

Original Article

Pattern of Eosinophil and Neutrophil/ Lymphocyte Ratio in Different Stages of Chronic Kidney Disease

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Abstract

Various expensive interventions are used to diagnosis the different stages of chronic kidney disease (CKD). This research is aimed to determine the pattern of eosinophil and neutrophil/ lymphocyte ratio in different stages of CKD. Data was collected in January 2023 from the patients of CKD and from their files of reports. Permission was taken from the patients. The individuals were from civil hospital Karachi and they were the patients of CKD. Sample size was 200. There was irregular pattern of eosinophil and neutrophil/lymphocyte ratio in different stages of CKD. The eosinophil count and neutrophil/ lymphocyte ratio were higher in higher stages of CKD. The eosinophil and neutrophil/ lymphocyte ratio were higher in higher stages of CKD and the pattern was irregular. Study finds that eosinophil and neutrophil/ lymphocyte ratio were higher and the pattern was irregular in higher stages of CKD.

Keywords: Chronic kidney disease, eosinophil, lymphocyte, neutrophil.

INTRODUCTION

It has many types including type 1 and two, neonatal, gestational and maturity onset diabetes of young.¹ Diabetes is major risk factor of chronic kidney disease.² Neutrophil/ lymphocyte (N/L) ratio were high in CKD stage 4 and can be used as predictor in clinical practice.³ Another research stated that N/L ratio was increased in CKD patients with ESRD in stage 4.⁴ A source supported that eosinophils were high in CKD patients with

granulocytes and there were low lymphocytes.⁵ Another study conducted by Tariq, A et al showed that eosinophils were predictor of end -stage renal disease (ESRD) and progression of CKD.⁶ Eosinophil count and neutrophil/ lymphocyte ration is used as marker for determine the severity of chronic kidney disease.^{3- 7}

This research is implicated to determine the neutrophil/ lymphocyte ratio and eosinophil count pattern in different stages of CKD so hat early diagnosis can be possible without higher, expensive interventions

MATERIAL AND METHODS

This cross-sectional study was conducted in the patients of CKD of civil hospital Karachi. The sample size was 200 and the information was taken from the patients and from their reports. Their participation was voluntarily. Inclusion criteria include diabetic patients with CKD. Exclusion criteria include non-diabetic patient with or without CKD. Descriptive percentages were calculated for variable. Chi square test was done.

RESULTS

Table I shows the stages of CKD, 12.2% respondents were having stage one, 5.6% were having stage 2, 34.2% were having stage 3, 24.5% were having stage 4 and 23.5% were having stage 5.

Table- I: Percentages of respondents in different stages of CKD

GFR staging	Percentages
Stage 1	12.2%
Stage 2	5.6%
Stage 3	34.2%
Stage 4	24.5%
Stage 5	23.5%

Table II contains the eosinophil count, 43.4% were having high eosinophil count, 6.1% were having low eosinophil count and 50.5% were having normal eosinophil count.

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Table- II: Distribution of respondents having various eosinophil count

Eosinophil count	Percentages
High	43.4%
Low	6.1%
Normal	50.5%

Table III states that Neutrophil/lymphocytes ratio 25.5% were having high Neutrophil/ lymphocytes ratio, 2.6% were having Neutrophil/lymphocytes ratio and 71.9% were having normal Neutrophil/lymphocytes ratio.

Table- III: Distribution of respondents having different neutrophil/lymphocyte ratio

Neutrophil/lymphocytes ratio	Percentages
High	25.5%
Low	2.6%
Normal	71.9%

Table IV presents the eosinophil count pattern varies with different stages of CKD. There is no specific pattern and eosinophil count varies irregularly. Eosinophil count decreases from stage 1 to 2 and peaks at stage 3, then decreases from stage 3 to stage 4 and then again increases from stage 4 to stage 5. Eosinophil count peaks at stage 3 and is lowest at stage 2. Eosinophilia was observed in higher stages of CKD.

Table-: IV Relation of eosinophil and neutrophil/lymphocyte ratio at different stages

CKD staging	95% confidence interval of eosinophil count	P-value	95% confidence interval of neutrophil/ lymphocytes ratio	P-value
Stage 1	2.1-3.6	<0.001	1.5-3.2	
Stage 2	1.4-3.9		1.2-4.0	
Stage 3	6.1-8.4		2.1-2.8	0.027
Stage 4	3.7-5.6		2.4-3.1	
Stage 5	4.9-6.2		2.3-2.8	

Table V shows the neutrophil/ lymphocytes ratio pattern varies with different stages of CKD. There is no specific pattern and neutrophil/ lymphocytes ratio varies irregularly. At first it increases in stage one, then decreases at stage 2 and increases from stage 2 to stage 4 and then decreases in stage 5 (P=0.027). Stage 4 is associated with peak neutrophil/ lymphocytes ratio (<0.001) and stage 2 is associated with lowest neutrophil/ lymphocytes ratio (<0.001). Neutrophil/lymphocytes ratio was increased at higher CKD stages.

Table- V: Relation of different variable with eosinophil and neutrophil/lymphocyte ratio

Variable		Percentages	95% confidence interval of eosinophil count	P-value	95% confidence interval of neutrophil/ lymphocytes ratio	P-value
Gender	Male	33.7%	4.6-5.9	0.489	2.4-2.8	0.595
	Female	66.3%	4.8-6.8		2.1-2.8	
Age	<20	19.9%	4.3-8.6	0.007	1.9-3.0	0.340
	>50	32.7%	4.7-5.7		2.33-2.97	
	20-50	46.9%	4.6-5.8		2.31-2.90	
Do you smoke	yes	12.8%	3.2-5.6	0.01	1.8-2.8	0.395
	no	87.2%	5.05-6.2		2.4-2.8	
Do you have diabetes	yes	34.7%	4.7-5.8	0.602	2.30-2.89	0.712
	no	65.3%	4.8-6.3		2.34-2.87	
Do you have hypertension	yes	41.8%	5.5-6.3	0.01	2.3-2.8	0.278
	no	58.2%	4.2-5.9		2.2-2.8	

Table VI state the Regarding the age, >50 age group was associated with more severe CKD while <20 age group was associated with less severe CKD. Smoking was associated with less severe CKD while diabetes and hypertension were associated with severe CKD. Gender was not associated with CKD.

Table- VI: Relation of GFR with different variable

Variable		Percentages	95% confidence interval of GFR	P-value
Gender	Male	33.7%	4.8-6.8	0.489
	Female	66.3%	4.6-5.9	
Age	<20	19.9%	4.3-8.6	0.007
	>50	32.7%	4.7-5.7	
	20-50	46.9%	5.2-4.6	
Do you smoke	yes	12.8%	3.2-5.6	0.015
	no	87.2%	5.05-6.5	
Do you have diabetes	yes	34.7%	4.8-6.3	<0.001
	no	65.3%	4.7-5.8	
Do you have hypertension	yes	41.8%	5.5-6.3	0.001
	no	58.2%	4.2-5.9	

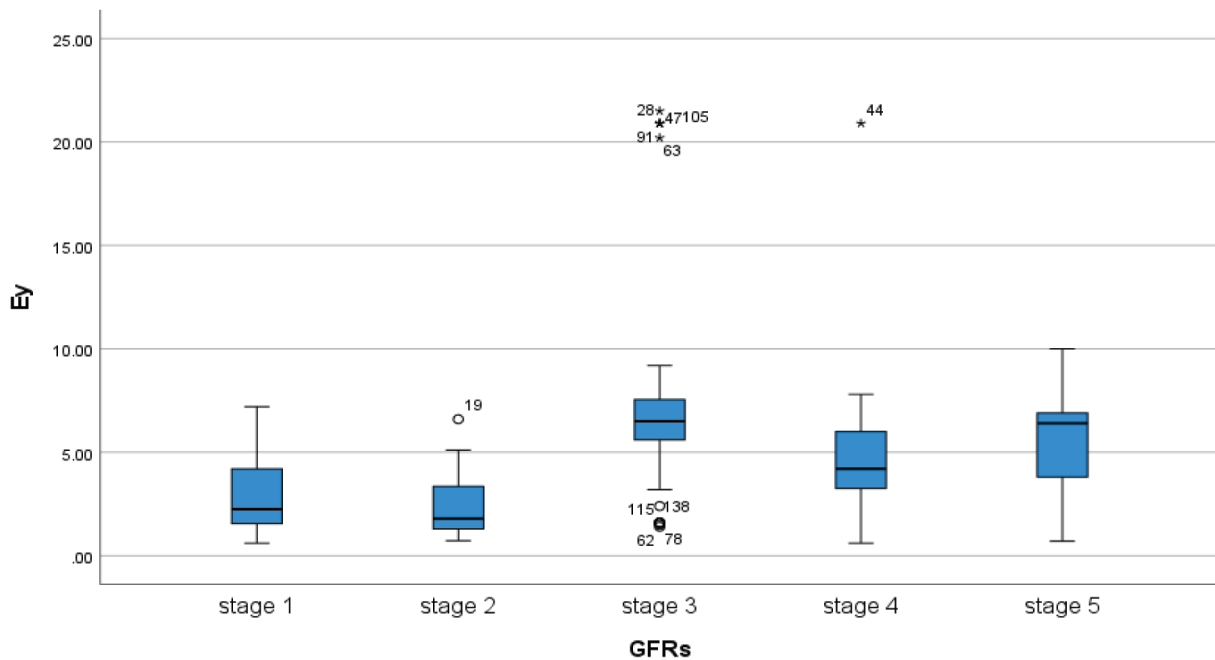


Figure- 1: Eosinophil in different stages of CKD

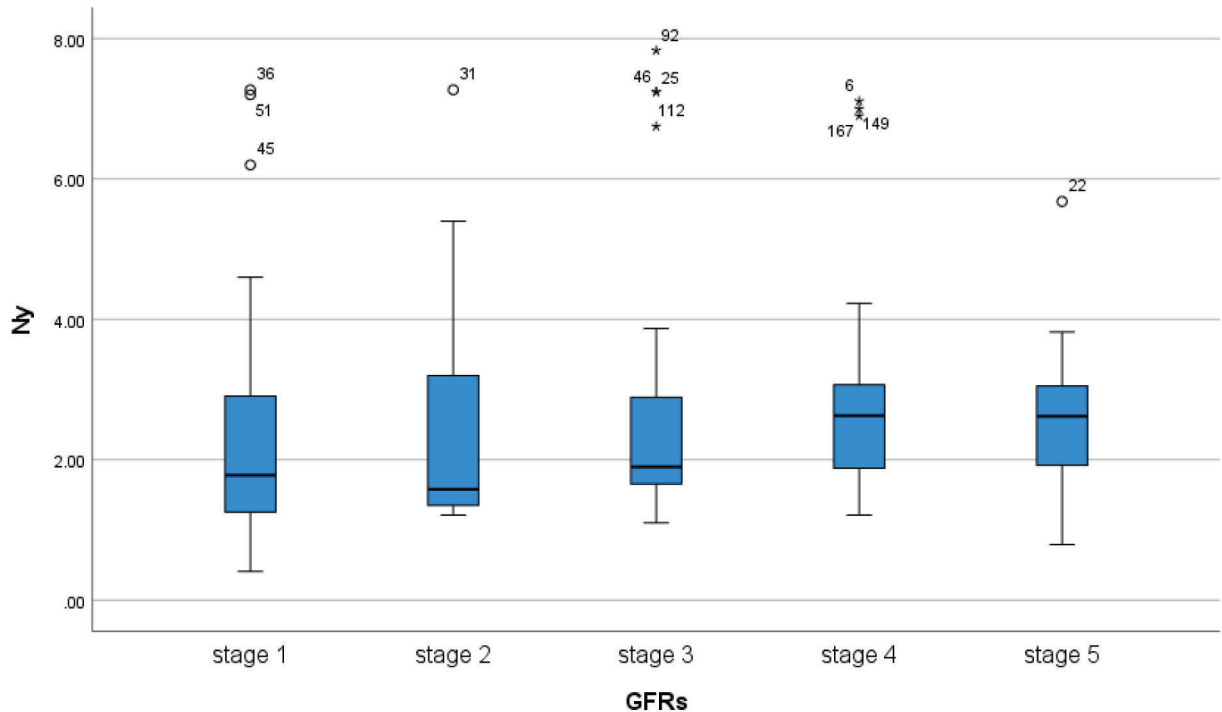


Figure- 2: Neutrophil / eosinophil ratio in different stages of CKD

Related to how different factors affect the eosinophil count in CKD patients, Age group 20-50 and >50 were associated with high eosinophil count in CKD patients while <20 age group was associated with low eosinophil count in CKD patients. Smoking was associated with low eosinophil count in CKD patients while hypertension was associated with high eosinophil count in CKD patients. Gender and diabetes was not associated with eosinophil count.

Related to neutrophil/lymphocytes ratio, gender, age, smoking, diabetes and hypertension were not significantly associated with neutrophil/ lymphocytes ratio in CKD patients.

DISCUSSION

A study conducted at southern Iraq by Khajehdehi P et al showed stages 1, 2, 3, 4, and 5 of CKD were found in 8.5%, 66.1%, 11.4%, 0.1%, and 0.1% of the participants, respectively.⁸ A study conducted by Hill NR et al showed Stage 1,2,3,4,5 were 3.5%, 3.9%, 7.6%, 0.4% and 0.1% respectively.⁹ A study conducted in Korea by Kim S et al showed prevalence of CKD according to stage were 2.0% stage 1, 6.7% stage 2, 4.8% stage 3, 0.2% stage 4, and 0.0% stage 5.¹⁰ This research showed 12.2% respondents

were having stage one, 5.6% were having stage 2, 34.2% were having stage 3, 24.5% were having stage 4 and 23.5% were having stage 5. This research percentages of CKD of different stages are greater than the Khajehdehi P et al, Hill NR et al and Korea by Kim S et al study.^{8,9,10}

This study shows similar results with the study conducted by Tariq, A et al which showed that Eosinophilia was associated with ESRD and higher stages of CKD.¹¹ Another study conducted by Ishii R et al among cardiac patients showed the similar results regarding Eosinophilia being prevalent in higher stages of CKD.¹² Another study conducted by Rajiv Agarwal et al showed higher stages of CKD were associated with eosinophil.¹³

This research showed neutrophil/lymphocytes ratio was higher in higher CKD stages. This research shows similar findings to the following researches. Woziwodzka K et al who showed NLR was associated with higher stages of CKD patients.¹⁴ A study conducted by Yoshitomi R et al in Japanese population showed NLR was greater in higher stages of CKD and predicts poor outcomes.¹⁵ Solak Y et al [showed NLR showed a significant increase from stage 3 to stage 5.¹⁶ Tonyali S et al showed NLR was positively correlated with CKD stage.¹⁷ Altunoren O et al showed that NLR was greater in advances stages of CKD.¹⁸ This

study contradicts with the study conducted by Yuan, Q et al who showed NLR was not associated with CKD progression.¹⁹

This study showed that severe CKD was associated with advanced age which is similar to the results of Nitta K et al [which showed ESRD was associated with older patients.²⁰ This research finding contradicts with the Ravani P et al research which showed that aging is associated with regression of CKD.²¹ Wahsh HA showed that eGFR decreased with advancing age.²²

This research shows that smoking was associated with less severe CKD which contradicts with the previous researches which are stated following. A research conducted by Yacoub R et al showed that smoking was associated with progression of CKD.²³ A study conducted by Xia J et al showed that smoking was independent factor related to progression of CKD.²⁴ Another study conducted by Yacoub R et al showed that smoking was associated with severe CKD and associated nephropathy.²³ A cohort study conducted among CKD Korean patients showed that smoking was associated with worsening of kidney function. Bundy JD et al [showed that smoking is associated with progression of CKD and mortality.²⁵ Jain G et al showed that smoking was associated with deterioration of kidney function but nicotine was less responsible for it.²⁶

CONCLUSIONS

The eosinophil and neutrophil/ lymphocyte ratio were higher in higher stages of CKD and the pattern was irregular.

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