

The relationship between monocyte/HDL cholesterol ratio and chronic kidney disease stages, single center study

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ABSTRACT

Objectives: Chronic kidney disease (CKD) is an increasing public health problem. It is very important to know the definition of CKD, its risk factors and to predict the progression of its stages. Recently, the monocyte/HDL ratio (MHR) has been thought to be a new marker of inflammation and oxidative stress. In this study, it was aimed to investigate the relationship between stages and MHR in patients with stage 3A, stage 3B and stage 4 CKD.

Methods: A total of 632 patients with CKD, aged 18 years and older, with stage 3A, stage 3B and stage 4 (eGFR) according to CKD stage were included in our study. Our study is retrospective and the data of the patients were obtained from the hospital system. Kruskal-Wallis and post hoc Tukey HSD tests were used for statistics. $p < 0.05$ was considered statistically significant.

Results: The mean age of the patients included in the study was 63.4 ± 14.91 (min:18max:98) and 305 (48.25%) of these patients were male and 327 (51.75%) were female. According to eGFR, 155 (24.5%) of the patients were stage 3A, 150 (23.8%) were stage 3B, and 327 (51.7%) were stage 4. In the statistical study of the groups divided into CKD stages with MHR, there was no significant difference between the groups ($p: 0.245$), while there was statistical significance for gender and hypertension ($p: 0.004$ and $p: 0.044$, respectively).

Conclusion: As a result of this study, we concluded that MHR is not affected by CKD stages.

Keywords: Monocyte-to-HDL ratio; Chronic kidney disease; Stage

Chronic kidney disease (CKD) is an important public health problem with an increasing incidence in our country and in the world. It is predicted that the number of patients to be treated with dialysis will double in the next 10 years. Regardless of the initial cause, the most important problems in chronic kidney disease are progression to end-stage renal disease (ESRD), complications due to loss of kidney function and increased cardiovascular risk due to CKD. The severity of these problems

increases with the progression of kidney disease, and the chances of adequate treatment of these problems decrease. Therefore, it is very important to prevent the development of CKD and/or to catch it in the early stages and to stop the progression to ESRD. Concordantly, it is very important to know the definition of CKD and the risk factors for CKD, as well as to predict the progression of CKD stages.¹

High-density lipoprotein HDL cholesterol (HDL-C) protects endothelial tissue from the destructive effects

Received: October 25, 2022; **Accepted:** January 02, 2023; **Published Online:** January 29, 2023

How to cite this article: Solmaz İ, Alakuş ÖF, Yakut Y, Tekin Y, Koyun S, Araç E. The relationship between monocyte/HDL cholesterol ratio and chronic kidney disease stages, single center study. DAHUDER M J 2023;3(1):9-12. DOI: 10.56016/dahudermj.1193872

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Table 1.

	STAGE 3A	STAGE 3B	STAGE 4	TOTAL	<i>p</i>
Number of patients	155(24,5%)	150(23,8%)	327(51,7%)	632(100%)	
Age	59,2 ± 14,2	65,3 ± 12,7	64,5 ± 15,8	63,44	0,000
Gender					0,004
Male	91(29,83%)	75(24,59%)	139(45,57%)	305(48,25%)	
Female	64(19,57%)	75(22,93%)	188(57,49%)	327(51,75%)	
DM	67(21,96%)	71(23,27%)	167(54,75%)	305(48,25%)	0,265
HT	138(23,54%)	137(23,37%)	311(53,07%)	586(92,72%)	0,044
CAD	99(23,07%)	112(26,1%)	218(50,81%)	429(67,87%)	0,104

DM: Diyabetes mellitus, HT: Hypertension, CAD: Coronary Arter Disease

of low-density lipoprotein cholesterol (LDL-C) and also inhibits the oxidation of LDL-C. HDL-C also has antithrombotic, anti-inflammatory and antioxidant effects.² Monocytes and macrophages are cells that play an important role in the synthesis and release of proinflammatory and pro-oxidant cytokines. Recently, it has been thought that the monocyte/HDL ratio (MHR) may be a new marker of inflammation and oxidative stress due to the proinflammatory effect of monocytes and the anti-inflammatory and antioxidant effects of HDL cholesterol.³

Along with the anti-inflammatory and antioxidant effects of HDL-C, and the pro-inflammatory effect of monocytes, MHR reflects inflammation and oxidative stress. This ratio has been used in many studies to determine whether inflammation and atherosclerosis contribute to the etiopathogenesis of cardiovascular and cerebrovascular diseases.⁴⁻⁸

In this study, it was aimed to investigate the relationship between stages and MHR in patients with stage 3A, stage 3B and stage 4 chronic kidney disease.

METHODS

Patients diagnosed and followed up with stage 3A, stage 3B and stage 4 chronic kidney disease in

Diyarbakir Gazi Yaşargil Training and Research Hospital Internal Medicine or Nephrology polyclinics were included in this study. Patients' data such as age, gender, biochemical parameters, hemogram, lipid profile, crp, comorbidity were recorded retrospectively through the hospital data processing system. With the eGFR calculated in the hospital laboratory system, the patients were divided into 3 groups as stage 3A, stage 3B and stage 4. The monocyte values in the hemograms of the patients were evaluated and the ratio of HDL to Monocyte/HDL in the lipid profile was calculated.

Ethical considerations: Written informed consent to participate in the study was obtained from all patients. The study was approved by the Ethics Committee of Diyarbakır Gazi Yaşargil Training and Research Hospital. (Issue-199; date: 30.09.2022)

Statistical analysis

Quantitative data are expressed as mean ± standard deviation (minimum-maximum), and categorical data are expressed as frequency (percentage). Data were analyzed using SPSS version 22.0. ShapiroWilk and Levene tests were used to determine the normality and homogeneity of the distribution, respectively. In statistical analysis, Oneway ANOVA was used for normal distribution, Kruskal-Wallis and post hoc

Table 2

	STAGE 3A	STAGE 3B	STAGE 4	<i>p</i>
AGE	59,2 ± 14,2	65,3 ± 12,7	64,5 ± 15,8	0,000
MHR	0,1571574 ± 0,0738	0,015877 ± 0,00731	0,015487 ± 0,00968	0,245

MHR: Monocyte HDL ratio, MHR values of the groups were statistically insignificant ($p = 0.245$).

Tukey HSD tests were used for data not normally distributed. $p < 0.05$ was considered statistically significant.

RESULTS

Patients aged ≥ 18 years and diagnosed with stage 3A, stage 3B and stage 4 CKD (with eGFR) in internal medicine or nephrology polyclinics were included in this study. The mean age of the 632 patients included in our study was 63.4 ± 14.91 (min:18max:98) and 305 (48.25%) of these patients were male and 327 (51.75%) were female. According to eGFR, 155 (24.5%) of the patients were stage 3A, 150 (23.8%) were stage 3B, and 327 (51.7%) were stage 4. Considering the comorbid conditions of the patients, 305 patients had DM, 586 patients had HT, and 429 patients had CAD. The distribution of patients' age, sex and comorbid conditions according to stages is summarized in table 1.

In the statistical study of the MHRs of the groups separated according to CKD stages, it was seen that there was no significant difference between the groups ($p: 0,245$) (Table 2 and fig. 1). There was statistical significance for gender and HT ($p: 0.004$ and $p: 0.044$, respectively) (Table 1).

DISCUSSION

CKD is a very important health problem. It is known that CKD patients progress rapidly to ESRD and need renal replacement therapy. Therefore, it is very important to prevent CKD and/or catch it in the early

stages and stop the progression to ESRD. Concordantly, it is very important to know the definition of CKD and the risk factors for CKD, as well as to predict the progression of CKD stages.¹ MHR appears to be a new and useful marker of proinflammatory and anti-inflammatory indices. Monocytes and macrophages are cells that play an important role in the synthesis and release of proinflammatory and prooxidant cytokines.⁹ It has been shown that HDL-C protects the endothelium against the destructive effects of LDL-C and prevents the oxidation of LDL-C.^{10, 11} In this way, HDL-C acts as an anti-inflammatory agent and an antioxidant.¹²⁻¹³

In our literature review, we could not find a study between CKD stages and MHR. In this single-center retrospective study, we compared the MHR of 632 patients at different CKD stages. For this reason, we consider this study significant in terms of both the absence of similar studies in the literature and the number of patients examined.

Recently, studies have been published showing that MHR can be used in the early prediction of many chronic diseases or in the prediction of disease progression. In one study, MHR was evaluated while evaluating the stages of diabetic retinopathy and it was found to be significant in predicting the progression of retinopathy.¹⁴ In another study, MHR was shown to play a prominent role in the prediction of subclinical carotid atherosclerosis in diabetics compared to non-diabetic populations.¹⁵ In some studies, MHR was not found to be significant. In one study, MHR was compared between diabetic patients without nephropathy and healthy individuals, and no significant difference was found.¹⁶⁻¹⁷ In another study, MHR was evaluated in patients with diabetic neuropathy and it was not found

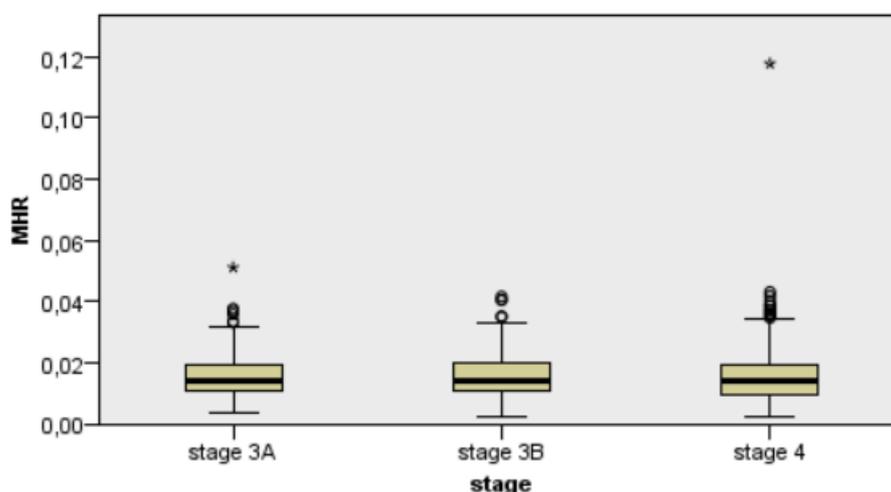


Fig. 1. Cruscal Wallis test comparison of CKD stages and MHR data

to be significant.¹⁸ In this study, we compared stage 3A, stage 3B and stage 4 of CKD and we did not find any statistical difference between stages ($p = 0.245$). As a result of this study, we concluded that MHR is not affected by CKD stages.

Limitations

The most important limitation of the study is that it is a single center study. We recommend multicenter studies and further studies investigating the relationship between CKD stages and MHR with larger patient groups.

CONCLUSION

Authors' Contribution

Study Conception: İS, ÖFA, YY,; Study Design: İS, SK, YT,; Supervision: İS, EA, YT,; Materials: İS, ÖFA,; Data Collection and/or Processing: İS, ÖFA, YT,; Statistical Analysis and/or Data Interpretation: İS, ÖFA, SK,; Literature Review: İS, SK, EA,; Manuscript Preparation: İS, EA, SK and Critical Review: İS, SK, EA.

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