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END STAGE RENAL DISEASE;

HEMATOLOGICAL PROFILE IN GERIATRIC END STAGE RENAL DISEASE HEMODIALYSIS CASES

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ABSTRACT… Objectives: To study hematological profile in geriatric cases undergoing hemodialysis and compare with non-geriatric. **Study Design:** Descriptive Cross Sectional Study. **Setting:** Department of Nephrology & Medicine, Rawal Institute of Health Sciences Islamabad. **Study Duration:** 12 months (June 2016-June 2017). **Material and Methods:** Adult patients (>18years) diagnosed as end stage renal disease (ESRD), undergoing maintenance hemodialysis for >3 months included after ethical approval and consent. Group A had 88 geriatric ESRD cases (>65 years); group B had 88 non-geriatric (<65 years). Data analyzed by SPSS version 17. Hematological profile and other variables compared between two groups by Chi-Square and t-test (significant $p<0.05$). **Results:** Among 166 ESRD cases (69% males and 31% females), mean age was 54.9+10.6 years. Anemia present in 89% (group A) vs. 74% (group B; $p=0.012$). Mean hemoglobin was 8.57+2.00 (group A) vs. 9.27+2.39 (group B; $p=0.035$). Mean platelets count was lower among geriatrics; however leukocyte counts comparable between two groups. Mean eGFR was 7.95+2.68 (group A) vs. 9.16+4.04 (group B; $p=0.020$). Diabetes and hypertension were frequent in geriatric group ($p<0.05$). No difference in hepatitis B, C and congestive cardiac failure observed. BMI was 26.74+5.87 (group A) vs. 22.43+4.83 (group B; $p<0.0001$). Lack of social support observed in 25% (group A) vs. 9% (group B). **Conclusion:** Anemia is frequent observation in ESRD hemodialysis cases. Geriatric ESRD hemodialysis cases have significantly low hemoglobin levels than non-geriatric. Hence, suggested that old age to be considered as an additional risk factor for anemia in ESRD hemodialysis cases. Geriatric ESRD hemodialysis cases should undergo frequent anemia screening and timely intervention. Iron supplementation, dietary modification, erythropoietin administration and blood transfusion as per indication needs to be individualized in geriatric cases to improve hematological parameters and quality of life.

Key words: Anemia of Chronic Disease, End Stage Renal Disease, Glomerular Filtration Rate, Hemodialysis, Iron Deficiency Anemia.

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INTRODUCTION

Pakistan being a developing country is facing the epidemic of both communicable and non-communicable diseases with their complications. Diabetes, hypertension and ischemic heart disease are among the major challenges faced by our country with end-organ damage including nephropathy, retinopathy, neuropathy and other micro/macro-vascular complications.[1] Ullah K et al in a regional study concluded thatmajor contributory factors to chronic kidney disease (CKD) in Pakistan are diabetes, hypertension, glomerulonephritis, tubule-interstitial disease and renal stones.[2]

Incidence of newly diagnosed cases of end stage renal disease (ESRD) has been estimated to be more than hundred per million of population.[3] Delay in timely diagnosisof renal disease and its referral contributes to progression to ESRD and need for renal replacement therapy (RRT) i.e. maintenance hemodialysis. Thomson et al concluded that early referral of patients with renal impairment to nephrologist (i.e. GFR<60ml/min/m^2) delays the need for hemodialysis.[4]

The CKD cases manifest various types of anemia; reported by Afshar et al in an Iranian study to be normochromic normocytic (80%), hypochromic

microcytic (15%) and macrocytic (5%).[5] The hemodialysis procedure in the background of pre-existing anemia bears an impact on hematological profile of the patients. Studies report increase in severity of anemia in the immediate post dialysis period. Also significant fall in leukocyte and platelets counts observed.[6]

Along with in increased life expectancy, there is rise in geriatric population in Pakistan with long standing diseases and their complications. Measures need to be taken to improve health care facilities, resources and guidelines for better quality of life and reduce morbidity among geriatrics. Geriatric age group has special needs and therapy needs to be individualized according to co-morbids, safety, tolerance and patient preference.

Current study is conducted to study hematological profile in hemodialysis cases, in particular the geriatric patients. There is limited regional data available regarding geriatric ESRD patients. Results of current study will be helpful to study regional profile of geriatric ESRD cases that can be compared to regional and international data. Suggestions made on the basis of the results may be helpful to improve wellbeing of geriatric ESRD cases.

SUBJECTS AND METHODS

This descriptive cross sectional study was conducted at dept. of Nephrology and Medicine, Rawal Institute of Health Sciences from June 2016 to June 2017 after ethical approval from institutional committee. Total 176 cases of end stage renal disease i.e. CKD-5 (GFR<15ml/min) were included and informed consent was obtained. Patients >18 years age and diagnosed with chronic renal failure (ESRD) on regular hemodialysis for >3months were included. Critically ill cases, those with pre-existing known hematological disorder, active bleed or recent blood loss in last 2 weeks, malignancy, comatose, renal transplant cases, acute renal failure and peritoneal dialysis cases were excluded.

Sixty six cases of age >65 years were included in group A (geriatric group) and sixty six cases <65 years age in group B (non-geriatric group). The data was recorded on specially designed proforma. Demographic details were documented, followed by height weight and body mass index (BMI=height m^2/weight kg) for both the groups.

The laboratory investigations performed including complete blood picture (hemoglobin, leukocyte count, platelets count and red cell indices). The type of anemia labeled after performing serum ferritin and other investigations as per indication in each case. Serum creatinin, blood urea, serum sodium and potassium performed.Estimated glomerular filtration rate (eGFR) calculated by Cockroft-Gault formula; eGFR=(140-age) x weight/72 x creatinin (x 0.86 for females).[7,8]

SPSS version 17 was used for data analysis. Frequencies and percentages calculated for descriptive variables and mean +standard deviation for quantitative variables. The variables were compared between both the groups (i.e. age, gender, BMI, eGFR, hematological profile, renal function tests and electrolytes). Chi-square test was performed for qualitative variables (gender, obesity, anemia, social support). For quantitative variables (age, creatinin, urea, hemoglobin, leukocyte count, platelets count, electrolytes, eGFR and BMI), student t-test applied as a test of significance. P-value<0.05 considered as statistically significant. Data presented as tables and bar graph.

RESULTS

Among 176 selected cases, comprising 108 (61%) males and 68(39%) females. There were 62(70%) males in group A vs. 48(55%) in group B; 26(30%) females in group A vs. 40(45%) in group B (p=0.029). Mean age was 54.9+10.6 years (range 18-90 years); mean age in group A (71+6.58) vs. group B (39+11.2; p<0.0001). Diabetes mellitus and hypertension werefrequent in group Aas compared to group B (p<0.05). Hepatitis B, hepatitis C and cardiac failure were comparable between two groups (p>0.05). No significant difference in systolic blood pressure observed between two groups, however diastolic blood pressure was higher in group A(p=0.02).

BMI was 26.74+5.87 (group A) Vs. 22.43+4.83 (group B); p<0.0001). Lack of social support seen in 22(25%) geriatric vs. 8(9%) non-geriatric group (p=0.005; Table-I).

Anemia observed in 143(81%) ESRD hemodialysis cases; 78(89%) amonggroup A vs. 65(74%) group B were anemic (p=0.012; Table-II). Mean hemoglobin was significantly low in group A (8.57+2.00) vs. group B (9.27 + 2.39; p=0.035). Iron deficiency anemia was seen in 21.6% (group A) vs. 26% (group B), anemia of chronic disease in 65% (group A) vs. 47% (group B; Figure-1). Mean platelets count was lower in group A (198,454 + 106,826) vs. group B (237,920+130,742; p=0.030), however mean leukocyte count was comparable between two groups. Mean serum creatinin was higher in group A (6.99 + 3.42) vs. group B (8.52 + 4.39; p=0.011). Mean eGFR was 7.95+ 2.68 (group A) vs. 9.16+4.04 (group B; p=0.020).

Variable	Among all n=176	Geriatric n=88	Non-Geriatric n=88	P-value
Age (mean + SD)	54.9+18.36	71+6.58	39+11.2	<0.0001**
Gender • Males • Females	 68(39%) 108(61%)	 62(70%) 26(30%)	 48(55%) 40(45%)	0.029*
Monthly income (Rupees)	11,980+15,200	14,784+16,938	9,176+12,725	0.014**
CO-MORBIDS • Hypertension • Diabetes Mellitus • Hepatitis C positive • Hepatitis B positive • Heart failure	 149(85%) 103(59%) 15(8.5%) 5(2.8%) 16(9%)	 80(91%) 67(75%) 5(5.7%) 3(3.4%) 10(11.4%)	 69(78%) 37(42%) 10(11.4%) 2(2.3%) 6(6.8%)	 0.018* <0.0001* 0.177* 0.650* 0.294*
Systolic BP	148+18	150+16.64	145+19.06	0.10**
Diastolic BP	92+8	93.86+6.19	90.99+9.83	0.02**
Body Mass Index	24.7+5.8	26.74+5.87	22.43+4.83	< 0.0001**
Lack of Social Support	30(17%)	22(25%)	8(9%)	0.005*
Anemia • Yes • No	 143(81%) 33(19%)	 78(89%) 10(11%)	 65(74%) 23(26%)	0.012*

Table-I. Demographic details, clinical parameters and co-morbid conditions in ESRD cases (n=176) (Test of significance: Chi-square test*, student t-test; significant p<0.05)**

Hematological diagnosis	Among all n=176	Group A (geriatric) n=88	Group B (Non-geriatric) n=88	p-value
Hemoglobin	8.90+2.22	8.57+2.00	9.27+2.39	0.035**
Total leukocyte count	8744+3607	8372+3503	9115+3690	0.173**
Platelets count	218,187+120,676	198,454+106,826	237,920+130,742	0.030**
Estimated GFR	8.49+3.23	7.95+2.68	9.16+4.04	0.020**
Creatinin	7.75+4.00	6.99+3.42	8.52+4.39	0.011**
Urea	122+64.7	108.7+59.1	136.7+67.3	0.004**
Sodium	137+5.09	138+5.43	136+4.59	0.020**
Potassium	4.87+1.16	4.87+1.07	4.88+1.26	0.954**
Calcium	8.58+1.56	8.75+1.21	8.41+1.83	0.142**
Phosphorus	6.26+5.71	6.30+7.76	6.23+2.31	0.939**

Table-II. Hematological Laboratory Findings in Geriatric Vs. Non-Geriatric ESRD Hemodialysis Cases (n=176). Test of significance: Student t-test; significant p<0.05**

Hematological diagnosis		Among all n=166	Group A (geriatric) n=88	Group B (Non-geriatric) n=88	p-value
Type of Anemia	No anemia	33(18.8%)	10(11.4%)	23(26%)	0.025*
	Anemia of chronic disease	98(55.7%)	57(65%)	41(47%)	
	Iron deficiency anemia	42(23.9%)	19(21.6%)	23(26%)	
	Megaloblastic anemia	2(1.1%)	2(2.3%)	0(0%)	
	Thalassemia minor	1(0.6%)	0(0%)	1(1.1%)	
Test of significance: Chi-square test*; significant p<0.05					

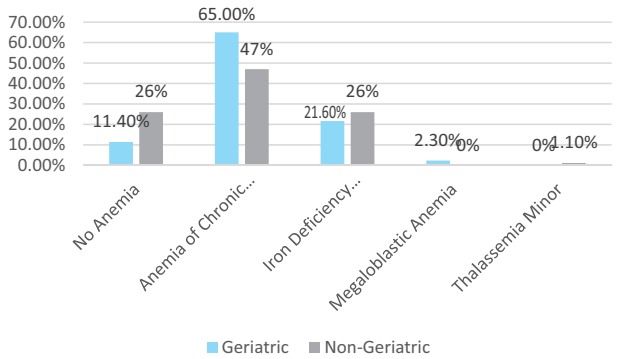

Figure-1. Bar Graph Representation of Various Types of Anemia Observed in Geriatric and Non-Geriatric ESRD Hemodialysis Cases (n=166).

DISCUSSION

Pakistan has a significant number of geriatric populations facing the end organ damage resulting from long standing diabetes and hypertension. Regional study conducted in Peshawar showed prevalence of diabetes and hypertension to be 32% and 48% respectively.[9] In current study, both groups had more than half males. Geriatric group had 61% males as compared to 55% in non-geriatric group.

The study population included adult patients from all age groups meeting the selection criteria. We may conclude that all age groups are affected by ESRD, though underlying etiology varies in different age groups.[10] The maximum age observed was 90 years, hence suggesting that old age should not be considered as absolute contraindication to hemodialysis provided that all pre-requisites and safety measures are followed in geriatric cases. The ultimate decision of hemodialysis depends upon the wishes of patent, family and the nephrology team.[11]

Diabetes and hypertension were significantly higher in geriatric group. These chronic non-communicable diseases are considered as major contributors to ESRD in Pakistan.[12] However literature reveals that younger ESRD patients have variety of underlying conditions leading to ESRD i.e. obstructive uropathy, glomerulonephritis, drug induced renal failure, connective tissue disorders, interstitial nephritis, etc.[13]

Comparatively lesser number of Hepatitis B cases was observed (i.e.2.8%)as compared to Hepatitis C (i.e.8.5%).These results are comparable to results of Palestinian study conducted by Al Zabadi et al that showed Hepatitis B in 3.8% and Hepatitis C in 7.4% hemodialysis cases.[14] Similarly, regional study conducted by Idrees et al in SIUT Karachi Pakistan found hepatitis B in 10% hemodialysis cases.[15] Hepatitis B prevalence in general population of Pakistan is 2.5%.[16] This may indicate the affective hepatitis B vaccination protocols in ESRD cases. However, we still haven't a vaccine available against Hepatitis C virus. All the renal failure cases should be considered at risk of acquiring viral hepatitis via blood transfusions, hemodialysis, frequent intravenous sampling and medications. The newly diagnosed ESRD case should be screened for viral serology and appropriate vaccination should be suggested sooner.

Approximately 3/4th ESRD cases had anemia in current study. The presence of anemia was more frequent in elderly (i.e. 89%) as compared to younger (non-geriatric) cases (73%). Salman et al found anemia in 87% cases in Malaysian study conducted on CKD pre-dialysis cases that was 42% in stage-3 CKD and 97% in stage-5 CKD.[17] The geriatric patients had low mean hemoglobin levels in current study, possible reasons could be poor nutritional status, and deterioration in general health, long standing renal failure, co-morbid conditions and likelihood of hemolysis

and bleeding tendency secondary to the hemodialysis procedure.

The predominant type of anemia in geriatric group was normochromic (65%), i.e. anemia of chronic disease secondary to renal failure, long standing diabetes and other chronic illnesses. And half of the non-geriatric cases also had anemia of chronic illness. The iron deficiency anemia was found in 26% non-geriatric and 22% geriatric group. This indicates that all age groups having ESRD are prone to iron deficiency. Salman et al found microcytic anemia in 22% and normocytic anemia in 77%.[17] Contributory factors could be anorexia secondary to uremia or ill health, poor gastrointestinal perfusion and absorption, poly-pharmacy and occult gastrointestinal bleeds.

Anemia in CKD is multifactorial.[18] Appropriate dietary support and iron supplementation suggested to maintain desirable iron stores in ESRD cases. Current study didn't include the extensive laboratory investigations and workup for mixed deficiencies in ESRD cases due to financial constraints. It is suggested that all ESRD anemic cases to be evaluated for iron deficiency regardless of the peripheral morphological picture to evaluate the mixed deficiency and etiology.

The mean eGFR was lower in geriatric group (7.95) than non-geriatric (9.16). This is possibly secondary to rapid deterioration of renal function in geriatric group than younger. Davies et al proposed in as earlier as 1950 that GFR declines by about 8 ml/min/1.73 m^2 per decade after 40 years age.[19] Weinstein et al also studied the physiology of aging kidney in 2010.[20]

The social support was present in 73% of our ESRD cases. These could be explained by the social, ethical and religious norms in Asian countries with the trend of joint family system. Da Silva et al in a Spanish study also found high social support in hemodialysis cases.[21] Literature proves that psychosocial interventions improve quality of life, compliance, physical functioning and reduce the cardiovascular risk in patients with chronic diseases.[22] The geriatric group had significantly lower social support (i.e. 85%), than non-geriatric group (91%). Hence, pointing to need for measures to encourage family assistance and co-ordination with organizations to help the elderly ESRD cases lacking financial or social support.

Though several regional studies have focused on ESRD cases, current study is unique as it has focused on geriatric ESRD cases that will be helpful to study and compare the hematological profile among these. Results of current study will be helpful to take measures to improve quality of life in our geriatric ESRD cases and to review the diagnostic and management protocols in background of regional data. Measures need to be taken regarding nutrition, supplementation, timely identification and intervention in geriatric ESRD hemodialysis cases to improve quality of life and maintain target hematological parameters.

LIMITATIONS

There are certain limitations of this study, i.e. consecutive cases were selected and authors recommend random sampling in future studies. Also multicenter selection of data may lead to improved sample size. Multifactorial etiology of anemia needs to be studied by extensive evaluation and investigation but this needs better resources and finances.

CONCLUSION

Anemia in ESRD hemodialysis cases is recognized since decades. Geriatric ESRD hemodialysis cases have significantly low hemoglobin than non-geriatric. Geriatric age group should be considered as additional risk factor for anemia in ESRD hemodialysis cases. Frequent screening and intervention for early diagnosis and management of anemia suggested, hence optimizing the target hemoglobin. Iron supplements, dietary modification, erythropoietin administration and blood transfusion as per indication needs to be individualized in geriatric cases to improve hematological parameters and quality of life.

REFERENCES

1. Jafar TH. **The growing burden of chronic kidney**

disease in Pakistan. N Engl J Med 2006; 354:995-97.

2. Ullah K, Butt G, Masroor I, Kanwal K, Kifayat F. **Epidemiology of chronic kidney disease in a Pakistani population.** Saudi J Kidney Dis Transpl 2015; 26:1307-10.

3. Jafar TH, Hatcher J, Chaturvedi N, Levey AS. **Prevalence of reduced estimated GFR (eGFR) in Indo Asian population.** J AmSocNephrol.2005; 16:323A.

4. Thomsen S. **Delayed Progression to Dialysis with Early and Intensive Management of Predialysis Chronic Kidney Disease: A Case-Based Approach.** Case Reports in Nephrology and Urology. 2013; 3(1):74-86.

5. Afshar R, Sanavi S, Salimi J, Ahmadzadeh M. **Hematological profile of chronic kidney disease (CKD) patients in Iran, in pre-dialysis stages and after initiation of hemodialysis.** Saudi J Kidney Dis Transpl 2010; 21:368-71.

6. Pandian J, Amitkumar K, Swaminathan A. **Assessment of impact of hemodialysis on hematological parameters among patients with chronic kidney disease.** Comparative Clinic Path. 2017: 26:213-18.

7. Cockcroft DW, Gault MH. **Prediction of creatinin clearance from serum creatinin.** Nephron. 1976; 16(1):31-41.

8. Inker AS. **Frequently asked questions about GFR estimates.** New York: The National Kidney Foundation; 2011.

9. Rehman SU, Nasir M, Gul R, Hussain I, Rehman SU. **Prevalence of diabetes and hypertension in geriatric population of urban areas of Peshawar.** J Med Sci 2016; 24(3):128-132.

10. Mahmud HM, Siddiqui M, Bashir B, Ali SF, Baloch AA, Masroor M. **Hemodialysis patients profile at Dow University of Health Sciences, Karachi. Pakistan.** Pakistan Journal of Medical Sciences. 2014; 30(6):1327-1330.

11. Rostami Z. **When to Start Dialysis in Elderly Patients.** Nephro-urology Monthly. 2013; 5(4):855-57.

12. Akram A, Amanullah F, Ansari NB, et al. **Prevalence and risk factors of kidney disease in urban Karachi: baseline findings from a community cohort study.** BMC Research 2014; 7:179.

13. Jha V. **Current status of end-stage renal disease care in India and Pakistan.** Kidney International Supplements 2013; 3(2):157-160.

14. Al Zabadi H, Rahal H, Fuqaha R. **Hepatitis B and C prevalence among hemodialysis patients in the West Bank hospitals, Palestine.** BMC Infectious Diseases. 2016; 16:41.

15. Idrees MK, BatoolS, Ahmed E. **Hepatitis B virus among maintenance hemodialysis patients: A report from Karachi, Pakistan.** J Pak Med Assoc 2011; 61(12):10210-1214.

16. Qureshi H, Bile KM, Jooma R, Alam SE, Afridi HUR. **Prevalence of hepatitis B and C viral infections in Pakistan: findings of a national survey appealing for effective prevention and control measures.** Eastern Mediterranean health J 2010; 16: S15-23.

17. Salman M, Khan AH, Adnan AS, Sulaiman SAS, Hussain K, et al. **Prevalence and management of anemia in pre-dialysis Malaysian patients: A hospital-based study.** Rev Assoc Med Bras 2016; 62(8):742-747.

18. Babitt JL, Lin HY. **Mechanisms of anemia in CKD.** J Am SocNephrol 2012; 23(10):1631-34.

19. Davies DF, Shock NW. **Age changes in glomerular filtration rate, effective renal plasma flow, and tubular excretory capacity in adult males.** J Clin Invest. 1950; 29(5):496-507.

20. Weinstein JR, Anderson S. **The aging kidney: physiological changes.** AdvChr Kidney dis. 2010; 17(4):302-307.

21. Da Silva SM, Braido NF, Ottaviani AC, et al. **Social support of adults and elderly with chronic kidney disease on dialysis.** Revista Latino-Americana de Enfermagem. 2016; 24:e2752.

22. Katon W, Lin E, Korff M, Ciechanowski P, Ludman E, et al. **Collaborative care for patients with depression and chronic illnesses.** NEJM.2010; 363:2611-20.

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