DISSERTATION SUBMITTED FOR THE MASTER'S DEGREE INMEDICAL PHYSIOLOGY

Inspiring Excellence

TITLE

"ASSOCIATION OF ANAEMIA WITH GESTATIONAL HYPERTENSION AMONG PREGNANT WOMEN IN RURAL AREAS OF LUCKNOW

SUBMITTED BY

MOHD MONIS

2022

DEPARTMENT OF MEDICAL PHYSIOLOGY INTEGRAL INSTITUTE OF MEDICAL SCIENCES & RESEARCH

INTEGRAL UNIVERSITY, LUCKNOW-226026, U.P

INTEGRAL INSTITUTE OF MEDICAL SCIENCES & RESEARCH

INTEGRAL UNIVERSITY, LUCKNOW

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"ASSOCIATION OF ANAEMIA WITH GESTATIONAL HYPERTENSION AMONG PREGNANT WOMEN IN RURAL AREAS OF LUCKNOW

Dissertation submitted to

Integral Institute of Medical Sciences and Research

In partial fulfilment of the requirements for the award of degree of

Master of Science in Medical Physiology

By

MOHD MONIS

Enrollment No.2000100209

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DECLARATION BY CANDIDATE

I hereby declare that this dissertation entitled **"ASSOCIATION OF ANAEMIA WITH GESTATIONAL HYPERTENTION AMONG PREGNANT WOMEN IN RURAL AREAS OF LUCKNOW"** is a bonafide & genuine research work carried out by me under the guidance of Prof (Dr.) Khaleel Ahmad Manik, Professsor and Head of the Department of Physiology and co-supervision Prof(Dr.) Bhavna Gupta, Professor, Department of Obstetrics & Gynaecology and Dr. Samreen Farooqui, Assistant Professor, Department of Physiology.

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ENDORSEMENT BY THE HOD

This is to certify that the dissertation entitled **"ASSOCIATION OF ANAEMIA WITH GESTATTIONAL HYPERTENSION AMONG PREGNANT WOMEN IN RURAL OF LUCKNOW"** is a bonafide & genuine research work carried out by MOHD MONIS under the guidance of Prof(Dr.) Khaleel Ahmed Manik , HOD& Professor, Department of Physiology and under the co- supervision of Prof(Dr.) Bhavna Gupta, Professor, Department of Obs& Gynae, and Dr, Samreen Farooqui Assistant Professor Department of Physiology , in partial fulfillment of requirement for the degree of Master of Science in Medical Physiology. The research methods and procedures described have been done by the candidate and result observed by the Guides periodically.

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This is to certify that MOHD MONIS student of M.Sc. MEDICAL PHYSIOLOGY; Integral University has completed his dissertation entitled **"ASSOCIATION OF ANAEMIA WITH GESTATIONAL HYPERTENSION AMONG PRAGNANT WOMENS RURAL AREAS OF LUCKNOW"** successfully. He has completed this work from the department of Physiology, Integral Institute of Medical Sciences and Research, Integral University under the guidance of DR. KHALEEL AHMAD MANIK. The dissertation was a compulsory part of his M.Sc. degree. I wish him good luck and bright future.

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MOHD MONIS

ACKNOWLEDGEMENT

It is a matter of great privilege to have an opportunity to extend my gratitude to those remarkable persons who helped me to make my work worthy of presentation.

First and foremost, I am extremely thankful to ***Dr. Khaleel Ahmed Manik****, Professor & Head, Department of Physiology, IIMS&R, whose benevolent guidance and constant encouragement helped me during my work.*

I feel immense pleasure to express my regards, and sincere thanks to my esteemed teacher and co guide, ***Dr. Bhavana Gupta****, Professor, Department of obs,& Gynae IIMS&R, Integral University, Lucknow, , who despite of his busy schedule, provided me excellent guidance, motivation, constant help and keen interest in my dissertation, without whose untiring efforts and able guidance, this work would have never taken the present shape.*

I am extremely grateful to pay my deep sense of gratitude and indebtedness to my Co-guide, ***Dr. Samreen Farooqui****, Assistant Professor in Department of Physiology, IIMS&R, for his unfailing support, valuable suggestions & for providing all necessary Facilities that made it possible to claim the accuracy in this work.*

I express my heartiest thanks to ***Dr. Sara Siddiqui, Dr. Samreen Farooqui, Dr. Inam, Dr. Sabi Qazi,*** *and* ***Dr, Nikhat ,*** *faculty of Department of Physiology, for their ready help, immense support and guidance.*

I am highly thankful to ***Dr. Ausaf Ahmad*** *Statistician and Assistant professor in Community Medicine for his kind interest valuable guidenace and statistical analysis in proposed dissertation work*

I am also thankful to ***Mr. Ghazali Rabbani, Mr. Asif Khan, Mr. Furkan Ahmad,*** *for providing with whatever facilities wereneeded during my period of work.*

I would also pay my special thanks and appreciation to my batchmates, by ***Dr. Anurag Vishwakarma*** *and* ***Mr. Anil Kumar their*** *continuous help, care, co-operation and help in understanding this venture.*

I would also pay my heartfelt thanks to my batchmate and friend ***Mr.Sakib Khan*** *who helped me in getting best out of my work and saved me from lots of labour by their support.*

Date **MOHD. MONIS**

Place

List of Abbreviations

BMI	:	Body Mass Index
CHD	:	Chronic Heart Disease
CKD	:	Chronic Kidney Disease
CVS	:	Cardiovascular System
DBP	:	Diastolic Blood pressure
EPO	:	Erythropoietin
Hb	:	Haemoglobin
HTN	:	Hypertension
IHD	:	Ischaemic Heart Disease
MCV	:	Mean Corpuscular Volume
SBP	:	Systolic Blood Pressure

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INTRODUCTION

ANEMIA IN PREGNANCY

Anemia is a clinical condition in which the oxygen carrying capacity of blood is reduced. It is characterized by reduction in the number of RBCs less than 4 million/µL or their content of hemoglobin less than 12 gm/dl or both.

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. It occurs at all stages of the life cycle, but is more prevalent in pregnant women[1].

According to the standards laid down by WHO, anemia in pregnancy is present when the hemoglobin concentration in the peripheral blood is 11 g/100 mL or less. During pregnancy plasma volume expands (maximum around 32 weeks) resulting in hemoglobin dilution. For this reason, hemoglobin level below 10 g/dL at any time during pregnancy is considered anemia (WHO, 1993; CDC, 1990).Hb level at or below 9 g/dL requires detailed investigations and appropriate treatment. Adopting this lower level, the incidence of anemia in pregnancy ranges widely from 40% to 80% in the tropics compared to 10% to 20% in the developed countries. Anemia is responsible for 20% of maternal deaths in the third world countries[1].

The woman who has got sufficient iron reserve and is on a balanced diet, is unlikely to develop anemia during pregnancy in spite of an increased demand of iron. But if the iron reserve is inadequate or absent, the factors which lead to the development of anemia during pregnancy are:-[2]

1. **Increased demands of iron**: The demand of iron during pregnancy is markedly increased. An adequate balanced diet contains not more than 18–20 mg of iron and assuming that the absorption rate is increased by twofold (20%), the demand is hardly fulfilled.

2. **Diminished intake of iron**: Apart from socioeconomic factors, faulty diet habits, loss of appetite and vomiting in pregnancy are responsible factors.

3. **Diminished absorption**: Acid environment in the duodenum helps in iron absorption. On the other hand intake of antacids, H2 blockers and proton pump inhibitors inhibit iron absorption.

4. **Disturbed metabolism**: Presence of infections markedly interferes with the erythropoiesis; one should not even ignore the presence of asymptomatic bacteriuria.

5. **Pre-pregnant health status**: Majority of the women in the tropics actually start pregnancy on a pre-existing anemic state or at least with inadequate iron reserve. It is the state of the stored iron which largely determines whether or not and how soon a pregnant woman will become anemic.

6. Excess demand:

I. **Multiple pregnancy** increases the iron demand by twofold.

II. **Women with rapidly recurring pregnancy**, within 2 years following the last delivery, need more iron to replenish deficient iron reserve.

III. The demand of iron which accompanies the natural growth before the age of 21, should not be underestimated, specially where teenage pregnancies are quite prevalent.

IRON DEFICIENCY ANEMIA:

The clinical features depend more on the degree of anemia than anything else. Majority of the patients have got no symptom and the anemia is detected accidentally during examination. However, the following features may develop slowly.[3]

Symptoms:

1. Lassitude and fatigue or weakness may be the earliest manifestations.

2.The other features are anorexia and indigestion; palpitation caused by ectopic beats, dyspnea, giddiness and swelling of the legs.[3]

On examination:

1. There is pallor of varying degrees; evidences of glossitis and stomatitis.
2. Edema of the legs may be due to hypoproteinemia or associated preeclampsia.
3. A soft systolic murmur may be heard in the mitral area due to physiological mitral incompetence.
4. Crepitations may be heard at the base of the lungs due to congestion. [3]

INVESTIGATIONS:

The patient having a hemoglobin level 9 gm% or less should be subjected to a full hematological investigation.

This requires hematological examination which includes estimation of:

1. Hemoglobin,
2. Total Red Cell Count
3. Determination of Packed Cell Volume.

All these factors help not only to identify the physiological anemia of pregnancy but also to note the degree of pathological anemia.

Arbitrary grading of pathological anemia is done according to the level of hemoglobin:

a) Mild—between 8 gm% and 10 gm%,

b) Moderate—less than 8 to 7 gm% and

c) Severe—less than 7 gm%.

COMPLICATIONS OF ANEMIA IN PREGNANCY

The following complications are likely to increase:

1. Preeclampsia- may be related to malnutrition and hypoproteinemia.

2. Intercurrent infection—Not only does anemia diminish resistance to infection, but also any pre-existing lesion, if present, will flare up. It should be noted that the infection itself impairs erythropoiesis by bone marrow depression. [4]

3. Heart failure- at 30–32 weeks of pregnancy.

4. Preterm labor.

DURING LABOR:

1. **Uterine inertia-** is not a common associate, on the contrary the labor is short because of a small baby and multiparity.
2. **Postpartum hemorrhage-** is a real threat. Patient tolerates even a minimal amount of blood loss.
3. **Cardiac failure-** may be due to accelerated cardiac output which occurs during labor or immediately following delivery. As the blood in the uterine circulation is squeezed in the general circulation, it puts undue strain on the weak heart already compromised by hypoxia.
4. **Shock**—Even a minor traumatic delivery without bleeding may produce shock or a minor hypoxia during anesthesia which may be lethal.

PUERPERIUM:

There is increased chance of:

1. Puerperal sepsis
2. Subinvolution
3. Poor lactation
4. Puerperal venous thrombosis
5. Pulmonary embolism.

Risk periods:

The risk periods when the patient may even die suddenly are:

1. At about 30–32 weeks of pregnancy

2. During labor
3. Immediately following delivery
4. Any time in puerperium especially 7–10 days following delivery due to cardiac failure or pulmonary embolism.[5]

EFFECTS ON BABY: -

Amount of iron transferred to the fetus is unaffected even if the mother suffers from iron deficiency anemia. so, the neonate does not suffer from anemia at birth.

1. There is increased incidence of low-birth-weight babies with its incidental hazards [5].
2. Intrauterine death—due to severe maternal anoxemia. The sum effect is increased perinatal loss.

GESTATIONAL HYPERTENSION

A sustained rise of blood pressure to 140/90 mm Hg or more on at least two occasions 4 or more hours apart beyond the 20th week of pregnancy or within the first 48 hours of delivery in a previously normotensive woman is called gestational hypertension[5].

It is associated with a much higher incidence of essential hypertension in later life than preeclampsia. Both, thus appear to be two phases of the same disorder. It should fulfill the following criteria:

1- Absence of any evidences for the underlying cause of hypertension.

2- Generally unassociated with other evidences of preeclampsia

3- Majority of cases are more than or equal to 37 weeks pregnancy[5].

4- Generally not associated with hemoconcentration or thrombocytopenia, raised serum uric acid level or hepatic dysfunction.

5- The blood pressure should come down to normal within 12 weeks following delivery. However, gestational Hypertension may go to proteinuric phase and may evolve to preeclampsia.

It is a retrospective diagnosis. The hypertensive effect may be a stress response. There are no longer any real differences in management between Pre-Eclampsia and gestational Hypertension, in terms of Blood Pressur management and in the decision to deliver.

A case of severe Hypertension, with appearance of symptoms or abnormal laboratory values, suggests delivery.

Gestational edema

It is excessive accumulation of fluid with demonstrable pitting edema over the ankles greater than 1 + after 12 hours in bed or gain in weight of 2 kg or more in a week due to influence of pregnancy[6].

Gestational proteinuria

It is the presence of protein of more than 0.3 g in the 24 hours urine during or under the influence of pregnancy in the absence of hypertension, edema or renal infection. It may be orthostatic proteinuria[6].

REVIEW OF LITERATURE

Anaemia has previously been found to affect pregnant women in eastern Sudan regardless of their age and parity which is confirmed in this study. Our data showed that women with severe anaemia were less educated, and had a lower rate of antenatal attendance and a higher rate of rural residency. We also recently observed an association between education level and antenatal care, and an influence of both education and antenatal care on maternal mortality.

The number of RBCs and the concentration of Hb in the blood are kept at normal levels by a nice balance between the formation of new RBCs and the destruction of old of erythrocytes.

Anaemia results when the balance is tipped one way or the other, that is by a defect of blood formation or an increase in hemolysis. Basically, it is a condition in which the Hb level of the blood is reduced below the normal limits.

Children	6 months – 6 years: < 11 gm/dl
	6 years – 14 years: < 12 gm/dl
Adult Female	< 12 gm/dl
Adult (pregnant female)	< 11 gm/dl

	Normal Hb Level	Mild Anaemia	Moderate Anaemia	
Adult Female Pregnant Women	≥ 12mg/dl 11-11.9 mg/dl	11 mg/dl – 11.9 mg/dl 10 mg/dl-10.9mg/dl	8-10.9 mg/dl 7mg/dl-9.9mg/dl	
Unit	BEFORE PREGNANCY	THE FIRST TRIMESTER	THE SECOND TRIMESTER	THE THIRD TRIMESTER
g/dl	12-15.8	11.6-13.9	9.7-14.8	9.5-15

The anaemia may be classified broadly in to

A) Those associated with blood loss or increased blood destruction
B) Those caused by defective blood formation

Blood Loss Acute: trauma

Chronic: gastrointestinal tract lesions, gynaecologic disturbance

Increased Destruction (Haemolytic Anaemias)

Intrinsic (Intracorpuscular) Abnormalities

Hereditary

Membrane abnormalities

Membrane skeleton proteins: spherocytosis, elliptocytosis

Membrane lipids: abetalipoproteinemia

Enzyme deficiencies

Enzymes of hexose monophosphate shunt: glucose-6-phosphate dehydrogenase,

glutathione synthetase Glycolytic enzymes: pyruvate kinase, hexokinase

Disorders of haemoglobin synthesis

Structurally abnormal globin synthesis (hemoglobinopathies): sickle cell anaemia, unstable

haemoglobins

Extrinsic (Extracorpuscular) Abnormalities

Antibody-mediated Iso haemagglutinins: transfusion reactions, immune hydrops (Rh disease of the Newborn)

Autoantibodies: idiopathic (primary), drug-associated, systemic lupus erythematosus **Mechanical trauma to red cells** Microangiopathic haemolytic anaemias: thrombotic thrombocytopenic purpura, disseminated intravascular coagulation

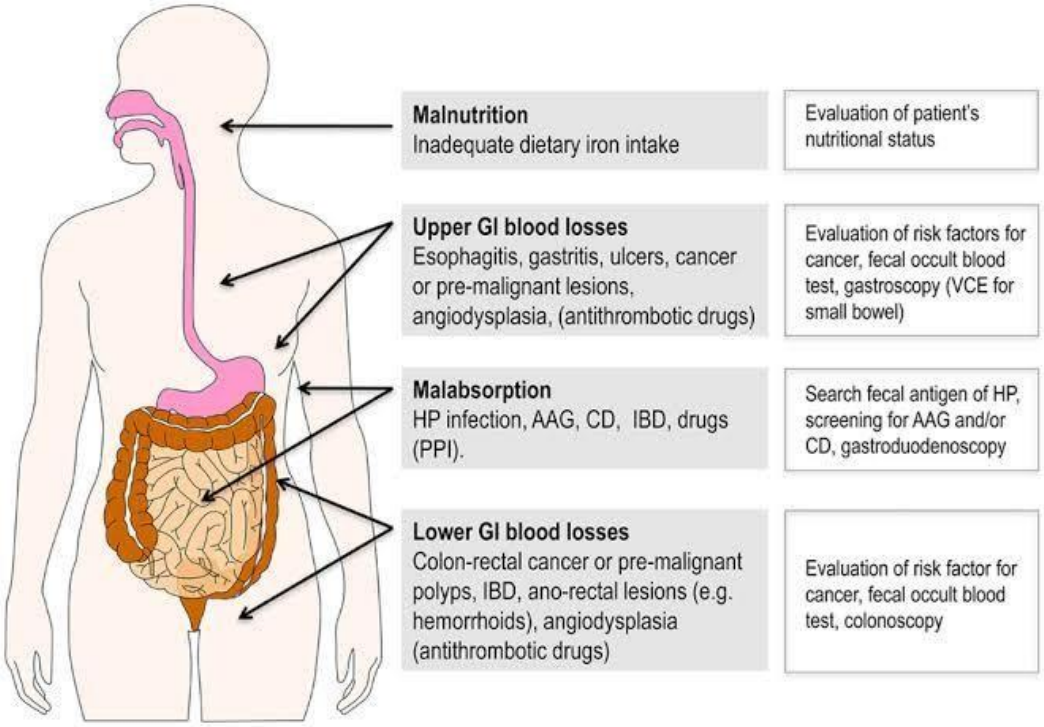
Defective cardiac alves

Impaired Red Cell Production

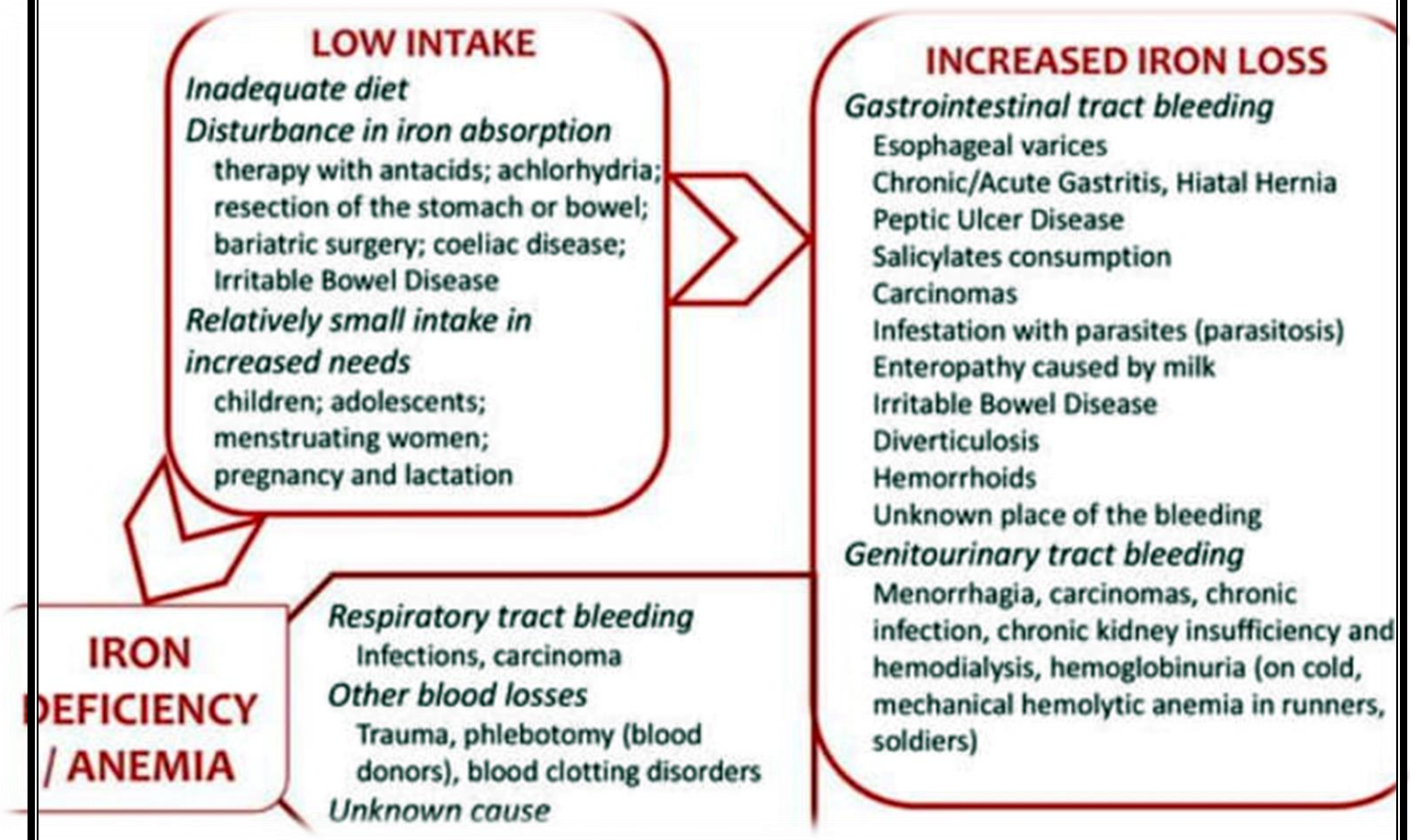
- Disturbed proliferation and differentiation of stem cells: aplastic anaemia, pure red cell aplasia
- **Disturbed proliferation and maturation of erythroblasts**
- Defective DNA synthesis: deficiency or impaired use of vitamin B12 and folic acid (megaloblastic anaemias)
- Anaemia of renal failure (erythropoietin deficiency)
- Anaemia of chronic disease (iron sequestration, relative erythropoietin deficiency)
- **Anaemia of endocrine disorders**
  Defective haemoglobin
  synthesis
- Deficient haeme synthesis: iron deficiency, sideroblastic anaemias
  Deficient globin synthesis: thalassemia's
- Marrow replacement: primary hematopoietic neoplasms (acute leukaemia, myelodysplastic

When anaemia is severe enough it results in certain clinical findings. Patients appear pale. Lethargy, malaise, and easy fatigability are common complaints. The lowered oxygen level of the circulating blood results in dyspnea on mild exertion. Hypoxia can cause fatty change in the liver, myocardium, and kidney.

Risk Factors for iron deficiency anemia during pregnancy



1. Have two closely spaced pregnancies
2. Are pregnant with more than one baby
3. Are vomiting frequently due to morning sickness.
4. Do not consume enough iron-rich foods.
5. Have a heavy pre -pregnancy menstrual flow.
6. Have a history of anemia before pregnancy



Hypertension is defined as a SBP of 140 mm Hg or greater and/ or a DBP of 90 mm Hg or greater. Isolated systolic hypertension is defined as a systolic pressure of 140 mm Hg or greater with a diastolic pressure of more than 90 mm Hg.

Despite the high prevalence of hypertension in Pregnant Women, it should not be considered a normal consequence of pregnancy. Hypertension is the major risk factor for cardiovascular disease in Pregnant women , and that risk increases with each trimester. Both increase of systolic blood pressure and pulse pressure are better predicators of adverse events than diastolic pressure. This is particularly relevant to Pregnant women.

Hypertension may be primary (idiopathic) or less commonly secondary to an identifiable underlying condition. In close to 95% of cases hypertension is idiopathic or “essential”. Most of the remaining cases (secondary hypertension) are due to primary renal disease, renal artery narrowing renovascular hypertension, or adrenal disorders. Essential hypertension is compatible with long life unless a myocardial infarction, stroke, or other complication supervenes. Prognosis of secondary hypertension depends on adequate treatment of the underlying cause. Several relatively rare single-gene disorders cause hypertension (and hypotension) by affecting renal sodium reabsorption.

CLASSIFICATION OF HYPERTENSION: -

1. **Essential Hypertension-** Accounts for 90% to 95% of all cases
2. **Secondary Hypertension**

Renal

Acute glomerulonephritis

Chronic renal disease

Polycystic disease

Renal artery stenosis

Renal vasculitis

Renin-producing tumours

primary aldosteronism, congenital adrenal [including pregnancy induced and oral contraceptives], sympathomimetics and tyramine containing foods, monoamine oxidase inhibitors)

Pheochromocytoma

Acromegaly

Hypothyroidism (myxoedema)

Hyperthyroidism (thyrotoxicosis)

Pregnancy-induced (pre-eclampsia)

Cardiovascular

Coarctation of the aorta

Polyarteritis nodosa

Increased intravascular volume

Increased cardiac output Rigidity of the aorta **Neurologic**

Psychogenic

A study conducted by (**Atsma Femke et.al 2012**) Additionally, they noted that in healthy individuals, there is a positive correlation between haemoglobin level and both systolic and diastolic blood pressure. They came to the conclusion that SBP increased by 0.7 mm Hg in women for an increase in Hb of 1.3 mm Hg per millimole per litre and by 0.9 mm Hg for an increase in Hb of 1.8 mm Hg per millimole per litre in women. The findings showed that in healthy individuals, haemoglobin level is positively correlated with both systolic and diastolic blood pressure.

In 30.1% of all cases, iron deficiency was a more common kind of anaemia than other types. Additionally, a high frequency of folate and B12 insufficiency (23.6 percent and 14 percent, respectively) was noted. 14 percent of cases were found to have unexplained anaemia. From the first trimester until the third trimester, all patients were split into three groups. In this study, the incidence of anaemia and hypertension rose with each pregnancy trimester.

AIM AND OBJECTIVES

NULL HYPOTHESIS (H0)

There is no association between anaemia and gestational hypertension among pregnant women .

ALTERNATIVE HYPOTHESIS (H1)

There is significant association between anaemia and gestational hypertension among pregnant women.

AIM

To determine association of anaemia with gestational hypertension among pregnant women.

OBJECTIVES

- To estimate Haemoglobin level in cases.
- To record arterial blood pressure in cases.
- To determine the association of anaemia with gestational hypertension in cases.

MATERIALS AND METHOD

TYPE OF STUDY – Cross-sectional Study.

PLACE OF STUDY - The study will be performed in the Department of Physiology at Integral Institute Medical Science & Research, Lucknow (U.P.).

Duration of Study- (February 2022 to July 2022)

INCLUSION CRIETERIA-

1. Subjects with diagnosed anaemia and hypertension as per WHO criteria.
2. Pregnant women who have signed the consent forms.

EXCLUSION CRIETERIA-

1. Pregnant women with diseases, other than anaemia and hypertension.
2. Drug addicts and history of Alcohol.
3. Pregnant women with obesity.

COLLECTION OF DATA

1. Record of cases of Anemia and Hypertension in Obstetrics and Gynaecology Department of IIMS&R was taken.
2. From volunteer pregnant women who have signed informed consent forms, their haemoglobin level (by Sahli's Acid Hematein method) and Arterial blood pressure by Sphygmomanometer was estimated in Haematology and Clinical Laboratories of the department of Physiology of IIMS&R, Lucknow.

SAMPLE SIZE-

The sample size was calculated using the formula:

$$N = \frac{Z_{\alpha/2} P(1-P)}{d^2}$$

N = sample size

$Z_{1-\alpha/2}$ = Critical value and a standard value for the corresponding level of confidence. (At 95% CI or 5% level of significance (type-I error) it is 1.96)

p = Prevalence 3.5% (previous study)

d = Margin of error or precision 3%

Non -response = 10% (Daniel WW;1999)

The study includes N=160 cases diagnosed with anaemia and hypertension.

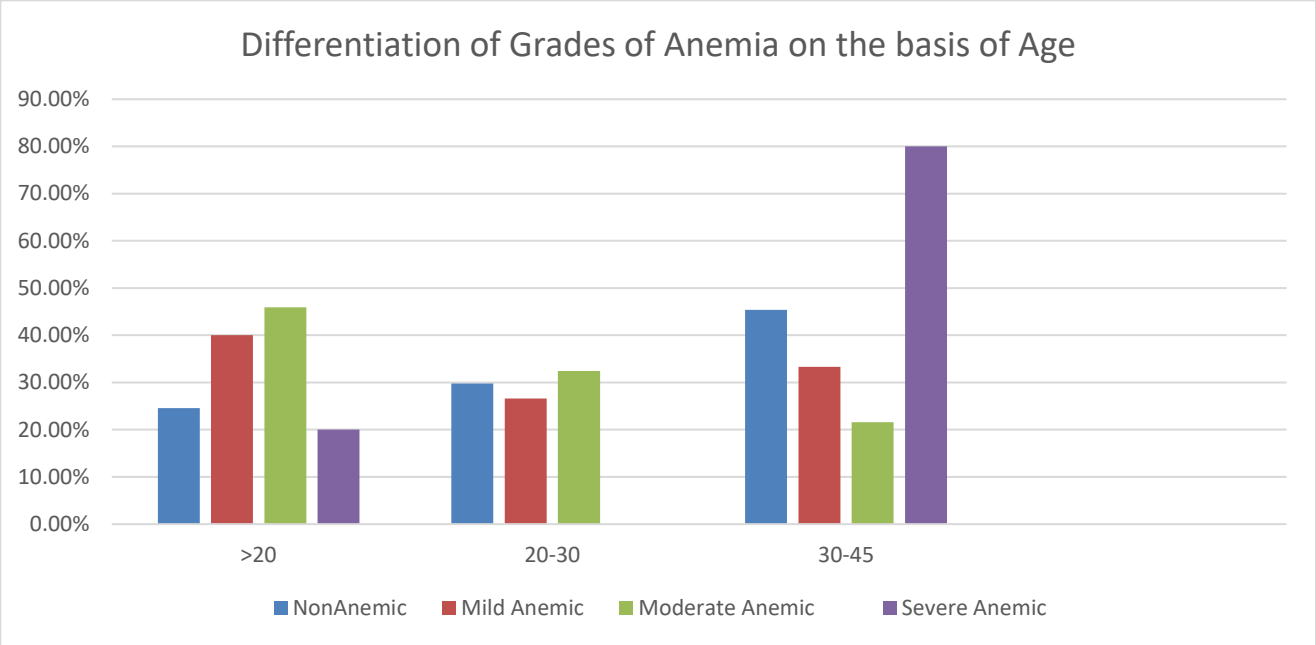
OBSERVATIONS AND RESULTS

	Pregnant Women	
	Percentage	Number
Women with Anemia	41.8%	83
Women with Gestational Hypertension	6%	10
severe anemia & Gestational Hypertension both	17% of severe anemia	1
Normal	48%	77
Total	160(100%)	160(100%)

Table NO.1- Frequency Distribution Table

Age in Year	Non Anemic N=77	Mild Anemic N=30	Moderate Anemic N=37	Severe Anemic N=5
>20	19(24.6%)	12(40%)	17(45.9%)	1(20%)
20-30	23(29.8%)	8(26.6%)	12(32.43%)	Nill(0%)
30-45	35(45.4%)	10(33.3%)	8(21.62%)	4(80%)
Total	77(100%)	30(100%)	37(100%)	5(100%)

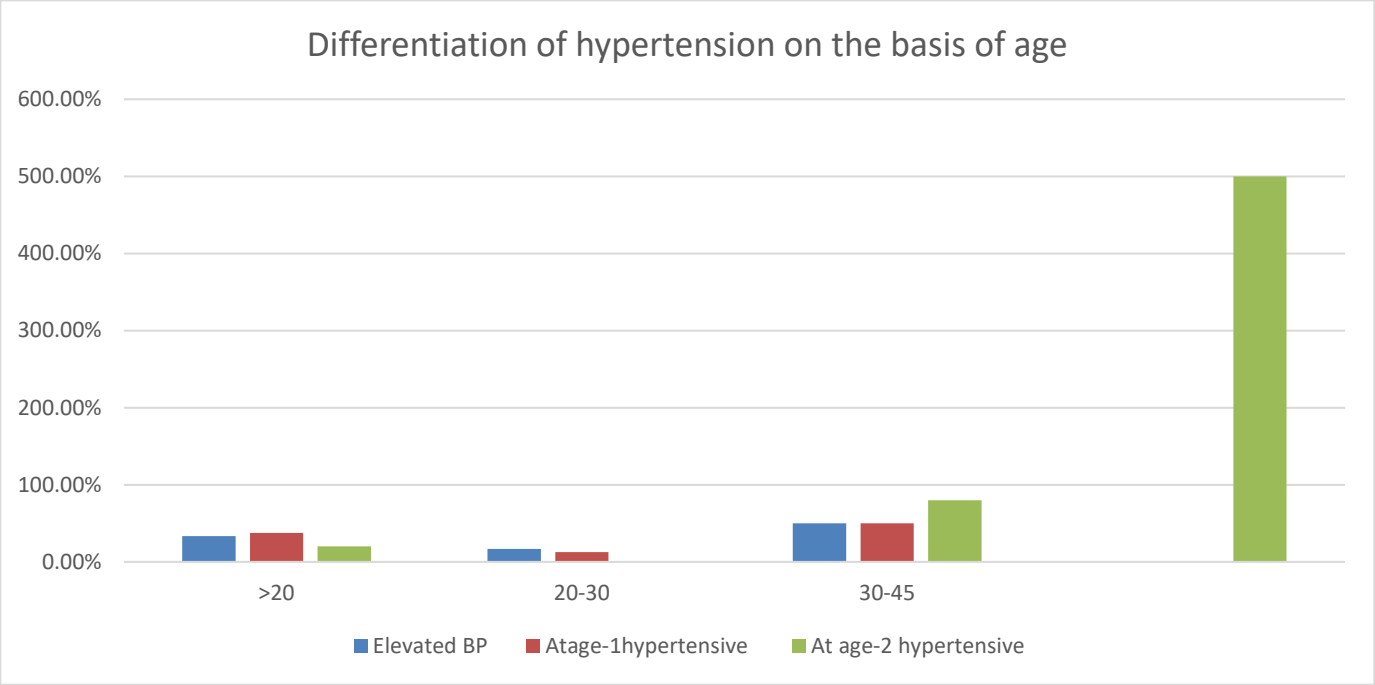
Table No. 2- Differentiation of Grades of anemia on the basis of age



Graph No. 1- Differentiation of Grades of anemia on the basis of age

Age in Year	Elevated BP N=12	Stage-1hypertensive N=8	Stage-2 hypertensive N=10
>20	4(33.33%)	3(37.5%)	2(20%)
20-30	2(16.6%)	1(12.5%)	Nill(0%)
30-45	6(50%)	4(50%)	8(80%)
Total	12(100%)	8(100%)	10(100%)

Table No.3- Differentiation of Hypertension on the basis of age.


Differentiation of hypertension on the basis of age
600.00%
500.00%
400.00%
300.00%
200.00%
100.00%
0.00%
>20
20-30
30-45
Elevated BP
Atage-1hypertensive
At age-2 hypertensive

Gestational Hypertension

ANEMIA		**Yes**	**No**	**Fisher Exact Test**
	Yes	1(1.2%)	82(98.8%)	0.007
	No	9(11.7%)	68(88.3%)	
	Table NO. 4 Contingency table Showing Association between Anemia and Gestational Hypertension			

Anemia during pregnancy is a major public health problem , especially in developing countries . It effects 41.8% of pregnant women with the highest prevalence in rural areas of Lucknow. Severe anemia during pregnancy is only associated with gestational hypertension.

Anemia during pregnancy is associated with gestational hypertension.

. Table No 1- Shows the frequency distribution of anemia and gestational hypertension

. Table No 2- Shows the Differentiation of Grades of anemia on the basis of age

. Table No 3- Shows the Differentiation of Hypertension on the basis of age

Table NO. 4 Contingency table Showing Association between Anemia and Gestational Hypertension

RESULTS

There were 160 pregnant women, after analyzing the above data only One Pregnant women have both severe anemia and gestational hypertension, After analysing the above data, we identified that in our study using Fisher's Exact Test p-value is <0.05 and it shows statically significant

1. pregnant women having anemia 41.8% so number of anemics 67 out of 160 (sample size)

2. pregnant women having gestational hypertension 6% so number is 10 out of 160 (sample size)

3. pregnant women having severe anemia only 3.1% so number is 5 out of 160 (sample size)

Note- gestational hypertension find with only severe anemia in pregnant women- not with mild and moderate anemia in pregnant women so the number of women having both,

Severe anemia and gestational hypertension (17% of severe anemia)

So only one women having both severe anemia and gestational hypertension out of 160 (sample size)

DISCUSSION

The whole study population divided on the basis of presence of Anemia -(41.8%) gestational hypertension (6%) , women with severe anemia (3%) and 48% women were found non anemic , normotensive and hypotensive

This study did not demonstrate the precise sort of connection, necessitating further investigation and an intervention with a sizable sample size from various geographical areas.

Previous research has found a variety of connections between anaemia and hypertension. Some studies found that chronic hypertension can harm the kidneys' EPO-producing cells and renal tubules, which in turn causes a reduction in RBC production and anaemia. With this indicator, we can see how anaemia and hypertension are associated.[16]

Stress may also have a role in the relationship between haemoglobin and blood pressure. It has been found that the sympathetic nervous system's activation causes an increase in haemoglobin and hemocrit, and that mental stress has a stronger correlation with changes in cardiovascular indicators like heart rate and blood pressure than physical stressors do.[17]

Xuan Y et.al concluded in their study showed Hb level has a favourable correlation with both SBP and DBP. They further revealed that haemoglobin may act as a NO scavenger, relaxing smooth muscle cells, changing peripheral resistance, and ultimately lowering blood pressure. NO is formed in endothelial cells, which line blood arteries. A higher concentration of free Hb may bind to NO, causing the blood vessels to constrict and the blood pressure to rise.[18]

Conclusion

The present study had concluded that the decreased level of Hb is significantly associated with gestational hypertension in pregnant women in rural areas of Lucknow region of India

We can apply our results and its interpretation in prevention and early detection of anemia and gestational hypertension among pregnant women

Limitations

- This was a single centerd, hospital based, cross-sectional study with small sample size (n=160). As a result, we cannot generalise our findings as there was no specific type of association found in our study.
- Demographical distribution also influences the Heamoglobin level and blood pressure.
- There were many confounding factors which could be excluded by considering large sample size from different regions so that specific association between anemia with gestational hypertension can be detected among pregnant women

BIBILIOGRAPHY

1. De Benoist B, McLean E, Egli I, Cogswell M: Worldwide Prevalence of anaemia 1993-2005: WHO Global Database on Anaemia. 2008, Geneva: World Health Organization
2. World Health Organization: The prevalence of anemia in women: a tabulation of available information. 1992, Geneva, Switzerland: WHO
3. Allen LH: Anaemia and iron deficiency: effects on pregnancy outcome. Am J Clin Nutr. 2000, 71 (Suppl): 1280S-1284S.
4. Adam I, Babiker S, Mohmmed A, Salih M, Prins M, Zaki Z: Low body mass index, anaemia and poor perinatal outcome in a rural hospital in eastern Sudan. J Trop Pediatr. 2007, 54: 202-204
5. D.C. Dutta, Hypertensive disorders in pregnancy in, text book of obstetrics, 6th edition, new central book agency,2004;239.
6. Kidanto HL, Mogren I, Lindmark G, Massawe S, Nystrom L. Risks for preterm delivery and low birth weight are independently increased by severity of maternal anaemia. *S Afr Med J.* 2009 ;**99**(2):98–102.
7. Haggaz AD, Radi EA, Adam I. Anaemia and low birth weight in Western Sudan. 2009, *Trans R Soc Trop Med Hyg.* 2010;**104**:234–236. doi: 10.1016/j.trstmh..07.013.
8. Elhassan EM, Abbaker AO, Haggaz AD, Abubaker MS, Adam I. Anaemia and low birth weight in Medani, Hospital Sudan. 2010, *BMC Res Notes.* ;**28**:181.
9. Ali AA, Adam I. Anaemia and stillbirth in Kassala hospital, eastern Sudan.*J Trop Pediatr*. 2011;**57**(1):62–4. doi: 10.1093/tropej/fmq029
10. Rohilla M, Raveendran A, Dhaliwal LK, Chopra S. Severe anaemia in pregnancy: a tertiary hospital experience from northern India. 2010, *J Obstet Gynaecol.* ;**30**(7):694–6. doi: 10.3109/01443615.2010.509821
11. Levy A, Fraser D, Katz M, Mazor M, Sheiner E. Maternal anemia during pregnancy is an independent risk factor for low birth weight and preterm delivery.2005, *Eur J Obstet Gynecol Reprod Biol.* ;**122**(2):182–6. doi: 10.1016/j.ejogrb..02.015.

12. Xiong X, Buekens P, Alexander S, Demianczuk N, Wollast E. Anaemia during pregnancy and birth outcome. 2000 A meta-analysis. *Am J Perinatol.* ;**17**(3):137–146. doi: 10.1055/s-2000-9508
13. Ali AA, Khojali A, Okud A, Adam GK, Adam I. Maternal near-miss in a rural hospital in Sudan. 2011, *BMC Pregnancy Childbirth.* ;**29**:11–48.
14. A2dam I, Khamis AH, Elbashir MI. Prevalence and risk factors for anaemia in pregnant women of eastern Sudan. 2005,*Trans R Soc Trop Med Hyg.* 2005;**99**:739–743. doi: 10.1016/j.trstmh. .02.008.
15. Jain S, Sharma P, Kulshreshtha S, Mohan G, Singh S. The role of calcium, magnesium, and zinc in pre-eclampsia. 2010, *Biol Trace Elem Res.* ;**133**(2):162–70. doi: 10.1007/s12011-009-8423-9.
16. Elhassan EM, Haggaz AD, Magzoub MM, Adam I. Non-malarial fever among pregnant women in Medani Hospital, Sudan: Diagnostic uncertainty and overtreatment with quinine.2010, *Asian Pac J Trop Med.* ;**5**:395–398
17. Phaloprakarn C, Tangjitgamol S. Impact of high maternal hemoglobin at first antenatal visit on pregnancy outcomes: a cohort study.2008 ,*J Perinat Med.* ;**36**(2):115–9. doi: 10.1515/JPM.2008.018

ANNEXURE

CONSENT FORM

I……age…….W/o,D/o……Address……

……. agree to participate in the research work

Topic "ASSOCIATION OF ANAEMIA WITH GESTATIONAL HYPERTENSION AMONG WOMEN'S IN RURAL AREAS OF LUCKNOW "

I have known the details of the research work very well and I give my consent for the same.

Date:

Signature/thumb impression of the patients: Name of research scholar

Signature/thumb impression of the witness: Signature of research schola

INFORMATION SHEET (FOR CASES)

I, MOHD MONIS of Medical Physiology is a research scholar in IIMS&R.

I am associated with your treating doctor panel.

You are a newly diagnosed case of anaemia and gestational hypertension.

For this study, I will take few drops of your blood sample for the estimation of haemoglobin level.

The blood will be used for estimation of haemoglobin level and not for any other purpose.

I will also measure your blood pressure with Sphygmomanometer.

You will be neither charged for any of the above test nor be paid.

Your identity will be kept confidential and information and result of your blood test will not be revealed to any other except you if you, so desire.

The result of this test may or may not be helpful for your treatment but may improve the knowledge and understanding of disease and the knowledge may be helpful in future.

After having the all above information would you like to participate in our study? YES NO

सूचना पत्र

1.मै **मो0 मोनिष** आईआईएमएसआर लखनऊ में शोध विद्यार्थी हूँ

2.इस परीक्षण के लिए ना ही शुल्क लिया अथवा दिया जायेगा

3.इस दौरान आपकेद्वारा दी गयी सारी जानकारी परीक्षण गोपनीय रखा जायेगा।

4.आप अगर चाहेंगे तो उसका परिणाम आपको बताया जायेगा।

5.आप इस अध्यन में अपनी स्वेच्छा से शामिल अथवा इंकार कर सकते हैं।

6.इससे आपके इलाज पर कोई दुष्प्रभाव नहीं पड़ेगा।

7.इस समस्त तत्व को समझते हुए क्या अध्यन में योगदान देने की सहमति प्रदान करते है हां/नहीं।

स्वीकृति/सहमति पत्र

मै.....उम्र.....पुत्र/पुत्री/पत्नी.....निवासी.....

.....

मुझे अधय्यन शीर्षक " एसोसिएशन ऑफ एनीमिया और जेस्टेशनल हाइपरटेंशन

" की संभावनाओ एवं परिणामो के बारे में विधिवत बताया गया है।

अतः मै सूचित करता/ करती हूँ एवं लिखित सहमति देता / देती हूँ, कि मेरे रक्त का नमूना केवल ऊपर कहे गये अधय्यन के लिय एकत्रित किया जाए।

रोगी के हस्ताक्षर/अँगूठे के निशान

शोध छात्र के हस्ताक्षर

गवाह के हस्ताक्षर/अंगूठे के निशान

1.WORKING PROFORMA

1. Registration No.: **Date** **OPD** ☐ **IPD** ☐

2. Contact No:

3. Name: ☐ ☐ ☐ **Age** **Sex**: a) Male b) Female

4. Father 's Name:

5. Place of Residence: a) Urban b) Rural

6. Address:

7. Marital status: a) Unmarried b) Married c) Divorced d) Widow

8. Education:

9. Occupation:

10. Diet: a) Vegetarian b) Non-Vegetarian

11. Height:

12. Weight:

2. Family history

1. Mother

a) Mother suffers from Thyroid Disorders:

Yes, No Unknown

2. Father

b) Father suffers from Thyroid Disorders.

Yes, No Unknown

3. No. of siblings: ☐

How many of them suffering from Hypertension? ☐

MEDICAL HISTORY

1 Grades of anemia

Mild

Moderate

Severe

2 Stage of hypertension

Normotensive

Elevated BP

Hypertension Stage 1

Hypertension Stage 2

Name	Age	Sex	Hieght	Weight	Trimester	grades of Anemia		gastetional hypertension		
Gun gun Mishra	27	f	132		2nd	n/a		nill		
Sirajunnisha	33	f	132	78	1st	mild		nill		
Ritika singh	27	f	143	82	1st	moderate		nill		
Abida	29	f	134	78	3rd	n/a		nill		
pooja gupta	31	f	132	82	1st	n/a		nill		
preety pal	28	f	134	87	3rd	n/a		nill		
bilkees jahan	29	f	154	78	2nd	n/a		nill		
raisa	27	f	142	90	3rd	moderate		nill		
manna	26	f	124	100	1st	mild		nill		
rafikunnisha	28	f	144	77	2nd	mild		nill		
priya	24	f	111	80	3rd	moderate		nill		
tabassum	42	f	123	81	2nd	moderate		nill		
huda ara	36	f	143	62	2nd	mild		nill		
eram	38	f	143	75	1st	moderate		nill		
kiran rawat	33	f	132	84	2nd	n/a		nill		
sariba	27	f	141	64	1st	n/a		nill		
mammta yadav	32	f	142	92	1st	n/a		nill		
umme anjum	43	f	144	80	1st	mild		nill		
parveen bano	36	f	134	98	2nd	mild		nill		
ajeema bano	28	f	143	90	2nd	mild		nill		
ram sajhani	41	f	132	72	1st	moderate		nill		
babita bhisht	39	f	123	55	1st	moderate		nill		
sabiha	22	f	132	85	3rd	moderate		nill		
desbo bhagel	41	f	136	67	2nd	n/a		nill		
ajeesha khatoon	28	f	134	56	1st	n/a		nill		
pargati	29	f	143	45	1st	n/a		nill		
komal	27	f	135	49	1st	mild		nill		
basundhara	26	f	143	56	1st	n/a		nill		
sabiha	28	f	134	58	1st	n/a		nill		
shaheen	24	f	124	76	2nd	n/a		nill		
nikahat	42	f	134	74	2nd	n/a		nill		
mahnoor	36	f	143	78	2nd	moderate		nill		
gulishta	46	f	154	67	2nd	n/a		nill		
savitri	33	f	135	66	1st	mild		nill		
javitri	27	f	134	79	2nd	n/a		nill		
riyanshi	32	f	147	75	2nd	mild		nill		
deepika maurya	43	f	147	66	1st	n/a		nill		
subi	36	f	121	54	1st	n/a		nill		
neelam chauhan	28	f	143	55	1st	moderate		nill		
tayyaba fatima	41	f	124	65	2nd	n/a		nill		
babita bhisht	39	f	145	68	2nd	n/a		nill		
kashifa	22	f	143	90	3rd	severe		nill		
sabi qazi	19	f	130	87	3rd	severe		nill		
vindhiya	36	f	134	85	3rd	severe		nill		
savita maurya	24	f	134	91	3rd	moderate		nill		
shivani	37	f	123	83	2nd	mild		nill		
rukhsar	29	f	132	54	1st	n/a		nill		
antima	38	f	144	67	2nd	n/a		nill		
rajni	25	f	132	87	3rd	n/a		nill		
neelam chauhan	26	f	116	54	1st	mild		nill		
rukhsar khatoon	27	f	133	90	3rd	n/a		nill		
nasreen khan	29	f	122	75	3rd	n/a		nill		
rubiya	21	f	155	53	1st	moderate		nill		
anju verma	23	f	111	48	1st	mild		nill		
jyoti	26	f	155	49	1st	n/a		nill		
nida fatima	24	f	144	60	1st	n/a		nill		
mammta tiwari	21	f	133	84	3rd	mild		nill		
subiya khan	34	f	133	64	1st	n/a		nill		
qudsiya	33	f	122	92	3rd	severe		nill		
rukhsar	31	f	143	65	1st	n/a		nill		
shahibun	32	f	132	98	3rd	n/a		nill		
saliha	30	f	112	65	2nd	moderate		nill		
zaiba	19	f	112	72	2nd	moderate		nill		
raziba	22	f	131	54	1st	n/a		persent		
shabista	24	f	132	85	1st	mild		nill		

arti	25	f	142	90	3rd	n/a		nill		
noor afsha	40	f	132	75	3rd	moderate		nill		
ayisha khatoon	25	f	132	75	2nd	n/a		nill		
akansha soni	34	f	132	43	1st	mild		nill		
rushda khan	31	f	120	66	2nd	moderate		nill		
soni devi	29	f	123	82	3rd	moderate		nill		
sabiya bano	42	f	124	85	3rd	severe		present		
khusnuma bano	26	f	142	89	3rd	n/a		nill		
afsar jahan	27	f	134	46	1st	n/a		nill		
firdos	29	f	145	75	3rd	moderate		nill		
nasreen jahan	21	f	134	82	2nd	mild		nill		
saliha	23	f	134	87	3rd	n/a		nill		
maisar	26	f	132	85	3rd	n/a		nill		
preety	29	f	143	67	1st	mild		nill		
najma	39	f	113	82	3rd	moderate		nill		
madhu	41	f	130	95	3td	n/a		nill		
sangeeta	44	f	130	87	2nd	mild		nill		
rajvanti	21	f	130	84	2nd	moderate		nill		
hajra	19	f	139	54	1st	n/a		nill		
nisha	21	f	123	45	1st	n/a		nill		
subi	26	f	132	76	1st	n/a		persent		
anshu	28	f	132	54	1st	n/a		nill		
sapna	24	f	132	88	3rd	moderate		nill		
shabana	29	f	120	67	1st	n/a		nill		
afsana	27	f	120	85	1st	mild		nill		
nausheen	29	f	112	91	3rd	moderate		nill		
najmeen	24	f	120	83	3rd	n/a		present		
rinki	26	f	129	70	2nd	n/a		nill		
rani	27	f	132	54	2nd	moderate		nill		
umme anjum	31	f	142	76	2nd	mild		nill		
rajni	29	f	132	85	3rd	n/a		nill		
nujhat	29	f	143	90	3rd	n/a		persent		
mahinoor	31	f	134	75	2nd	moderate		nill		
nikhat	27	f	123	75	3rd	n/a		nill		
archana	21	f	123	91	3rd	mild		nill		
khusnjuma	20	f	112	75	2nd	moderate		nill		
divyanshi	26	f	132	57	1st	n/a		nill		
rajiya	24	f	133	80	3rd	moderate		nill		
pooja chauhan	21	f	122	56	1st	mild		nill		
mammta	19	f	115	75	3rd	moderate		nill		
waqasan	21	f	118	68	2nd	moderate		nill		
kahkasha	26	f	116	77	3rd	n/a		nill		
rukhsar	28	f	119	80	3rd	n/a		nill		
shahibun nisha	24	f	105	81	3rd	n/a		nill		
saba khatoon	29	f	112	62	3rd	moderate		nill		
seema	27	f	125	75	3rd	n/a		nill		
savita	29	f	146	56	1st	n/a		present		
preety	24	f	128	64	3rd	n/a		nill		
pooja	26	f	127	92	2nd	moderate		nill		
preety jaiswal	27	f	126	70	2nd	n/a		persent		
shalu	31	f	128	68	2nd	moderate		nill		
rani	29	f	138	55	1st	moderate		nill		
saziya	29	f	133	72	1st	n/a		nill		
zainab	31	f	133	50	1st	mild		nill		
rukhsar khan	27	f	132	85	3rd	n/a		present		
nisha pal	21	f	132	90	2nd	n/a		nill		
fahmida	20	f	123	75	1st	n/a		nill		
rabni	26	f	132	75	2nd	moderate		nill		
pushpa	24	f	141	75	1st	n/a		nill		
shalu	21	f	142	64	1st	n/a		present		
mohsina	19	f	144	46	1st	n/a		nill		
gulsaba	21	f	143	75	2nd	moderate		nill		
afsha	26	f	135	80	2nd	n/a		nill		
arti	28	f	126	53	1st	n/a		nill		
rooji	24	f	115	75	3rd	moderate		nill		
hina	29	f	132	82	3rd	n/a		nill		

anju	27	f	123	87	1st	n/a		nill		
tabassum	29	f	121	85	1st	mild		nill		
jyoti	24	f	111	87	3rd	moderate		nill		
punita	26	f	121	56	1st	n/a		nill		
sarita	27	f	123	95	2nd	n/a		nill		
anajli	31	f	132	87	3rd	n/a		nill		
nsreen bano	29	f	123	84	3rd	n/a		nill		
nida	29	f	132	78	3rd	n/a		nill		
chunni devi	31	f	132	87	2nd	n/a		nill		
sadhna	27	f	111	88	3rd	n/a		nill		
ranjana	21	f	132	81	3rd	severe		nill		
shabnam	20	f	134	88	3rd	n/a		nill		
fatima	26	f	112	67	1st	mild		nill		
shashi	24	f	102	82	2nd	n/a		nill		
sona vati	31	f	108	74	2nd	n/a		persent		
muveena khatoon	30	f	112	84	3rd	n/a		nill		
mamta	24	f	111	80	3rd	n/a		nill		
rujana parveen	26	f	132	78	2nd	n/a		nill		
nasreen bano	29	f	132	65	1st	mild		nill		
savita rawat	31	f	123	76	3rd	n/a		nill		
sajida bano	35	f	143	67	3rd	n/a		present		
shahiba	32	f	145	68	3rd	n/a		nill		
preety rawat	28	f	143	57	2nd	n/a		nill		
aqeela bano	25	f	120	49	1st	mild		nill		
chand baby	21	f	114	78	3rd	n/a		nill		
sana parveen	19	f	123	69	2nd	n/a		nill		
shafiq bano	34	f	132	65	2nd	n/a		nill		
shafaq razi	38	f	136	56	1st	n/a		nill		
bushra khatoon	40	f	143	80	3rd	n/a		nill		

INSTITUTIONAL ETHICS COMMITTEE (IEC)

IIMS&R INTEGRAL UNIVERSITY, LUCKNOW

IEC/IIMS&R/2022/25

CERTIFICATE

This is to certify that research work entitled"**Association of Anaemia with Gestational Hypertension among Pregnant women in rural areas of Lucknow**" submitted by**Mohd.Monis, Dr.(Prof.)Khaleel Ahmad Manik, Dr.Samreen farooqui, Dr.Bhawna Gupta** for ethical approval before the Institutional Ethics Committee IIMS&R.

The above mentioned research work has beenapprovedby Institutional Ethics Committee, IIMS&R with consensusin the meeting held on **19 May 2022**.

Dr.Deepak Chopra
(Jt.Member Secretary)
IRC/IEC
IIMS &R

Dr.Q.S.Ahmed
(Member Secretary)
IRC/IEC
IIMS &R

TO WHOM SO EVER CONCERNED

This is to certify that the Mr... Mohd. Monis ..... (Enroll. No 2000100209 student of M.Sc. Medical Physiology, Department of Physiology, Integral Institute of Medical Sciences and Research (IIMSR), Integral University has worked on the dissertation thesis entitled. Association of Anemia with Gestational Hypertension among pregnant women in rural areas of Lucknow

It has been checked for plagiarism through a plagiarism detection tool i.e..... Turnitin ..... This study is approved by the Institute and the contents are original and not copied/taken from any one or many other sources.

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Designation: Assist. Prof. & Head

Signature with date: 15/11/2022

Seal:

Dr. Mohd. Mustufa Khan
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IIAHS&R, Integral University, Lucknow

Thesis work done by:

Name of Student: Mohd Monis

Enrollment No. 2000100209

Signature with date: 15/11/2022

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Word count: 2875
Character count: 15821

INTRODUCTION

Anemia is considered a clinical condition in which the blood, which is having capacity to carry oxygen, is reduced. Reduced levels of RBCs fewer than 4 million per litre or a decrease in their composition of hemoglobin less than 12 gm/dl or both.

Anemia has risen to a global problem regarding public health which is affecting under-developed as well as developed countries with having a major consequences for economic, social and human health development as well. It befalls at all phases of life, but it is more dominant in women having pregnancy [1].

According to WHO recommendations, anaemia in pregnancy is present when the peripheral blood haemoglobin level is 11 g/100 mL or lower. A maximum increase in plasma volume occurs around 32 weeks into pregnancy, which dilutes hemoglobin. Because of this, anaemia is defined as having a haemoglobin level <10 g/dL at any point throughout pregnancy (WHO, 1993; CDC, 1990). A haemoglobin level of 9 g/dL or less calls for thorough investigation and the right kind of care. According to this lower standard, the prevalence of anemia throughout pregnancy in the tropics ranges from 40% to 80% compared to 10% to 20% in developed nations. Twenty percent of maternal deaths in third-world nations are attributable to anaemia. [1].

Despite the increased demand for iron, a woman with having a sufficient reserve in her body and follows a healthy diet is less likely to experience anaemia during pregnancy. But the factors that cause anaemia to develop during pregnancy if the iron reserve is insufficient or nonexistent are:-[2]

1. **Increased demands of iron**: The need for iron increases noticeably during pregnancy. Even if the absorption rate is increased by 20%, an adequate balanced diet only contains 18–20 mg of iron, so the demand is barely met.
2. **Moderated intake of iron**: In addition to socio-economic factors, poor eating habits, appetite loss, and pregnancy vomiting are to blame.
3. **Diminished absorption**: The duodenum's acidic environment promotes iron absorption. The consumption of antacids, H2 blockers, and proton pump inhibitors, on the other hand, prevents the

absorption of iron.

4. **Disturbed metabolism**: When infections are present, erythropoiesis is significantly hindered; asymptomatic bacteriuria should not even be disregarded.
5. **Pre-pregnant health status**: The women majority in the tropics really begin their pregnancies anaemic with insufficient iron reserves. The level of iron which is stored in the body, plays a significant role in determining whether a woman with pregnancy will become anaemic.

6. Excess demand:

I. **The demand for iron is doubled during multiple pregnancies.**

II. **Women who experience a pregnancy quickly after giving birth the first time need more iron to make up for a low iron reserve.**

III. Particularly in areas where teenage pregnancies are quite common, the demand for iron that comes along with growth which happens naturally, before 21 should not be misjudged.

IRON DEFICIENCY ANEMIA:

The level of anaemia has the biggest impact on the clinical characteristics. The majority of patients have no symptoms, and anaemia is inadvertently discovered during examination. The following traits, however, might take longer.[3]

Symptoms:

1. Laziness and exhaustion or weakness may be the first symptoms.
2. Other symptoms include indigestion, anorexia, palpitations brought on by ectopic heartbeats, dyspnea, giddiness, and swelling of the legs. [3]

HYPERTENSION IN PREGNANCY

Blood pressure consistently rising to 140/90 mm Hg or higher on no less than two separate occasions. Gestational hypertension is expressed as blood pressure readings that are 4 or more than 4 hours apart within the first 48 hours of the pregnancy or after the 20th week after delivery in a earlier normotensive woman. [5].

Compared to preeclampsia, it is linked to a higher incidence of necessary hypertension in later life. As a result, both seem to be two stages of the identical disorder. It should meet the following requirements:

1. The underlying cause of hypertension is not supported by any evidence.
2. Typically unrelated to other preeclampsia symptoms
3. Mostly cases are ≥ 37 weeks preg/nancy[5].
4. Generally, it is not associated with hemoconcentration or thrombocytopenia, elevated serum uric acid level or hepatic dysfunction.
5. The blood pressure should fall to normal under 12 weeks post-delivery.

It is a diagnosis made after the fact. The effect of hypertension could be a result of stress. Pre-Eclampsia and gestational hypertension are no longer really treated differently in terms of controlling blood pressure and making the decision to deliver.

Symptoms or abnormal laboratory results in a case of severe hypertension point to delivery.

Gestational edema

It is an abnormal buildup of fluid with pitting edema above the ankles that is more than 1+ following 12 hours of sleep or a weight gain of 2+ kg in a week brought on by pregnancy. [6].

Gestational proteinuria

When there is no hypertension, edoema, or renal infection, there must be more than 0.3 g. of protein in the urine over the course of 24 hours while pregnant or under the influence of pregnancy. Orthostatic proteinuria could be the cause. [6].

REVIEW OF LITERATURE

This study supports previous research that pregnant women present in the east of Sudan, irrespective of age or parity, are at risk for anaemia. Our findings indicated that women with having severe anaemia had lower levels of education, lower antenatal attendance rates, and higher rates of rural residency. Additionally, we have recently noticed a connection between education level and antenatal care as well as the impact of both factors on maternal mortality.

The amount of RBCs and the concentration of Hb in the blood are kept at normal levels by a nice balance between the formation of new RBCs and the destruction of old of erythrocytes.

Anaemia results when the balance is tipped one way or the other, that is by a defect of blood formation or an increase in hemolysis. Basically, it is a situation in which the Hb level of theblood is reduced below the normal limits.

The anaemia may be classified broadly in to

A) Those associated with blood loss or increased blood destruction

B) Those caused by defective blood formation

Loss of blood **Acute:** trauma

Chronic: gastrointestinal tract lesions, gynaecologic disturbance

Increased Destruction (Haemolytic Anaemias)Intrinsic (Intracorpuscular) Abnormalities Hereditary

Membrane abnormalities

Membrane skeleton proteins: spherocytosis, elliptocytosisMembrane lipids: abetalipoproteinemia

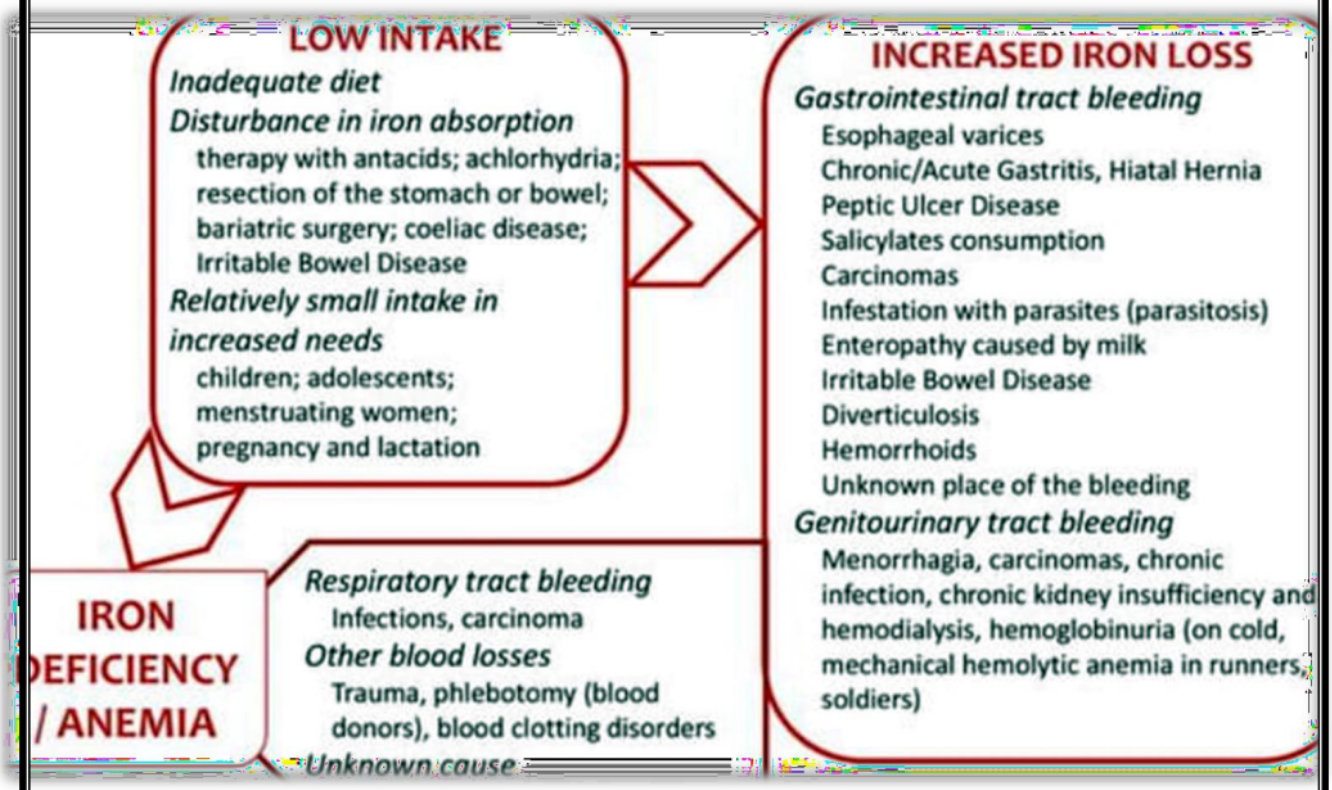
Enzyme deficiencies

Hexose monophosphate shunt enzymes: Glutathione synthase and glucose-6-phosphate dehydrogenase glycemic enzymes Hexokinase and pyruvate kinase

Disorders of haemoglobin synthesis

Hemoglobinopathies (structurally abnormal globin synthesis) include sickle cell anaemia and unstable anaemia.

1. two pregnancies
2. Are carrying multiple children
3. Frequently vomit because of morning sickness.
4. You don't eat enough foods high in iron.
5. Experience a heavy menstrual flow prior to conception.
6. Have experienced anaemia before becoming pregnant


LOW INTAKE
Inadequate diet
Disturbance in iron absorption
therapy with antacids; achlorhydria; resection of the stomach or bowel; bariatric surgery; coeliac disease; Irritable Bowel Disease
Relatively small intake in increased needs
children; adolescents; menstruating women; pregnancy and lactation
INCREASED IRON LOSS
Gastrointestinal tract bleeding
Esophageal varices
Chronic/Acute Gastritis, Hiatal Hernia
Peptic Ulcer Disease
Salicylates consumption
Carcinomas
Infestation with parasites (parasitosis)
Enteropathy caused by milk
Irritable Bowel Disease
Diverticulosis
Hemorrhoids
Unknown place of the bleeding
Genitourinary tract bleeding
Menorrhagia, carcinomas, chronic infection, chronic kidney insufficiency and hemodialysis, hemoglobinuria (on cold, mechanical hemolytic anemia in runners, soldiers)
IRON DEFICIENCY / ANEMIA
Respiratory tract bleeding
Infections, carcinoma
Other blood losses
Trauma, phlebotomy (blood donors), blood clotting disorders
Unknown cause

A SBP of 140 mm Hg or higher and/or a DBP of 90 mm Hg or higher are considered to be high blood pressure. A systolic pressure of 140 mm Hg or higher with a diastolic pressure of more than 90 mm Hg is referred to as isolated systolic hypertension.

It should not be assumed that pregnancy's high prevalence of hypertension is a normal side effect. The main risk factor for cardiovascular disease in pregnant women is high blood pressure, and this risk rises with each trimester. Diastolic pressure is a poorer predictor of adverse events than an increase in systolic blood pressure or pulse pressure. This is especially important for expectant mothers.

It is possible for hypertension to be either primary (idiopathic) or, less frequently, secondary to a known underlying condition. Nearly 95% of the time, hypertension is "essential" or idiopathic. The majority of secondary hypertension cases (remaining cases) are brought on by primary renal disease, renal artery narrowing, or adrenal disorders. Except in the event of a myocardial infarction, stroke, or other complication, essential hypertension is not a barrier to long life. The effectiveness of treatment for the underlying cause will determine the prognosis of secondary hypertension. By affecting renal sodium reabsorption, a number of relatively uncommon single-gene disorders can lead to hypertension (and hypotension).

CLASSIFICATION OF HYPERTENSION: -

AIM AND OBJECTIVES

1. **Primary Hypertension-** Accounts for 90% to 95% of all cases
2. **Secondary Hypertension**

Renal

Acute glomerulonephritis

Chronic renal disease

Polycystic disease

Renal artery stenosis

Renal vasculitis

Renin-producing tumours

primary aldosteronism, congenital adrenal[pregnancy induced and oral contraceptives], sympathomimetics and tyramine containing foods, monoamine oxidase inhibitors)

Pheochromocytoma

Acromegaly

Hypothyroidism (myxoedema)

Hyperthyroidism (thyrotoxicosis)

Pregnancy-induced (pre-eclampsia)

Cardiovascular

Coarctation of the aorta

Polyarteritis nodosa

Increased intravascular volume

Increased cardiac output

Rigidity of the aorta

Neurologic

Psychogenic

Increased intracranial pressure Sleep

NULL HYPOTHESIS (H0)

There is no relation between anaemia and gestational hypertension among pregnant women .

ALTERNATIVE HYPOTHESIS (H1)

There is significant association between anaemia and gestational hypertension among pregnant women.

AIM

To determine association of anaemia with gestational hypertension among pregnant women.

OBJECTIVES

- To estimate Haemoglobin level in cases.
- To record arterial blood pressure in cases.
- To determine the association of anaemia with gestational hypertension in cases.

MATERIALS AND METHOD

TYPE OF STUDY – Cross-sectional Study.

PLACE OF STUDY - The study will be performed in the Department of Physiology at Integral Institute Medical Science & Research, Lucknow (U.P.).

Duration of Study- (February 2022 to July 2022)

INCLUSION CRIETERIA-

1. Subjects with diagnosed anaemia and hypertension as per WHO criteria.
2. Pregnant women who have signed the consent forms.

EXCLUSION CRIETERIA-

1. Pregnant women with diseases, other than anaemia and hypertension.
2. Drug addicts and history of Alcohol.
3. Pregnant women with obesity.

COLLECTION OF DATA

1. Record of cases of Anemia and Hypertension in Obstetrics and Gynaecology Department of IIMS&R was taken.
2. From volunteer pregnant women who have signed informed consent forms, their haemoglobin level (by Sahli's Acid Hematein method) and Arterial blood pressure by Sphygmomanometer was estimated in Haematology and Clinical Laboratories of the department of Physiology of IIMS&R, Lucknow.

SAMPLE SIZE-

The formula was used to determine:

$$N = \frac{Z_{\alpha/2} P(1-P)}{d^2}$$

N = sample size

$Z_{1-\alpha/2}$ = Critical value and a standard value for the corresponding level of confidence. (At 95% CI or 5% level of significance (type-I error) it is 1.96)

p = Prevalence 3.5% (previous study)

d = Margin of error or precision 3%

Non -response = 10% (Daniel WW;1999)

The study includes N=160 cases diagnosed with anaemia and hypertension.

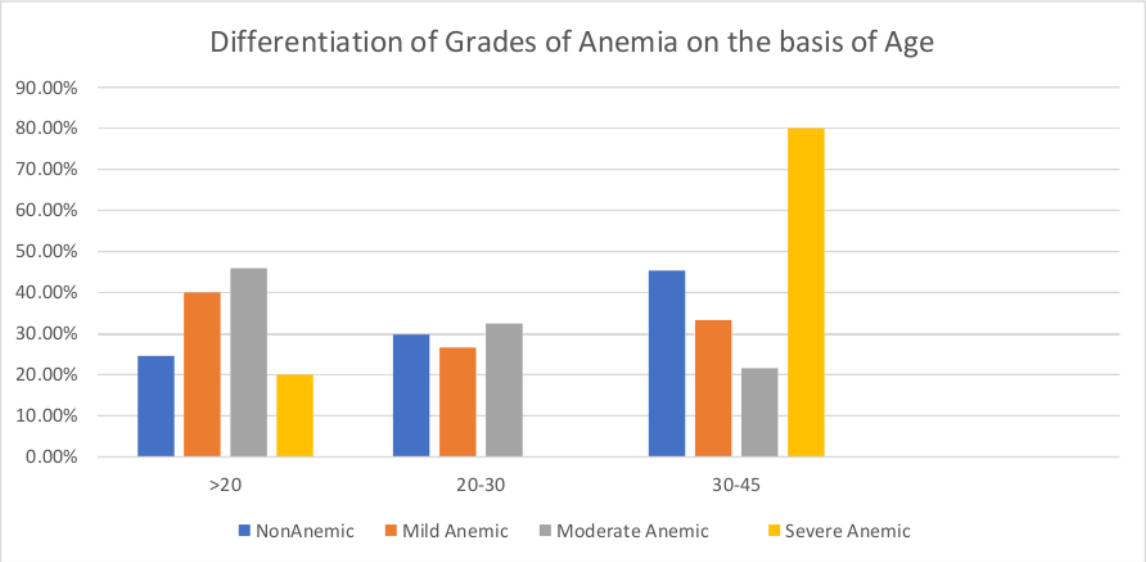
OBSERVATIONS AND RESULTS

	Pregnant Women	
	Percentage	Number
Women with Anemia	41.8%	83
Women with Gestational Hypertension	6%	10
severe anemia & Gestational Hypertension both	17% of severe anemia	1
Normal	48%	77
Total	160(100%)	160(100%)

Table NO.1- Frequency Distribution Table

Age in Year	Non Anemic N=77	Mild Anemic N=30	Moderate Anemic N=37	Severe Anemic N=5
>20	19(24.6%)	12(40%)	17(45.9%)	1(20%)
20-30	23(29.8%)	8(26.6%)	12(32.43%)	Nill(0%)
30-45	35(45.4%)	10(33.3%)	8(21.62%)	4(80%)
Total	77(100%)	30(100%)	37(100%)	5(100%)

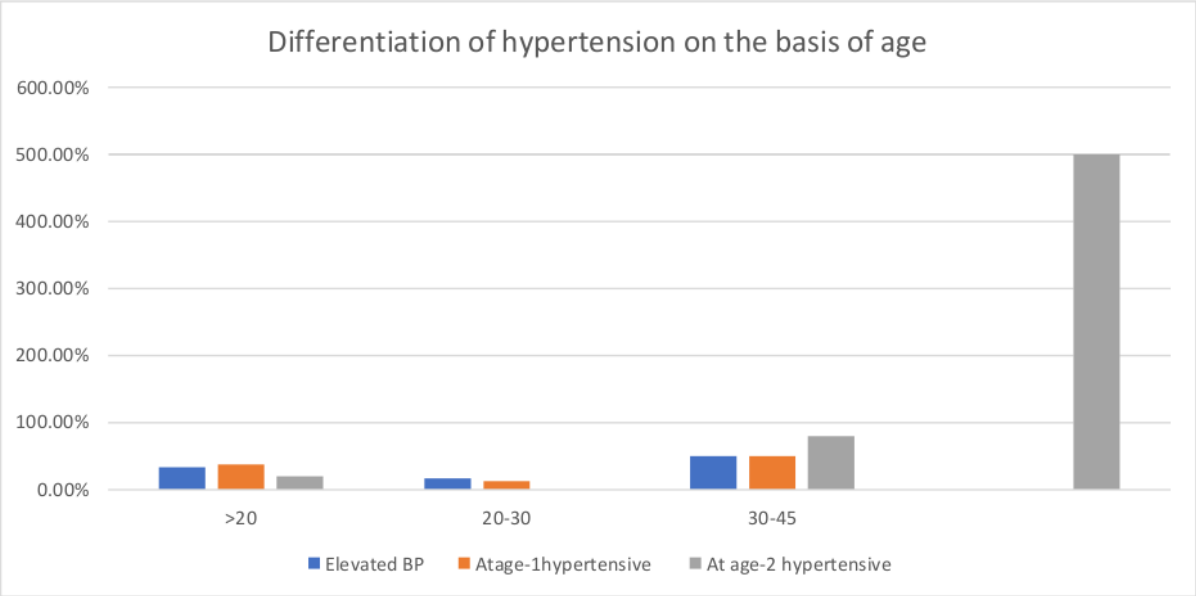
Table No. 2- Differentiation of Grades of anemia on the basis of age



Graph No. 1- Differentiation of Grades of anemia on the basis of age

Age in Year	Elevated BP N=12	Stage-1hypertensive N=8	Stage-2 hypertensive N=10
>20	4(33.33%)	3(37.5%)	2(20%)
20-30	2(16.6%)	1(12.5%)	Nill(0%)
30-45	6(50%)	4(50%)	8(80%)
Total	12(100%)	8(100%)	10(100%)

Table No.3- Differentiation of Hypertension on the basis of age.


Differentiation of hypertension on the basis of age
600.00%
500.00%
400.00%
300.00%
200.00%
100.00%
0.00%
>20
20-30
30-45
Elevated BP
Atage-1hypertensive
At age-2 hypertensive

Gestational Hypertension

		Yes	No	Fisher Exact Test
ANEMIA	Yes	1(1.2%)	82(98.8%)	0.007
	No	9(11.7%)	68(88.3%)	
	Table NO. 4 Contingency table Showing Association between Anemia and Gestational Hypertension			

Anemia in pregnant women is a major problem regarding public health, especially in under-developed countries. It effects 41.8% of pregnant women mostly in rural areas of Lucknow. Severe anemia during pregnancy is only having a relation with gestational hypertension.

. Table No 1- Shows the frequency distribution of anemia and gestational hypertension

. Table No 2- Shows the Differentiation of Grades of anemia on the basis of age

. Table No 3- Shows the Differentiation of Hypertension on the basis of age

Table NO. 4 Contingency table Showing Association between Anemia and Gestational Hypertension

RESULTS

There were 160 pregnant women, after analyzing the above data only One Pregnant women have both severe anemia and gestational hypertension, After analysing the above data, we identified that our study with the help of Fisher's Exact Test having p-value less than 0.05 and it shows statically significant

1. pregnant women having anemia 41.8% so number of anemics 67 out of 160 (sample size)

2. pregnant women having gestational hypertension 6% so number is 10 out of 160 (sample size)

3. pregnant women having severe anemia only 3.1% so number is 5 out of 160 (sample size)

Note- Gestational hypertension find with only severe anemia in women having pregnancy, not with mild and moderate anemia in women having pregnanc,y so the number of women having both. Severe anemia and gestational hypertension (17% of severe anemia)

So only one women having both severe anemia and gestational hypertension out of 160 (sample size)

DISCUSSION

The whole study population divided on the basis of presence of Anemia -(41.8%) gestational hypertension (6%) , women with severe anemia (3%) and 48% women were found non anemic , normotensive and hypotensive.

This study did not demonstrate the precise sort of connection, necessitating further investigation and an intervention with a sizable sample size from various geographical areas.

Previous research has found a variety of connections between anaemia and hypertension. Some studies found that chronic hypertension can harm the kidneys' EPO-producing cells and renal tubules, which in turn causes a reduction in RBC production and anaemia. With this indicator, we can see how anaemia and hypertension are associated.[16]

Stress may also have a role in the relationship between haemoglobin and blood pressure. It has been found that the sympathetic nervous system's activation causes an increase in haemoglobin and hemocrit, and that mental stress has a stronger correlation with changes in cardiovascular indicators like heart rate and blood pressure than physical stressors do.[17]

Xuan Y et.al concluded in their study showed Hb level has a favourable correlation with both SBP and DBP. They further revealed that haemoglobin may act as a NO scavenger, relaxing smooth muscle cells, changing peripheral resistance, and ultimately lowering blood pressure. NO is formed in endothelial cells, which line blood arteries. A higher concentration of free Hb may bind to NO, causing the blood vessels to constrict and the blood pressure to rise.[18]

Conclusion

- The present study had concluded that the decreased level of Hb is significantly associated with gestationalhypertension in pregnant women in rural areas of Lucknow region of India.
- We can apply our results and its interpretation in prevention and early detection of anemia and gestational hypertension among pregnant women

Limitations

- The study had a single centre, was cross-sectional, and had a small sample size (n=160).As a result, we cannot generalise our findings as there was no specific type of association found in our study.
- Demographical distribution also influences the Heamoglobin level and blood pressure.
- There were many confounding factors which could be excluded by considering large sample size from different regions so that specific association between anemia with gestational hypertension can be detected among pregnant women

BIBILIOGRAPHY

1. De Benoist B, McLean E, Egli I, Cogswell M: Worldwide Prevalence of anaemia 1993-2005: WHO Global Database on Anaemia. 2008, Geneva: World Health Organization
2. World Health Organization: The prevalence of anemia in women: a tabulation of available information. 1992, Geneva, Switzerland: WHO
3. Allen LH: Anaemia and iron deficiency: effects on pregnancy outcome. Am J Clin Nutr. 2000, 71 (Suppl): 1280S-1284S.
4. Adam I, Babiker S, Mohmmed A, Salih M, Prins M, Zaki Z: Low body mass index, anaemia and poor perinatal outcome in a rural hospital in eastern Sudan. J Trop Pediatr. 2007, 54: 202-204
5. D.C. Dutta, Hypertensive disorders in pregnancy in, text book of obstetrics, 6th edition, new central book agency,2004;239.
6. Kidanto HL, Mogren I, Lindmark G, Massawe S, Nystrom L. Risks for preterm delivery and low birth weight are independently increased by severity of maternal anaemia. *S Afr Med J*. 2009 ;**99**(2):98–102.
7. Haggaz AD, Radi EA, Adam I. Anaemia and low birth weight in Western Sudan. 2009, *Trans R Soc Trop Med Hyg*. 2010;**104**:234–236. doi: 10.1016/j.trstmh..07.013.
8. Elhassan EM, Abbaker AO, Haggaz AD, Abubaker MS, Adam I. Anaemia and low birth weight in Medani, Hospital Sudan. 2010, *BMC Res Notes*. ;**28**:181.
9. Ali AA, Adam I. Anaemia and stillbirth in Kassala hospital, eastern Sudan.*J Trop Pediatr*. 2011;**57**(1):62–4. doi: 10.1093/tropej/fmq029
10. Rohilla M, Raveendran A, Dhaliwal LK, Chopra S. Severe anaemia in pregnancy: a tertiary hospital experience from northern India. 2010, *J Obstet Gynaecol*. ;**30**(7):694–6. doi: 10.3109/01443615.2010.509821
11. Levy A, Fraser D, Katz M, Mazor M, Sheiner E. Maternal anemia during pregnancy is an independent risk factor for low birth weight and preterm delivery.2005, *Eur J Obstet Gynecol Reprod Biol*. ;**122**(2):182–6. doi: 10.1016/j.ejogrb..02.015.
12. Xiong X, Buekens P, Alexander S, Demianczuk N, Wollast E. Anaemia during pregnancy and

birth outcome. 2000 A meta-analysis. *Am J Perinatol*. ;**17**(3):137–146. doi: 10.1055/s-2000-9508

13. Ali AA, Khojali A, Okud A, Adam GK, Adam I. Maternal near-miss in a rural hospital in Sudan. 2011, *BMC Pregnancy Childbirth*. ;**29**:11–48.
14. A2dam I, Khamis AH, Elbashir MI. Prevalence and risk factors for anaemia in pregnant women of eastern Sudan. 2005,*Trans R Soc Trop Med Hyg*. 2005;**99**:739–743. doi: 10.1016/j.trstmh. .02.008.
15. Jain S, Sharma P, Kulshreshtha S, Mohan G, Singh S. The role of calcium, magnesium, and zinc in pre-eclampsia. 2010, *Biol Trace Elem Res*. ;**133**(2):162–70. doi: 10.1007/s12011-009-8423-9.
16. Elhassan EM, Haggaz AD, Magzoub MM, Adam I. Non-malarial fever among pregnant women in Medani Hospital, Sudan: Diagnostic uncertainty and overtreatment with quinine.2010, *Asian Pac J Trop Med*. ;**5**:395–398
17. Phaloprakarn C, Tangjitgamol S. Impact of high maternal hemoglobin at first antenatal visit on pregnancy outcomes: a cohort study.2008 „*J Perinat Med*. ;**36**(2):115–9. doi: 10.1515/JPM.2008.018

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