EVALUATION OF ANAEMIA AMONG WOMEN OF REPRODUCTIVE AGE GROUP IN UPPER AND LOWER SOCIOECONOMIC STATUS IN PATNA AND ITS ADJOINING AREAS

Sweta[1], Kumar Alok[2], Kumar Ajay[3], Kumari Asha[4], Sachidanand Sharma[5]

[1]Tutor, Department of Physiology, ANMMCH, Gaya.
[2]Tutor, Department of PSM, ANMMCH, Gaya.
[3]Senior Resident, Department of Microbiology, IGIMS, Patna.
[4]Lecturer, Department of Nutrition and Health Education, Patna.
[5]Professor, Department of Physiology, PMCH, Patna.

ABSTRACT

BACKGROUND

Anaemia is a global public health problem. It has been estimated that 20% of world's population is iron deficient. It occurs at all ages, but is especially common in women of childbearing age.

The present study was aimed atevaluating anaemia among women of reproductive age group in upper and lower socioeconomic status in Patna and its adjoining areas and evaluating anaemia in relation to PCV, MCV, RDW, Platelet count and Total WBC count.

MATERIALS AND METHODS

A cross-sectional survey comparative in nature was done over a period of one year and six months from April 2013 to September 2014 in the Department of Physiology, PMCH, Patna. Total number of 600 subjects were recruited in the study, out of which 300 were women in reproductive age group visiting OPD and Indoors in the Department of Medicine, Surgery and Obstetrics and Gynaecology, PMCH, Patna.Another 300 subjects were all interns and postgraduate female students of PMCH, Patna, from April 2013 to September 2014. As the study was a pilot study, sample size was taken as 600.

RESULTS

Out of 300 subjects in lower economic status group, 216(72%) cases belonged to microcytic hypochromic anaemia; 57(19%) were diagnosed as normocytic hypochromic anaemia; 27(9%) were diagnosed as dimorphic anaemia; 40% women were mildly anaemic, 43% women were moderately anaemic and 17% were severely anaemic.

CONCLUSION

The incidence of microcytichypochromicanaemia is high in reproductive age group in low socioeconomic status due to inadequate diet and poor iron absorption.

KEYWORDS

Anaemia, Reproductive Age Group.

HOW TO CITE THIS ARTICLE: Sweta, Alok K, Ajay K, et al.Evaluation of anaemia among women of reproductive age group in upper and lower socioeconomic status in Patna and its adjoining areas. Journal of Evolution of Research in Human Physiology2017; Vol. 3, Issue 1, Jan-June 2017; Page:1-6

BACKGROUND

Anaemia is defined as haemoglobin level in blood below the lower extreme of normal range for the age and sex of individual. Anaemia is a global public health problem of immense health significance affecting person of all ages and economic groups. It has been estimated that 20% of world's population is iron deficient. Iron deficiency anaemia is the most common type of anaemia met within clinical practice. It occurs at all ages, but is especially common in women of childbearing age in whom it is an important cause of chronic fatigue and ill health.[1]

During the reproductive life of the female menstruation, pregnancy and lactation significantly increase the physiological requirements of iron.[2] Iron deficiency anaemia is the most common type of anaemia throughout the world and according to Muhammad Idris et al when iron deficiency is widespread and severe, the prevalence of morbidity and effects on the individual's resistance to infectious disease are significant.[3]

It has been reported to affect about 50% -60% of young children and pregnant females and 20% -30% of non-pregnant females in the developing countries.[4] It is reportedly the most common cause of anaemia in general medical practice.[5]

It is one of the leading nutritional deficiencies in the world, particularly in developing countries. When iron deficiency is sufficiently severe the haemoglobin concentration in the blood decreases leading to iron deficiency anaemia, which has negative consequences especially in children, pregnant women and adolescents. Hence, women with inadequate stores are at increased risk of developing iron deficiency anaemia during pregnancy.[6]

Iron deficiency anaemia is the result of severe degree of iron deficiency. Iron deficiency leads to restriction in the production of haemoglobin. It also causes distortion of red cells with microcytosis and hypochromia and produces

Financial or Other, Competing Interest: None.
Submission 03-06-2016, Peer Review 23-06-2016,
Acceptance 28-06-2016, Published 30-06-2017.
Corresponding Author:
Dr. Ajay Kumar,
Senior Resident,
Department of Microbiology,
IGIMS, Patna.
E-mail: dr.ajay876@gmail.com

deleterious effect on health.[7] Yi-Chia Huang et al has shown that recurrence and risk of iron deficiency are more prevalent in females.[8]

Carmel et al have shown that highest rate of anaemia occur in hospitalised patients.[9] The screening procedure used most often is blood Hb determination, values falling below the cut-off point are considered abnormal. WHO cut-off points 12gm/dL for non-pregnant women and 11gm/dL for pregnant women.[10] Highest incidence of iron deficiency anaemia is seen in women of reproductive age. The incidence is much higher in underdeveloped countries to developed countries.[11]

According to WHO in developing countries the prevalence of anaemia among pregnant women averages 56%, ranging between 35%and 100% among different regions of the world. The various studies from different regions of the country (India) have reported the prevalence of anaemia to be between 33% and 100%. In a recent survey in Sweden, Rybo (1985) found that marrow iron stores were absent in 32% of 38 years old females.[12]

Anaemia in pregnancy is common.This is related to increased demands of iron during pregnancy, pre-existing negative iron balance due to frequent pregnancies, menstrual blood losses, dietary inadequacies, helminthiasis and amoebiasis are important contributory factors.

In India and other developing countries, incidence of nutritional anaemia in reproductive age groups ranges from 60% -80% compared to 10% -20% in developed countries.[13] In Asia the prevalence of nutritional anaemia is particularly high in countries such as Bangladesh (74% -80%), Indonesia (37% -73%), India (34% -69%) and Philippines (42% -47%).[14]

The overall prevalence of anaemia in India has increased from 74.2% (1998-99) to 79.2% (2005-06). Nagaland has the lowest prevalence (44.3%), Goa (49.3%) and Mizoram (51.7%). Bihar has the highest prevalence (87.6%) followed closely by Rajasthan (85.1%) and Karnataka (82.7%).[15] Since several decades it has been known to be an important problem in most tropical countries. The advances made in the therapy of iron deficiency anaemia have greatly minimised the problem of this disease.

In India, anaemia is the second most common cause of maternal deaths accounting for 20% of total maternal deaths. Anaemia affects mainly the women in childbearing age group, young children and adolescent girls. Association of anaemia with adverse maternal outcomes such as puerperal sepsis, antepartum haemorrhage, post-partum haemorrhage and maternal mortality is no longer a debatable subject. Apart from the risk to the mother, it is also responsible for increased incidence of premature births, low birth weight babies and high perinatal mortality.[16]

In pregnant women, WHO defined anaemia as a reduction in haemoglobin level <11 gm/dL. It occurs in 40% -80% of the pregnant women. Iron and folic acid deficiencies, malaria, intestinal parasitic infections and haemoglobinopathies are the principal causes of anaemia in pregnancy.[17]

Socioeconomic factors such as access to adequate health care, food availability, safe drinking water, environmental sanitation and personal hygiene in as much as they contribute to inadequate diet and prevention also contribute to anaemia.[18]

According to WHO, the cut-off point for diagnosis of anaemia in different age groups on the basis of Hb concentration isHaemoglobin level at or below 9 gm/dL required detailed investigations and appropriate treatment. Anaemia is responsible for 20% maternal deaths in the third world countries [Dutta DC, editors].[18]

Anaemia due to iron deficiency is the commonest malnutrition disorder seen throughout the world and in India. The single most important cause for the widespread iron deficiency anaemia in our country is inadequate iron intake in the habitual diets compared with the poor bioavailability of dietary iron.

However, risk factors such as anaemia in pregnancy can be controlled and monitored by good antenatal care and appropriate action including referral, in accordance to the level of severity of anaemia. Hence, the present study was performed to evaluate the status of anaemia among female, so free productive age groups (15 – 49years) in high and low socioeconomic status.

MATERIALS AND METHODS

A cross-sectional survey comparative in nature was done over a period of one year and six months from April 2013 to September 2014 in the Department of Physiology, PMCH, Patna. A total number of 600 subjects were recruited into the study, which were divided into two groups- Lower Economic Status (LES) group and Upper Economic Status (UES) group on the basis of Kuppuswamy's socioeconomic status scale. The subjects in LES group (n=300) were women in reproductive age group attending OPD and Indoors in the Department of Medicine, Surgery and Obstetrics and Gynaecology, PMCH, Patna.

An interview-administrated questionnaire was used to collect information from participants on the demographic (i.e. age, gender and education attainment), socioeconomic (i.e. father or mother occupation, household income) and medical treatment (i.e. whether the participant has taken anthelminthic drugs and iron supplement) of the participants, which will assist the assessment of potential factors associated with serum iron status. It was adapted from a standard questionnaire. The questionnaire was first designed in English and then translated and pretested in Indian language, which is the national language for India and well understood by the participants. For minors, the questionnaire was completed by interviewing their parents and guardians or the relevant adult (normally head of the family) who signed the informed consent.

The subjects in UES group (n=300) included all interns and postgraduate female students of PMCH, Patna from April 2013 to September 2014;88% of the students were normal because of the fact that anaemia prevalence in many areas persists at moderate-to-severe levels according to internationally accepted standards primarily reflects the difficulty of meeting the dietary iron needs of women.

Women within the age group of 15 – 49years(Hb <11 gm/dL for pregnant womenand Hb <12gm/dL for non-pregnant women) and having low socio-economic status were included in the study. UnwillingWomen,Women with systemic illness and bleeding disorders, having history of blood transfusion, family history of anaemia, history of receiving OCP and history of taking supplemental iron during previous years were excluded from the study.

Methods

Clinical history and thorough examination was performed. Consent was taken from each patient after introducing the importance and procedure of the test.

Sample Collection

Venous blood was collected in all women with aseptic precautions in EDTA anticoagulant for haematological investigations.The haematological investigations were performed on ABX Micros 60, an automatic cell counter with standard calibration using fresh whole blood.

As a part of CBC, red blood cell indices (MCV, MCH, MCHC), PCV, RDW, White blood cell count and Platelet count were obtained by ABX Micros 60. All these tests have been done in the Department of Pathology, PMCH, Patna. Peripheral blood smear study was performed on each of these patients. A good peripheral smear was made and the blood film was stained by Leishman's stain for morphological classification of anaemia.

Statistical Analysis

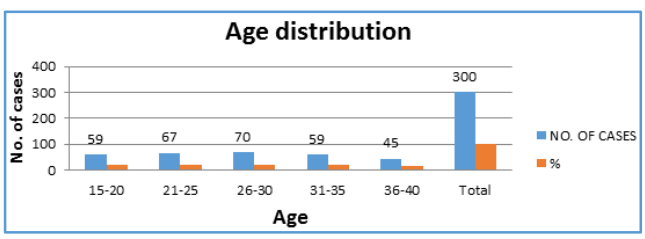
Prevalence of anaemia and its types were calculated using percentage method.For all data analysis, level of significance was set as $p < 0.05$. Data was analysed by using the software Program Statistical Package for Social Sciences (SPSS). Spearman rank correlation test was used for finding the correlation between socioeconomic factors and the prevalence of anaemia.

Ethical Committee Approval

Preceding the study, approval was obtained from the Institutional Research and Ethics Committee of Patna Medical College and conducted after informed consent was obtained from the participants.

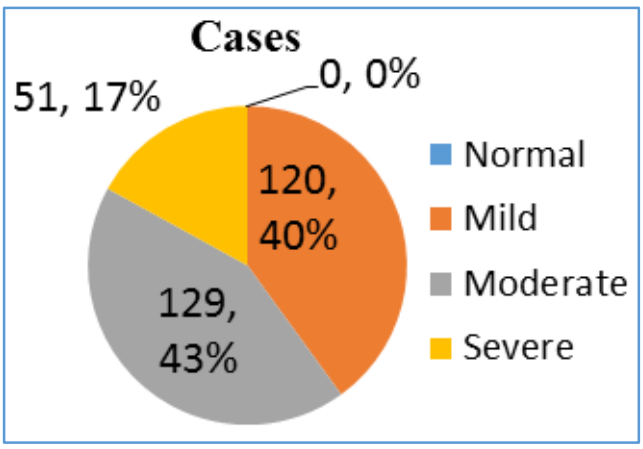
RESULTS

Out of 300 subjects in lower economic status group, 216(72%) cases belonged to microcytichypochromic anaemia; 57(19%) were diagnosed with normocytic hypochromic anaemia; 27(9%) were diagnosed as dimorphic anaemia; 40% women were mildly anaemic, 43% women were moderately anaemic and 17% were severely anaemic. Spearman rank correlation revealed perfect positive correlation in all the variables with correlation coefficient, r= 1. Age distribution of participants is given in Graph 1.



Graph 1. Age Distribution of Cases Studied

Number and Percentage of Women with Mild, Moderate and Severe anaemia is displayed in Graph 2.



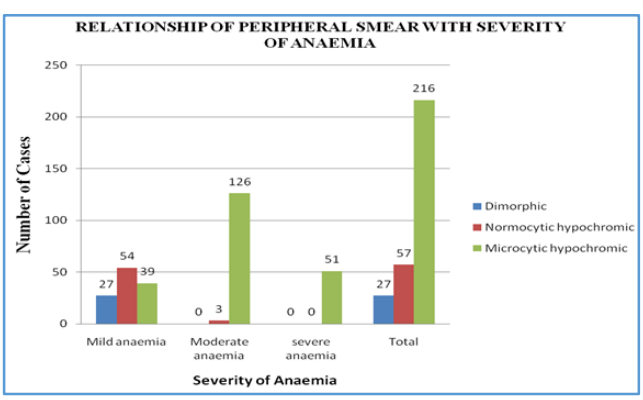
Graph 2. Pie Diagram showing Percentage Distributions of Women with Mild, Moderate and Severe Anaemia

Age wise distribution of cases with Mild, Moderate and Severe anaemia is given in Table 1.

Age (In Years)	Mild Anaemia	Moderate Anaemia	Severe Anaemia	Total
15-20	24	26	9	59
21-25	24	32	11	67
26-30	32	30	8	70
31-35	28	20	11	59
36-40	12	21	12	45

Table 1. Age Wise Distribution of Cases with Mild, Moderate and Severe Anaemia

Relationship of peripheral smear with severity of anaemia is depicted in Graph 3.



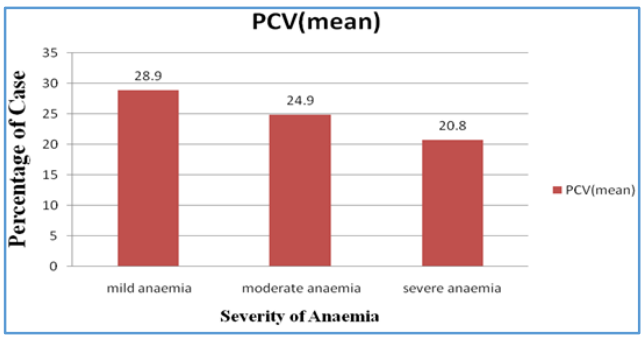
Graph 3. Showing Relationship of Peripheral Smear with Severity of Anaemia

Relation of RBC count with severity of Anaemia is given in Table 2.

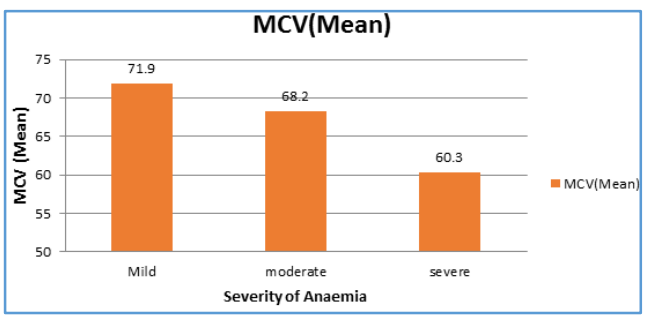
RBC	Normal	Reduced
Mild anaemia (n=120)	36	84
Moderate anaemia (n=129)	33	96
Severe anaemia (n=51)	0	51
Total	**69**	**231**

Table 2. Showing Relation of RBC Count with Severity of Anaemia

Relation of PCV with severity of anaemia is given in Graph 4.



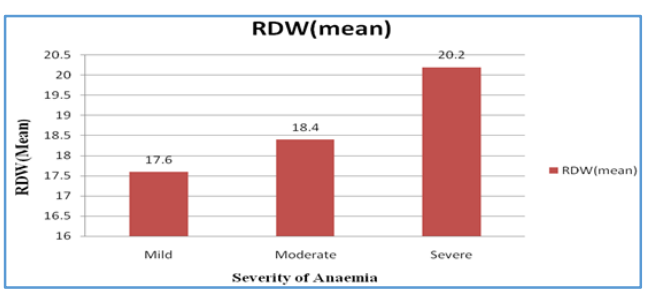
Graph 4. Relation of Packed Cell Volume (PCV) with Severity of Anaemia



Graph 5. Relation of Mean Corpuscular Volume with Severity of Anaemia

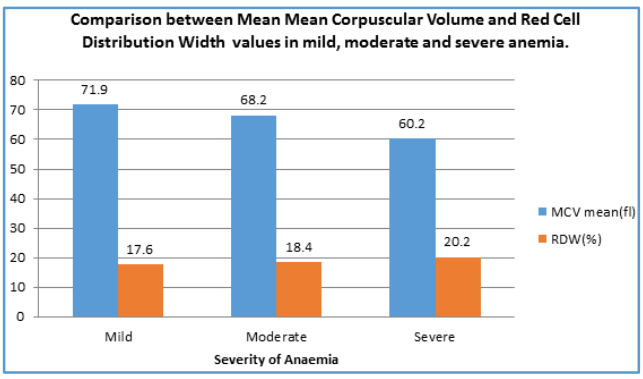
Relation of RDW (Red cell distribution width) with severity of anaemia is given in Graph 4.

Relation of Mean Corpuscular Volume (MCV) with Severity of Anaemia is given in Graph 4: All the 300 women had low mean corpuscular volume values ranging between53.0 and 79.9 fL (mean-100fL). In women with mild anaemia, Mean Corpuscular Volume values ranged from 62.1to79.9fL (mean-71.9fL). In women with moderate anaemia, mean corpuscular volume values ranged from 58.0to79.8fL (mean 68.2fL). In women with severe anaemia, Mean Corpuscular Volume values ranged from 53.0 to 66.0fL (mean-60.3fL).



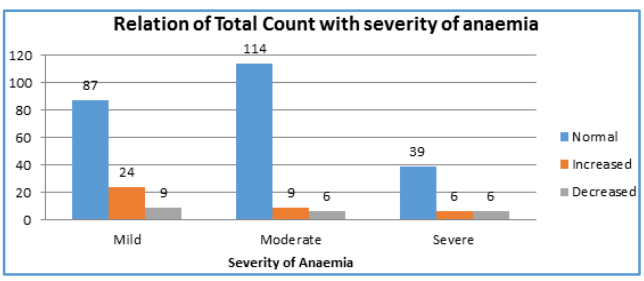
Graph 6. Relation of Red Cell Distribution on Width with Severity of Anaemia

Comparison between Mean Corpuscular Volume and Red Cell Distribution Width Values in Mild, Moderate and Severe Anaemia is depicted in Graph 7.



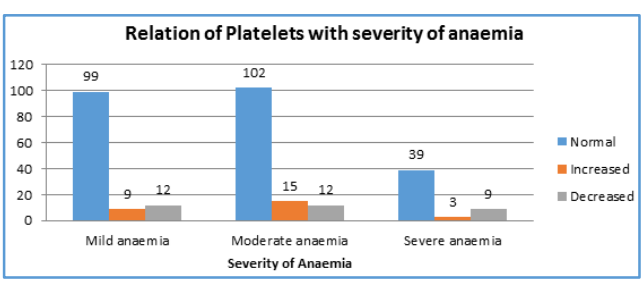
Graph 7. Comparison between Mean Corpuscular Volume and Red Cell Distribution Width Values in Mild, Moderate and Severe Anaemia

Relation of Total Count with Severity of Anaemia is given in Graph 8.



Graph 8. Relation of Total Count with Severity of Anaemia

Relation of Platelets with severity of anaemia is given in Graph 9.



Graph 9. Relation of Platelets with Severity of Anaemia

Age in Yrs.	Dimorphic Anaemia	Normocytic Hypochromic Anaemia	Microcytic Hypochromic	P Value
15-20	7	9	43	<0.1
21-25	8	12	47	
26-30	5	15	50	
31-35	6	14	39	
36-40	1	7	37	
Total	**27[9%]**	**57[19%]**	**216[72%]**	

***Table 3.* Correlation of Age with Type of Anaemia**

DISCUSSION

The prevalence of anaemia in women of reproductive age in developing countries is still high; 52% of reproductive age group women in the world are estimated to be anaemic compared to 23% in industrialised countries.

During the last 2 decades, automated blood cell counters have undergone a formidable technological evolution owing to the introduction of new physical principles for cellular analysis. For some consolidated parameters, such as WBC and RBC counts, haemoglobin concentration and mean corpuscular volume (MCV) and analytical performance is generally excellent.

From the RBC volume distribution histogram, modern analyzers calculate an index of heterogeneity known as the RDW, almost always expressed as a percentage coefficient of variation and less frequently as the SD. The usefulness of the anisocytosis obtained from the measurement of RBC size (Diameter) has been recognised.

In the present study, 300 women of reproductive age group with haemoglobin was less than 11 gm/dL were included. Anaemia is one of the most common medical conditions met during women of reproductive age group. In the present study, keeping Hb standard as 11 gm%, maximum number of cases i.e. 43% were classified as moderate anaemia and minimum number of cases i.e. 17% were classified as severe anaemia.

Authors	20-25Yrs.	26-30Yrs.	31-35Yrs.	36-40Yrs.
Ahmad N	30.9%	20.9%	2.36%%	45.84%
Pai PM	48%	14%	13%	25%
HaniffJetal	53.6%	37.9%	4.2%	4.3%
Present Study	22%	23%	20%	15%

Table 4. Showing Age Distribution of Anaemic Cases in Comparison with Other Studies

In the present study keeping haemoglobin standard as 11 gm%, maximum number of cases was classified as moderate anaemia (43%) and minimum number of cases was classified as severe anaemia (17%).

Authors	Microcytic Hypochromic	Dimorphic	Normocytic Hypochromic
Ratnam R	84%	9%	6%
Present Study	72%	9%	19%

Table 5. Showing Percentage Distribution of Type of Anaemia in Comparison with Other Studies

The present study shows maximum number of cases in the category of microcytic hypochromic anaemia (72%) and minimum number of cases in the category of dimorphic anaemia (9%).

Name of Authors	Sensitivity
BessmanJD	100%
McClureS	100%
FlynnMM	94%
ThompsonG	71%
SimelDL	77.1%
PresentStudy	92.2%

Table 6. Showing Sensitivity of RDW in Comparison with Other Studies

Varying selection criteria for cases to be included in the study was probably the contributing factor to the variability in sensitivity of RDW.

Beutler E [Beutler E. The Red Cell indices in the diagnosis of Iron deficiency anaemia. Ann Intern Med 1959; 50: 313-322] in his series of 80 patients with iron deficiency anaemia found out that in most of his patients red cell indices indicated the presence of hypochromasia and microcytosis.

Among the less severely anaemic patients, normal red cell indices were common and examination of stained smears was not superior to determination of red cell indices. The examination of stained smears was important, but could not exclude the diagnosis of iron deficiency anaemia on the basis of normal appearance of red cells on smear examination alone. This was particularly true in mildly anaemic patients.

In our present study of 300 women, 255 women had low MCV values and 45 women had normal MCV values.The mean MCV value was decreased, as the severity of anaemia increased from mild, moderate and severe.

In our present study of 300 women 264 women had low PCV values, 36 women had normal PCV values and the mean PCV values were decreased as the severity of anaemia increased from mild-to-moderate-to-severe anaemia.

In this study, examination of stained peripheral smears revealed a microcytic hypochromic anaemia in 216 women (72%).Thus, our study is in accordance with the study done by Beutler E.[Beutler E. The red cell indices in the diagnosis of Iron deficiency anaemia.Ann Intern Med 1959; 50: 313-322]Jen P [Jen P. The value of peripheral blood smear in anaemic patients. Arch Intern Med 1983; 143: 1120] in their study concluded that blood smear examination performed no better than RBC indices in detecting probable iron deficiency anaemia.Our study is in accordance with the above findings and it was found that red cell indices were more sensitive than peripheral smear findings. This was true specifically in cases with mild anaemia.

In the present study of 300 women platelet counts were found to be normal in 240 women (80%), increased in 27 women (9%) and decreased in 33 women (11%). The probable reason for the thrombocytosis is presumed to be related to increase in thrombopoietic substance, low level of circulating haemoglobin and low level of serum or tissue iron. The exact cause for thrombocytopenia is unknown. A concomitant deficiency of folic acid or vitamin B12 in some of them could be a reasonable explanation for thrombocytopenia.

Figure 1. Automated Haematology Analyzer ABX Micros 60

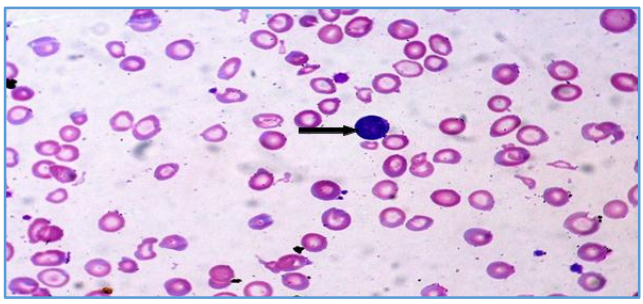


Figure 2. Microcytic Hypochromic Anaemia showing Microcytes and a Small Lymphocyte (Black Arrow). [Leishman's Stain, (x1000)]

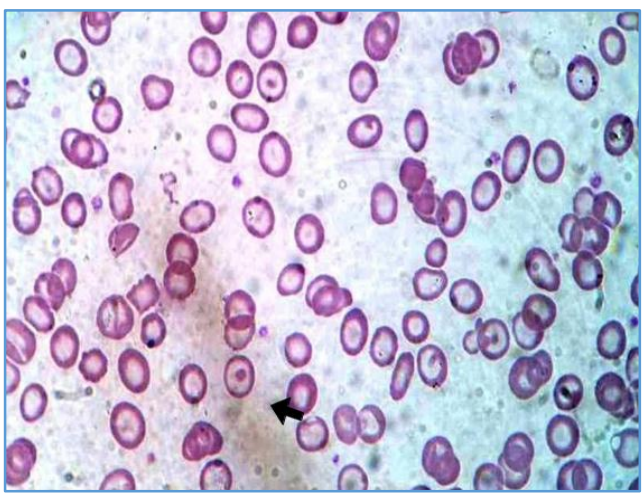


Figure 3. Dimorphic Anaemia showing both Macrocytes (Black Arrow) and Microcytes (Red Arrow) and a Small Lymphocyte for Comparison with RBC's (Yellow Arrow). [Leishman's Stain, (x10)

CONCLUSION

Anaemia is common in women of reproductive age group in low socioeconomic status due to inadequate diet and poor iron absorption.

REFERENCES

[1] Farkin F, Chesterman C, Penington D, et al.Hypochromic anaemia: iron deficiency and sideroblastic anaemia.de Gruchy's clinical haematology in medical practice.5thedn.Blackwell Science Ltd, Germany: 2008.

[2] Mehta BC, Jhaveri K, Patel JC. Anaemia in pregnancy. A study of 210 cases. Indian J Med Sci 1971;25(5):301-7.

[3] Haidar J, Muroki NM, Omwega AM, et al. Malnutrition &iron deficiency in lactating women in urban slum communities from Addis Ababa, Ethiopia.East Afr Med J 2003;80(4):191-4.

[4] Idris M, Rehman AU. Iron deficiency anaemia in moderate to severely anaemic patient.J Ayub Med Coll Abbottabad 2005;17(3):45-7.

[5] Andrews NC. Iron deficiency and related disorders.In: Greer JP, Foerster J, Rodgers GM, edrs. Wintrobe's clinical haematology.12thedn.Maryland: Williams and Wilkins Ltd, 2009:810-56.

[6] Chandyo RK, Strand TA, Ulvik RJ, et al.Prevalence of iron deficiency and anaemia among healthy women of reproductive age in Bhaktapur, Nepal. European Journal of Clinical Nutrition 2006:1-8.

[7] Hercberg S, Preziosi P, Galan P. Iron deficiency in Europe. Public Health Nutr 2001;4(2B):537-45.

[8] Huang Y, Wong Y, Wueng S. Nutrient intakes and iron status of elderly men and women. Nutr Res 2001;21(7):967-81.

[9] Carmel R. Anaemia and ageing:an overview of clinical, diagnostic and biological issues. Blood Rev 2001;15(1):9-18.

[10] Guyatt GH, Patterson C, Ali M, et al. Diagnosis of IDA in the elderly. Am J Med 1990;88(3):205-9.

[11] Roudsari SHR, Farahani M, Mogharabi A.Study of women iron deficiency anaemia in reproductive age referred to obstetric and gynecology center of hospital. Acta Medica Iranica 1996;34(3-4):107-12.

[12] Firkin F, Chesterman C, Penington D, et al.Hypochromic anaemia: iron deficiency and sideroblastic anaemia.In: de Gruchy's clinical haematology in medical practice.5th edn. Germany: B Lackwell Science Ltd, 2008.

[13] Hibbard BM, Hibbard EE.Folate metabolism and pregnancy.BritMedBull 1968;24:10.

[14] Dutta DC. Medical and surgical illness complicating pregnancy.Kolkata: New central book agency, 2006.

[15] Burman D.Iron requirements in infancy. Br J Haematology 1971;20(3):243-7.

[16] Mennon MKK, Chandrashekharan K. Anaemia in pregnancy with special reference to treatment.Indian JObst Gynae College 1954;4:17-23.

[17] Gautam VP, Bansal Y, Taneja DK, et al. Prevalence of anaemia amongst pregnant women and its socio-demographic associates in a rural area of Delhi. Indian Journal of Community Medicine 2002;24(4):157-60.

[18] Meda N, Mandelbrot L, Cartoux M, et al. Anaemia during pregnancy in Burkina Faso, West Africa, 1995-96:prevalence and associated factors.Bull World Health Organ 1999;77(11):916-22.