ showed that urban residence was significantly associated with reduced anemic cases.

Suega K et al⁸ in 2002 concluded in their study that prevalence of anemia decreased with an increase in level of education. This coincides with the present study which is statistically significant with p - value of 0.009. However, a similar study conducted by Jusuf EC and Rachmat M in 2021⁹, found that pregnant women with no formal education were associated with significantly higher prevalence of anemia. Present study showed that multigravidity is a risk factor for anemia which is statistically significant with p - value of 0.000. The results are similar to study conducted by Suryanarayana R et al⁴ which showed that hemoglobin level of pregnant women have a negative correlation with gravidity (p=0.032). Similarly, anemia was more often seen among pregnant women with parity of two or more in prospective cross - sectional study conducted by Mog et al¹⁰ (p<0.01). Out of 300 patients, maximum cases had severe anemia with microcytic hypochromic peripheral blood film which is statistically significant with p - value=0.000 in the present study. Rawat K in 2016¹¹ found similar results with 51% anemic patients having microcytic hypochromic picture

on peripheral blood film. Similarly, 66% patients with microcytic hypochromic red cell morphology were anemic in study done by Olatunbosun OA in 2014¹².

In the present study 56.65% (170) patients who were non - compliant in taking iron folic acid tablet developed anemia which is statistically significant with p - value of 0.000. A study by Suega K et al⁸ in 2022 also found that the prevalence of iron - deficiency anemia was higher in the group without iron pills intake compared with the group with a intake of iron pills (p < 0.05). In a similar study conducted by Varghese JS et al in 2018¹³, IFA supplementation was negatively associated with anemia. There were 74% lower odds of anemia with consistent consumption of IFA or folic acid supplement in previous trimester (OR: 0.26, 95% CI: 0.12 to 0.55, p = 0.001). It was observed that in the present report those taking < 2000 kcal/day developed nutritional anemia which is statistically significant with p - value of 0.000. Similar results were found by Pathak P et al in 2007¹⁴ where 59.9% of women consuming $< 75\%$ of recommended daily caloric allowance were anemic. Similarly, Sinawangwulan IP et al¹⁵ found that the risk of anemia during pregnancy directly decreased with better nutrition intake (b=1.02; 95% CI=1.73 to - 0.31; p= 0.005). There was an indirect relationship between dietary pattern and anemia through nutrition intake. Mothers with poor dietary pattern have a risk to get less nutritional intake compared to mothers who have a good dietary pattern. In present study, 161 (53.66%) anemic patients were positive for urinary tract infection. Okia CC et al in 2019¹⁶, also concluded that presence of UTI was significantly associated with anemia in pregnancy (p<0.002). Similarly, Jabbar AA in 2008¹⁷ found that the anemic individuals (< 1 Ig/ dl) constituted a significantly higher proportion (56%) of the UTI case and the risk of having anemia in cases, of UTI is 4.5 times that of the control. Similarly, in study conducted by Bembalagi S and Sojitra MP in 2018¹⁸, it was found that there was a high prevalence of UTI of about 40% in anemic pregnant women as compared to 12% in non - anemic pregnant women.

Prevalence of maternal complications in the present study is more in severely anemic mothers as compared to moderately and mildly anemic patients which is statistically significant with p - value of

Similar results were found by Arnold DL et al in 2009¹⁹ with 11% of abruptio placentae cases were associated with anemia. Another study by Shi and Huifeng et al in 2002²⁰ concluded that risk of placenta abruptio placentae increased with anemia. Lao TT et al in 2022²¹ also concluded that anemic mother had increased antepartum haemorrhage. Anemia during prenatal care is an important predictive factor of PPH according to Omotayo MO et al in 2021²². Kempainen L et al in 2021²³ also came to this conclusion that iron deficiency anemia was associated with increased risk of preterm birth. In case of low - birth - weight, prevalence is more in severely anemic patients which is statistically significant with p - value=0.000. Mohammad Owais Ahmed et al in 2011²⁴ found similar results where number of low - birth - weight infants (64%) was statistically very highly significant with p value (p<0.001) in anemic mothers. Ashraf T et al in 2022²⁵ also found a

significant association between low birth weight and anemia (p value = 0.004). Ren A et al in 2007 also concluded that anemia was associated with increased risk of low birth weight. In our study, preterm births were more prevalent in severely and moderately anemic mothers as compared to mildly anemic mothers with p - value of 0.000. Kempainen et al in 2021 also found that iron deficiency anemia was associated with increased risk of preterm birth. In our study, 84 (28%) babies born to anemic mother were admitted in NICU. Maximum number of cases who got admitted in NICU belonged to severely anemic mothers in comparison to mildly anemic mothers which is statistically significant with p - value - 0.000. This was comparable with observation of Shah et al in 2013 with 25.5% NICU admission of babies born to anemic mothers. Yilmaz E et al²³ in 2018 also arrived on consensus that NICU admissions were significantly higher for infants of anemic patients (OR: 2.68). Various studies have reported that prevalence of anemia in antenatal women and its impact, 0.5% babies born to anemic mothers developed birth asphyxias (Suryanarayana et al.2017). Another study by Madendag I in 2019²⁴ concluded that IUGR was significantly higher in the severe and moderate anemia groups compared to the mild anemia ($p < 0.001$). Same was observed by Jasim SK et al²⁵ that neonatal respiratory distress was strongly associated with maternal anemia with p - value < 0.001 . These reports are similar to the present study with significant outcomes (p - value of 0.000). In our study, patients were followed up till post - partum day 3rd and 28th. There was significant increase in haemoglobin concentration of the patients who were followed up till day 28 with hematinic. Hemoglobin levels improved and patient improved from severe to moderate, moderate to mild and from mild to non - anemic categories. Similarly, Suryanarayan et al in 2007 found that the number of women having various grades of anemia reduced and the number of women with normal Hb increased during the follow - up this was statistically significant.

5. Conclusion

In present study, maximum cases were of severe anemia, with microcytic hypochromic picture on peripheral blood film suggesting iron deficiency anemia. Prevalence of anemia was maximum in young patients and prevalence and severity of anemia decreased with increasing educational status. There was an elevated prevalence of anemia with increasing gravidity. Anemia was more common in antenatal mothers who were non - compliant in taking iron and folic acid supplementation. Prevalence of urinary tract infections was more in severely and moderately anemic patients. Thus, major causes of anemia came out to be nutritional anemias, iron deficiency anemia, UTI, and multiparity. Preterm labour was most common maternal complication of anemia followed by abruptio placentae, postpartum hemorrhage and APH. There was significant improvement in hemoglobin levels on post partum day 28 with hematinics. There was increase in prevalence of low birth weight babies with anemias. Fetal complications include low birth weight babies, IUGR, respiratory distress and birth asphyxias. A high prevalence of anemia in pregnant women increases the maternal and fetal risk.

References

- [1] Abriha A, Yesuf ME, Wassie MM. Prevalence and associated factors of anemia among pregnant women of Mekelle town: a cross sectional study. BMC research notes.2014 Dec; 7 (1): 1 - 6.
- [2] Axemo P, Liljestrang J, Bergstrom S, Gebre - Medhin M. Aetiology of late fetal death in Maputo. Gynaecol Obstet Invest.1995; 39: 103 - 9.
- [3] Brabin BJ, Premji Z, Verhoeff F. An analysis of anaemia and child mortality. J Nutr.2001; 132: 6365 - 455.
- [4] 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. Journal of family medicine and primary care.2017 Oct; 6 (4): 739.
- [5] Judith AN, Bhaduri A, Bhat HV. Prevalence of anaemia among pregnant women: a community - based study in Udipi district. Health Popul Perspect Issues 2008; 31 (1): 31-40
- [6] Ayensu J, Annan R, Lutterodt H, Edusei A, Peng LS. Prevalence of anaemia and low intake of dietary nutrients in pregnant women living in rural and urban areas in the Ashanti region of Ghana. Plos one.2020 Jan 24; 15 (1): e0226026.
- [7] Hunshikatti KB, Viveki PR. Prevalence of anemia and its predictors in pregnant women attending antenatal clinic: A hospital based cross - sectional study. IOSR J Nurs Health Sci.2015; 4: 12 - 17.
- [8] Suega K, Dharmayuda TG, Sutarga IM, Bakta IM. Iron - deficiency anemia in pregnant women in Bali, Indonesia: a profile of risk factors and epidemiology. Southeast Asian journal of tropical medicine and public health.2002 Sep 1; 33 (3): 604 - 07.
- [9] Jusuf EC, Rachmat M. Determinant of anemia in pregnancy at Polewali Mandar District, South Sulawesi, Indonesia. Gaceta Sanitaria.2021 Jan 1; 35: S319 - 21.
- [10] Mog M, Neogi D, Bharadwaz MP, Panda BK, Sil A. Prevalence and factors associated with Anaemia in Married Women of Reproductive age group: Evidence from North East India. Journal of Biosocial Science.2022 May 2: 1 - 3.
- [11] Rawat K, Rawat N, Mathur N, Mathur M, Chauhan N, Kakkar R, Tinna
- [12] R. Prevalence and pattern of anemia in the second and third trimester pregnancy in Western Rajasthan. Int J Res Med Sci.2016 Nov; 4 (11): 4797 - 799.
- [13] Olatunbosun OA, Abasiattai AM, Bassey EA, James RS, Ibanga G, Morgan A. Prevalence of anaemia among pregnant women at booking in the University of Uyo Teaching Hospital, Uyo, Nigeria. BioMed research international.2014 May 19; 2014.
- [14] Varghese JS, Swaminathan S, Kurpad AV, Thomas T. Demand and supply factors of iron - folic acid supplementation and its association with anaemia in North Indian pregnant women. PLoS One.2019 Jan 30; 14 (1): e0210634.
- [15] Pathak P, Kapil U, Yajnik CS, Kapoor SK, Dwivedi SN, Singh R. Iron, folate, and vitamin B12 stores among pregnant women in a rural area of Haryana

State, India. Food and nutrition bulletin.2007; 28 (4): 435 - 8.

Amritsar

- [16] Sinawangwulan IP, Dewi YL, Wekadigunawan CS. Association between socio - demographic, nutrition intake, cultural belief, and incidence of anemia in pregnant women in Karanganyar, Central Java. Journal of Maternal and Child Health.2018 Jul 6; 3 (2): 128 - 37.
- [17] Okia CC, Aine B, Kiiza R, Omuba P, Wagubi R, Muwanguzi E. Prevalence, morphological classification, and factors associated with anemia among pregnant women accessing antenatal clinic at Itojo Hospital, south western Uganda. Journal of blood medicine, 2019, pp.351 - 57.
- [18] Jabbar AA. The association between anemia and urinary tract infection among the pregnant women in Baghdad. J Fac Med Baghdad.2006; 48 (3): 2005.
- [19] Bembalagi S, Sojitra MP. Study of relationship between anemia and urinary tract infection in pregnant women.2018; 11 (1): 71 - 75
- [20] Arnold DL, Williams MA, Miller RS, Qiu C, Sorensen TK. Iron deficiency anemia, cigarette smoking and risk of abruptio placentae. Journal of Obstetrics and Gynaecology Research.2009; 35 (3): 446 - 52.
- [21] Lao TT, Hui SY, Wong LL, Sahota DS. Iron deficiency anaemia associated with increased placenta praevia and placental abruption: a retrospective case - control study. European Journal of Clinical Nutrition.2022; 76 (8): 1172 - 7.
- [22] Kempinen L, Mattila M, Ekholm E, Pallasmaa N, Törmä A, Varakas L, et al. Gestational iron deficiency anemia is associated with preterm birth, fetal growth restriction, and postpartum infections. Journal of Perinatal Medicine.2021; 49 (4): 431 - 38.
- [23] Ashraf T, Naing NN, Arfah NW, Ejaz G. Association of low birth weight with lack of antenatal care. Asian Journal of Allied Health Sciences (AJAHS).2022; 7 (2); 1 - 7
- [24] Yilmaz E, İştan OY, Soysal Ç, Yılmaz ZV, Kara OF, Küçüközkan T. The influence of anemia on maternal and neonatal outcomes in adolescent pregnant. Journal of Surgery and Medicine.2018; 2 (2): 69 - 73.
- [25] Madendag I, Eraslan Sahin M, Madendag Y, Sahin E, Demir MB, Acmaz B. The effect of iron deficiency anemia early in the third trimester on small for gestational age and birth weight: a retrospective cohort study on iron deficiency anemia and fetal weight. BioMed Research International, 2019; 1: 1 - 7.
- [26] Jasim SK, Al - Momen H, Al - Asadi F. Maternal anemia prevalence and subsequent neonatal complications in Iraq. Open Access Macedonian Journal of Medical Sciences.2020; 8 (B): 71 - 75.

Dr. Amritpal Kaur Dhillon, Professor and Head of department, Department of Obstetrics and Gynaecology, Government Medical College, Amritsar

Dr. Permeet Kaur Bagga, Professor and Head of department, Department of Pathology, Government Medical College, Amritsar himanshumehtmi29[at]gmail.com

Author Profile

Dr. Himanshu Lata, Junior resident, Department of obstetrics and gynaecology, Government Medical College, Amritsar

Dr. Kulwinder Kaur, Associate Professor, Department of Obstetrics and Gynaecology, Government Medical College,

Volume 12 Issue 5, May 2023

www.ijsr.net

Licensed Under Creative Commons Attribution CC BY