ORIGINAL ARTICLE
PREVALENCE OF ANAEMIA IN PREGNANT WOMEN

Kanza Hamid, Madiha Ajaz*, Mehtab Akhter**, Sher Afgan Khan***,
Muhammad Shakil Sadiq, Fauzia Aitazaz†

Department of Anatomy, AJK Medical College, Muzaffarabad, *Postgraduate Medical Institute, Lahore,
**Department of Hematology, Khyber Medical University, ***Department of Pharmacology, Northwest School of Medicine, Peshawar,
†Department of Physiology, AJK Medical College, Muzaffarabad, Azad Kashmir

Background: Anaemia is defined as a medical condition in which the red blood count or haemoglobin is lower than the normal levels. Deficiency of haemoglobin can be due to lack of vitamin B_{12}, folic acid and iron, extreme blood loss or nutrient-deficit diet. Anaemia during pregnancy is harmful both to the mother and foetus. It can cause pre-mature delivery and birth defects. Iron supplementation is often recommended to pregnant women. The aim of study was to find out the prevalence of anaemia in pregnant women. **Methods:** The study was carried out using quantitative methods. A sample of 300 participants was taken using purposive sampling technique. Socio-demographic data was collected from participants after informed consent. Haemoglobin levels were recorded for each participant using Blood Complete Picture already available with them. **Results:** There exists high prevalence (74.6%) of anaemia in pregnant women. The prevalence is much higher (80.3%) in the 3rd trimester of pregnancy. Low intake of meat was observed in 73% of the anaemic women. Low intake of other iron rich food was also observed in more than 50% of the participants. Only 93 participants had their MCV reports with them (53.7% among them had low MCV). This high rate of prevalence is associated with iron-deficient diet and unawareness about seriousness of the problem. **Conclusion:** There is high prevalence of anaemia among pregnant women associated with iron-deficient diet and lack of awareness. Introducing screening tests for anaemia, raising public awareness, and educating females about importance of nutrition diet are recommended.
Keywords: Anaemia, iron deficiency, pregnancy, status, prevalence, Kashmir, women

INTRODUCTION

Pregnancy is the time of critical physiological changes which are accompanied by several complications. The most common of the complications during pregnancy is anaemia. Anaemia is defined as a medical condition in which the red blood count or haemoglobin is lower than the normal levels.[1]

Haemoglobin-the iron containing protein, is the essential component of blood. It is present in the red blood cells and its major function is to transport oxygen from lungs to tissues which is accomplished by the binding of oxygen molecules with haemoglobin molecule (formation of oxy-haemoglobin). It is also a rich source of iron in blood.[2]

It is essential that the adequate level of haemoglobin be present in human body for normal functioning. Since, haemoglobin is a transporter of oxygen and a source of iron in blood, so its deficiency can lead to serious physiological problems, the most common of which is anaemia. Normal/average levels of haemoglobin are different for males and females. Normal level of haemoglobin in males is 14–18 g/dL or 8.7–11.2 mmol/L. The normal level of haemoglobin in females is 12–16 g/dL or 7.4–9.9 mmol/L. In pregnant women, the average level of haemoglobin should be >11 gm/dl.[3] According to the WHO, if the level of haemoglobin falls below 11 gm/dl in pregnant women, then she is said to be anemic.[4]

Many factors affect the level of haemoglobin in body, like extreme blood loss, low production of RBCs or destruction of the RBCs due to some other cause. Other most important factors in anaemia are the vitamin B_{12}, folic acid and iron.

Vitamin B_{12}, also called as Cobalamin is a very important micronutrient, also known as the energy nutrient as it is involved in the energy production for the body and also helps in the production of DNA and cell division in bone marrow. So, during pregnancy if Vitamin B_{12} deficiency occurs due to insufficient Vitamin B_{12} intake or problems in absorption, there is increased risk of anemia.[5]

Folic acid or B9 is one of the B complex required for the production of red blood cells. It is a water-soluble nutrient, which is not stored in body in large amounts. It is not synthesized by human body and is required through external sources. In case of folate-deficient diet; there is a risk of folate deficiency which may also serve as a risk factor for anaemia. This complication is also termed as 'folate-deficiency anaemia' or megaloblastic anaemia (red blood cells grow large). Folic acid deficiency during pregnancy is also harmful for foetus development (foetus brain and spinal cord development) leading to birth defects called neural tube defects.[6]

Iron deficiency is the major and most common form of anaemia. Among pregnant women,

iron-deficient diet is the common factor leading to anaemia.[7] According to a study, iron deficiency anaemia and folate deficiency megaloblastic anaemia are the common types of anaemia present in pregnant women. Studies have concluded that iron supplementation is necessary for improving level of iron/haemoglobin during pregnancy.[8]

Anaemia during pregnancy leads to many complications. According to some studies, anaemia during pregnancy can lead to problems in cognitive development, preterm delivery, low birth weight and low neonatal health. It is also found that iron deficiency/anaemia during pregnancy reduces the iron stores in the first year of life in infants. It also increases a risk of iron deficiency anaemia in infants.[9,10]

According to a research conducted in Pakistan, prevalence of anaemia was found to be 90.5% out of which a mild-moderate level of anaemia was observed in a high percentage of pregnant women (20–26 weeks pregnant). This low level of haemoglobin was also associated with low consumption of red meat and eggs, thus showing a lack of nutrition as common factor associated with anemia.[11]

Another study conducted in Pakistan revealed that a very high percentage of pregnant women in Railway Hospital of Multan had anaemia. The poor dietary habits account for this iron deficiency in pregnant women. The study emphasized on the need of a widespread approach regarding education and management of anaemia in pregnant women.[12]

Among the various nutritional disorders, iron deficiency anaemia is most common and pregnant women constitute a high-risk population for this problem.[13] Both in the developing and developed countries, there is a high prevalence of anaemia in pregnant women. This fact also got verified by a survey in India which showed that about 84.9% of the pregnant women were anaemic, among which 13.1% were severely anaemic while 60.1% were suffering from moderate anemia.[14]

Many other studies have also indicated that anaemia prevails commonly in pregnant women. Most of the studies have emphasized the need for iron supplementation for pregnant women.[15,16]

It is significant to study the status of anaemic pregnant women attending hospitals because it provides information about the needs of patients related to their diet and use of necessary supplements during pregnancy. The objective of this study was to find out the prevalence of anaemia in pregnant women through haemoglobin and MCV levels.

MATERIAL AND METHODS

This was a quantitative study carried out in the Obs/Gyn Outpatient Departments of Abbas Institute of Medical Sciences (AIMS) and Sheikh Khalifa Bin Zayed Hospital (SKBZH)/CMH Muzaffarabad after obtaining permission from institutional ethical review committee. Participants were selected using purposive sampling method. Using Sample size prevalence survey calculator, the sample size was calculated to be 289 which was rounded to 300.[17] Participants were selected on the basis of following inclusion criteria:

A total of 300 pregnant women presenting in the Obs/Gyne OPDs of AIMS and Sheikh Zaid Hospital consecutively were included after taking informed consent. Non-pregnant women and those suffering from any chronic systemic disorder or deficiency diseases were excluded.

The study was carried out for 2 months from July 15 to Sep 15 2019. Data were recorded on a special designed proforma. The haemoglobin level was recorded using Blood CP (Blood Complete Picture) available with the participants. They were interviewed using a closed ended questionnaire (self-constructed) which examined the demographics of the subject (socio-economic status, age, education, marital status, number of children etc.) as well as their diet patterns (intake of vegetables, egg, milk, meat) and medical reports regarding pregnancy.

The severity of anaemia was determined on the basis of WHO grading of anaemia as:[4]

Grade 1: Mild= 10–12 gm/dl
Grade 2: Moderate= 7–10 gm/dl
Grade 3: Severe= less than 7 gm/dl

RESULTS

The results indicated that prevalence of anaemia in pregnant women presenting in Gynaecology OPD of AIMS and SKBZ/CMH was 74.6%. Among the anaemic patients, 68.3% had mild anaemia, 29.9% had moderate, and 1.78% had severe anaemia (Table-1).

Out of 300 participants, MCV was available from only 93 participants. Among those 93 participants, 53.7% had low levels of MCV, 41.9% had normal MCV level and 4 had high levels of MCV (Table-2).

Among the anaemic participants, 3.1% were in their 1st trimester of pregnancy, 16.5% were in their 2nd trimester of pregnancy, while 80.3% were in 3rd trimester of pregnancy (Table-3).

The results also indicate that most of the anaemic women (about 73%) had less than 200 gm of meat intake per week (Table-4). More than 50% of the participants consumed iron rich food in less than 3 days a week (Table-5).

Table-1: Prevalence of anaemia (n=300)

Anaemic participants	n (%) (n=224)
Mild (10–12 g/dl)	153 (68.3%)
Moderate (7–10 g/dl)	67 (29.9%)
Severe (less than 7 g/dl)	4 (1.78%)
Prevalence	**74.6%**

Table-2: MCV (Mean Cell Volume) in participants (n=300)

MCV level (n=93)	Low (<80 fl)	Normal (80–95 fl)	High (>95 fl)
No. of participants	50	39	4
Percentage	53.7%	41.9%	4.3%

Table-3: Prevalence of anaemia in different trimesters (n=300), [n (%)]

Anaemia	1st Trimester	2nd Trimester	3rd Trimester
Mild (10–12 g/dl)	5	25	123
Moderate (7–10 g/dl)	2	11	54
Severe (<7 g/dl)	0	1	3
Total anaemic	7 (3.1)	37 (16.5)	180 (80.3)

Table-4: Meat intake per week (n=300)

Meat Intake	Number	Percentage
No meat intake	49	21.8
<100 gm	55	24.5
100–200 gm	60	26.7
200–300 gm	36	16
300–400 gm	24	10.7

Table-5: Intake of other iron rich food (leafy vegetables, fruits, eggs, milk etc) per week

Days Per Week	Number	% out of 300
1 day	92	31
2 days	73	24
3 days	48	16
4 days	31	10
5 days	21	7
6 days	17	6
7 days	18	6
Total	300	100

DISCUSSION

The results of this study were consistent with the literature findings. The prevalence of anaemia was very high (74.6%) among the pregnant women. This high prevalence of anaemia is an indicator of low maternal and neonatal health. Anaemia is the risk factor for several other complications during pregnancy[8–12], it can be stated that the women of this area are at greater risk for several complications. Development of foetus is dependent upon the health of the mother. In case of maternal anaemia, there are chances of many developmental problems in the foetus.

The MCV (mean corpuscular volume) is an indicator of size, and indirectly of Hb content of RBCs. It was found that majority of the participants did not have their MCV checked out. Only 93 participants out of 300 had their MCV checked, and among them 53.7% had low MCV indicating iron deficiency anaemia. These patients seem to have visited the healthcare attendant(s) (Lady Health Worker/*Dai*) in a far-flung area where appropriate health facilities and equipment is not available. The fact that majority of participants were having an iron deficiency anaemia is explained by poor nutrition intake. Iron deficient diet is the leading factor towards iron deficiency anaemia.[7,8] The diet pattern of the participants showed that majority of the anaemic

pregnant women took less than 200 gms of meat per week. Moreover, the consumption of other iron rich food like leafy vegetables, eggs, milk etc. was also very low and less than 1 in 5 women consumed iron rich food more than 5 times a week. Such nutritional deficiency is the major cause of high prevalence of anaemia. The lack of awareness and low nutrition intake can be explained by factors like socio-economic status. Most of the participants belonged to middle or lower socio-economic status. Due to economic crises, burden of family and lack of education, women stay ignorant about the importance of nutritional diet and problems which could arise from its deficiency. They also have less access to iron rich food or supplements which leads to anemia.[18]

Another important finding of the study was the different prevalence rates of anaemia in the three trimesters of pregnancy. In the last trimester of pregnancy, there is haemodilution due to plasma volume expansion, so there is some degree of physiological anaemia as well. There is also an increased requirement of iron (2–3 folds) and folate (10–20 folds) for the growing foetus during this time. The women require extra intake of iron and folate to cope up with the growing demand[19] especially in the last trimester of pregnancy. It was observed that most (80.3%) of the anaemic participants were in their last trimester of pregnancy. This highlights that the last trimester of pregnancy is a very critical time period so, special care is needed in maintaining healthy diet and nutrition to meet the demands of pregnancy and to prevent iron and folate deficiency.

The results have highlighted the fact that most of the time, anaemia goes unchecked and unreported (especially mild cases of anaemia) because of unawareness. People do not report the symptoms until they become extremely severe. This high prevalence of anaemia in pregnant women especially during the 3rd trimester of pregnancy can be due to high salt-water retention, and is associated with poor diet and careless attitude towards health. A comprehensive screening process has to be developed for checking anaemia in pregnant women and to treat it before it gets severe.

CONCLUSION

There exists a high prevalence of anaemia/iron deficiency among pregnant women. The major causal factors found are nutrient-deficient diet and lack of awareness about seriousness of the disorder.

LIMITATIONS

It was a single station study representative of the local area only. The study can be extended to other stations and locations to include a variety of subjects from different socioeconomic and demographic origins. The hospitals/healthcare facilities were not adequate which affected the data collection process.

RECOMMENDATIONS

The high prevalence can be controlled by setting up cost-effective screening tests (Hb level) to diagnose the disorder at a mild stage and by providing awareness to the general public for understanding the complications of this disease. The Lady Health Workers should visit the pregnant women in their early pregnancy and provide necessary awareness about their health issues during pregnancy. Media can also be used to provide awareness about preventing and controlling anaemia.

REFERENCES

1. Beutler E, Waalen J. The definition of anemia: what is the lower limit of normal of the blood hemoglobin concentration? Blood 2006;107(5):1747–50.
2. Panawala L. What is the function of hemoglobin in the human body? 2017. Available at: https://pediaa.com/what-is-the-function-of-hemoglobin-in-the-human-body/ accessed 7 Sep 2021.
3. Merritt BY. Hemoglobin concentration. Nov 27, 2019. Available at: https://emedicine.medscape.com/article/2085614-overview
4. Okia CC, Aine B, Kiiza R, Omuba P, Wagubi R, Muwanguzi E, *et al*. Prevalence, morphological classification, and factors associated with anemia among pregnant women accessing antenatal clinic at Itojo Hospital, South Western Uganda. J Blood Med 2019;10:351–7.
5. Chaparro CM, Suchdev PS. Anemia epidemiology, pathophysiology, and etiology in low- and middle-income countries. Ann N Y Acad Sci 2019;1450(1):15–31.
6. Greenberg JA, Bell SJ, Guan Y, Yu YH. Folic acid supplementation and pregnancy: more than just neural tube defect prevention. Rev Obstet Gynecol 2011;4(2):52–9.
7. Jamnok J, Sanchaisuriya K, Sanchaisuriya P, Fucharoen G, Fucharoen S, Ahmed F. Factors associated with anaemia and iron deficiency among women of reproductive age in Northeast Thailand: a cross-sectional study. BMC Public Health 2020;20(1):102.
8. O'Malley EG, Cawley S, Kennedy RAK, Reynolds CME, Molloy A, Turner MJ. Maternal anaemia and folate intake in early pregnancy. J Public Health (Oxf) 2018;40(3):e296–302.
9. Kennedy BC, Wallin DJ, Tran PV, Georgieff MK. Long-term Brain and behavioral consequences of early-life iron deficiency. In: Reissland N, Kisilevsky B. (Eds). Fetal Development. Springer Cham; 2016.
10. Helmy ME, Elkhouly NI, Ghalab RA. Maternal anemia with pregnancy and its adverse effects. Menoufia Med J 2018;31(1):7–11.
11. Baig-Ansari N, Badruddin SH, Karmaliani R, Harris H, Jehan I, Pasha O, *et al*. Anemia prevalence and risk factors in pregnant women in an urban area of Pakistan. Food Nut Bull 2008;29(2):132–9.
12. Khan DA, Fatima S, Imran R, Khan FA. Iron, folate and cobalamin deficiency in anaemic pregnant females in tertiary care centre at Rawalpindi. J Ayub Med Coll Abbottabad 2010;22(1):17–21.
13. Müngen E. Iron supplementation in pregnancy. J Perinat Med 2003;31(5):420–6.
14. Toteja GS, Singh P, Dhillon BS, Saxena BN, Ahmed FU, Singh RP, *et al*. Prevalence of anemia among pregnant women and adolescent girls in 16 districts of India. Food Nut Bull 2006;27(4):311–5.
15. Sukrat B, Sirichotiyakul S. The prevalence and causes of anemia during pregnancy in Maharaj Nakorn Chiang Mai Hospital. J Med Assoc Thai 2006;89(Suppl 4):S142–6.
16. Demuth IR, Martin A, Weissenborn A. Iron supplementation during pregnancy –a cross-sectional study undertaken in four German states. BMC Pregnancy Childbirth 2018;18(1):491.
17. Ali SA, Abbasi Z, Shahid B, Moin G, Hambidge KM, Krebs NF, *et al*. Prevalence and determinants of anemia among women of reproductive age in Thatta Pakistan: Findings from a cross-sectional study. PLoS One 2020;15(9):e0239320.
18. Soma-Pillay P, Nelson-Piercy C, Tolppanen H, Mebazaa A. Physiological changes in pregnancy. Cardiovasc J Africa 2016;27(2):89–94.

Address for Correspondence:

Dr Kanza Hamid, Department of Anatomy, AJK Medical College, Muzaffarabad, Azad Kashmir. **Cell:** +92-345-2922372
Email: kanza.dr@gmail.com