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DIFFERENT MANIFESTATIONS OF ANEMIA IN RHEUMATOID ARTHRITIS PATIENTS

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ABSTRACT

Background: Rheumatoid arthritis is chronic autoimmune disease that affected small joint in the hand and feet causing swelling that can result in bone erosion and joint deformity, anemia is the most common and serious blood abnormality seen in rheumatoid arthritis. Aim of this study was assessment of anemia in rheumatoid arthritis patients, differentiated between the types of anemia and correlation between anemia and du ration of rheumatoid arthritis. **Material and method:** This study was cross sectional study, carried out in DHQ teaching hospital Sargodha during period from January 2018 until March 2018. **Result:** (60%) of rheumatoid arthritis are anemic and (40%) non-anemic the result demonstrated that the Hb level, RBCs and PCV are significantly reduced in anemic rheumatoid arthritis patients in comparison with non-anemic rheumatoid arthritis patients with P value (0.000) for Hb, RBCs and PCV. The result demonstrated also that MCH significantly reduced in anemic rheumatoid arthritis patients in comparison with non -anemic rheumatoid arthritis patients with P value (0.003) while MCV & MCHC are within normal range. In anemic rheumatoid arthritis patients, serum ferritin was significantly reduced in 7 while 23 patients have normal level of serum ferritin. Based on cutoff of 15µg/L for ferritin, 23% of anemic rheumatoid arthritis patients have IDA and 77% have ACD. **Conclusion:** There are two types of anemia in rheumatoid arthritis patients, IDA and ACD. ACD is more common in rheumatoid arthritis patients.

KEYWORDS: Iron deficiency, Rheumatoid arthritis, Anemia of chronic disorder, ferritin.

INTRODUCTION

Rheumatoid arthritis (RA)is chronic autoimmune disease that affected small joint in the hand and feet causing swelling that can result in bone erosion and joint deformity.[1] RA may occur at any age but the prevalence increases until age of 70. The disease Infects 1% to 2% of the adult population and its incidence is greater in women than in men (3:1). Anaemia is the most common and serious blood abnormality seen in rheumatoid arthritis either anaemia of chronic disorder (ACD) or iron deficiency anemia.[2] The main problem in differential diagnosis of ACD in RA is the presence of concomitant iron deficiency.[3] ACD affects between one-half and two-thirds of all people with rheumatoid arthritis. The pathogenesis of the anemia of chronic disease including abnormal release of iron from transferrin to early erythroblast, iron accumulated in reticulo-endothelial cell this failure to release iron from to the erythroblast and that lead to decrease number of red cell blood and erythropoietin deficiency. Iron deficiency may be resulting from non-steroidal antiinflammatory drug which cause stomach bleeding leading to iron deficiency.[2,3] Rheumatoid arthritis is one of the most common diseases in Sudan. most of the patient can develop anaemia as complication of Rheumatoid arthritis so we want to study this problem to look for the types of anaemia which is important in planning, diagnostic, testing, and in guiding therapy.

MATERIALS AND METHOD

Study design: The study is a descriptive cross sectional study.

Study population: The study was carried out among patients diagnosed with Rheumatoid arthritis.

Study duration & place: The study was conducted between from January 2018 until March 2018, in General

outpatient Department of DHQ teaching hospital Sargodha.

Ethics approval: Before commencement of the study, ethical clearance was obtained from the hospital.

Sample size: A total of 100 samples were obtained, among them 50 patients diagnosed with Rheumatoid arthritis 50 samples were collected from healthy subjects as control.

Inclusion criteria: Fifty informed male and female consented patients diagnosed with Rheumatoid arthritis were recruited for the study.

Exclusion criteria: Rheumatoid arthritis Patients with chronic disease an such (renal failure, heart disease, liver disease, Malignant diseases) were also excluded.

Collection of Blood Samples: Under a septic condition 5 milliliters of venous blood will be collected. Then Two milliliters of these were placed in ethylenediethyltetra acetic acid (EDTA) bottles for hematological analysis. The remaining 3 milliliters were taken into universal bottle and centrifuged at 3000rpm for 5 minutes to obtain the serum for Quantitative serum ferritin.

Methodology

Hematological analysis: Blood samples were tested for Hb, PCV, RBCs, blood indices performed using Sysmexs 21 hematological analyzer.

Reference values[4]

Haemoglobin
Males 13.5-17.5 g/dL
Females 11.5-15.5 g/dL
Red cells (erythrocytes)
Males 4.5-6.5 x 10^{12}/L.

Reference values[6]

Serum ferritin concentration Men 15–300 µg/L (median 100 µg/L) Women 15–200 µg/L (median40 µg/L) Iron deficiency of anaemia (IDA) distinguished from anaemia chronic disease (ACD) was distinguished by ferritin concentration, based on cutoff of 15 µg/L for ferritin level. (IDA) was defined as serum ferritin ≤ 15µg/L.

Statistical analysis: Results obtained were analyzed using SPSS software (version 20) for both the descriptive and inferential analysis. Results were expressed as mean and standard deviation. One way analysis of variance (ANOVA) was used to determine the level of significance.

RESULTS

The result reflect that, 30(60%) out of 50 patients are anaemic and 20(40%) are non anaemic (Table 1). The Hb level ranged from 7g/dl to 11g/dl in anemic rheumatoid arthritis patient with mean ± SD of 8.7g/dl±1.5. For non-anemic patients the Hb level range from 12 g/dl to17 g/dl with a mean ± SD of14.1g/dl ± 1.3, this difference was found to be highly statistically significant with(*p value*=0.000) (table 2).

(Table 3) showed that the mean ± SD of the RBCs count in anemic rheumatoid arthritis patientswas 3.1 ±0.4 x10^{12}/L, while the mean ± SD in non-anemic rheumatoid arthritis patients was 4.8 ±0.5x10^{12}/L this difference was found to be highly statistically significant with (*p valu*e=0.000).

Females 3.9-5.6 x 1012/L in anemic rheumatoid arthritis patients the PCV with a PCV (haematocrit) Males 40-52% mean ± SD 27.2% ±4.4 while in non-anemic rheumatoid Females 36-48% arthritis patients it was found to be 42.5%±4.9. This MCV 80-95 fL difference was found to be highly statistically significant MCH 27-34 pg with (p value=0.0000) (table4). MCHC 20-35 g/dl The current study was intended to determine the type of Quantitative serum ferritin: Ferritin assay was anemia by calculation RBCs indices, The mean ± SD of performed using Ferritin kit (Ref-03737551 190) on cobas e 411 immunoassay analyzers.[5] Total duration of the MCH value in anemic rheumatoid arthritis patients was 27.4 pg± 3.0, in non-anemic rheumatoid arthritis assay: 18 minutes. 1st incubation: 10 µL of sample, a patient it was 29.8pg ±2.2 this difference was found to be biotinylated monoclonal ferritin-specific antibody, and a highly statistically significant with = (p value=0.003). For monoclonal ferritin-specific antibody labeled with a MCV, in anemic rheumatoid arthritis patients, the mean ruthenium complex a form a sandwich complex. 2nd ± SD was 86.9 fl±8.5, where it was found to be90.1 incubation: After addition of streptavidin-coated fl±4.7 in non-anemic rheumatoid arthritis patients this microparticles, the complex becomes bound to the solid difference was found to be Insignificant with (p value = phase via interaction of biotin and streptavidin. The 0.133). for MCHC, in anemic rheumatoid arthritis reaction mixture is aspirated into the measuring cell patients the mean ± SD was 31.6g/dl±2.1 while in non where the microparticles are magnetically captured onto anemic rheumatoid arthritis patients the mean ± SD was the surface of the electrode. Unbound substances are then 31.6g/dl±1.0, this difference was found to be removed with ProCell/ProCell M. Application of Insignificant with (p value=0.060) (table5). voltage to the electrode then induces chemiluminescent emission which is measured by a photomultiplier. The result revealed that; the 7(23%) out of 30 anemic Results are determined via a calibration curve which is rheumatoid arthritis patients

had low Serum ferritin level instrument-specifically generated by 2-point calibration with a mean ± SD of 10.05±1.3and 23(77%) had normal and a master curve provided via the reagent barcode. serum Serum ferritin level with a mean ± SD of 172.3 ±83.2 this difference was found to be significant with (*p value* = 0.000). based on cutoff of 15 µg/L for ferritin level, IDA was observed in 7 patients (23%) and ACD was observed in 23 patients (77%) Table (6, 7).

Regarding to the PCV The result was demonstrated that, Table (8) Show a strong negative correlation between duration with rheumatoid arthritis patients and hemoglobin with (*p-value* =0.000*).* On the other hand there was a moderate negative correlation between duration with rheumatoid arthritis patients and RBCs, PCV, MCH with (*p-value* = 0.000) and MCV with (*pvalue*=0.001).

MCHC in rheumatoid arthritis patients show week negative correlation with duration, MCHC (*p-value* = 0.164).

Table 1: Prevalence of anemia in rheumatoid arthritis.

Status	N	Percentage
Non anemic	20	40%
Anemic	30	60%
Total	50	100%

Table 2: Mean of Hb in anemic and non-anemic patients.

T-test			
Hb (g/dl)	**N**	**Mean**	**Std. Deviation**
Non anemic	20	14.1	1.3
Anemic	30	8.7	1.5
T-test p value = 0.000			

Table 3: Mean of RBCs in anemic and non-anemic patients.

T-test			
RBCs 10^{12}/L	**N**	**Mean**	**Std. Deviation**
Non anemic	20	4.8	0.5
Anemic	30	3.1	0.4
T-test p value = 0.000			

Table 4: Mean of PCV in anemic and non-anemic patients.

T-test			
PCV (%)	**N**	**Mean**	**Std. Deviation**
Non anemic	20	42.5	4.9
Anemic	30	27.2	4.4
T-test p value = 0.000			

Table 5: Mean of MCH, MCV, MCHC in anemicrheumatoid arthritis patient and non-anemic patients.

	Parameters	mean ± SD	p value
MCH (Pico gram)	Non anemic	29.8 ±2.2	0.003**
	Anemic	27.4 ±3.0	
MCV (fl)	Non anemic	90.1 ±4.7	0.133*
	Anemic	86.9 ±8.5	
MCHC (g/dl)	Non anemic	32.6 ±1.0	0.060*
	Anemic	31.6 ±2.1	

Table 6: Mean of Serum ferritin in rheumatoid arthritis patient.

Number of patient	Serum ferritin (microgram/l) mean ± SD	*P value*
7	10.05±1.3	0.000
23	172.3 ± 83.2	

Table 7: Prevalence of IDA and ACD in rheumatoid arthritis.

Type of Anemia	N	Percentage
IDA	7	23%
ACD	23	77%
Total	30	100%

Table 8: Correlation between the anemia in rheumatoid and duration.

Pearson Correlation		Hb. (g/dl)	RBCs (cmm)*10^{12}	PCV (%)	MCH (Pico gram)	MCHC (g/dl)	MCV (fl)
Duration (Years)	Pearson Correlation	-0.7**	-0.6**	-0.6**	-0.5**	-0.2*	-0.5**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.164	0.001
	N	50	50	50	50	50	50
Direction of Correlation		Negative	Negative	Negative	Negative	Negative	Negative
Strength of Correlation		Strong	Moderate	Moderate	Moderate	Weak	Moderate

DISCUSSION

Serum ferritin level in anemic rheumatoid patient Out of anemic patients ACD was found (77%) and IDA (23%) This study reflect that, the Prevalence of anemia in our Our result is similar with previous studies. Our result is study was 60%. This finding were correlated with the similar with previous studies.[9-11]

The results also demonstrate there was significant decrease in This study concludes that, there is correlation between anemia and rheumatoid arthritis. The Hb, RBCs, PCV, MCH, was low in rheumatoid arthritis patients. The types of anemia in rheumatoid arthritis patients are IDA or and ACD and Prevalence of ACD greater than IDA.

CONCLUSION

We recommended that CBC and serum ferritin levels must be investigated routinely to avoid the risk of anemia and guiding therapy. However, future research on a larger scale is needed.

Competing interests

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Consent (Where Ever Applicable)

Informed consent was obtained from all participants prior to sample collection.

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