MCV and MCH Values in Coronary Artery Patients with Positive Gensini Score

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ABSTRACT

This study aims to research whether gensini scoring of white blood cells and their subgroups and hemoglobin (Hb), hematocrit (Htc), erythroscyte and their computational tests are related, through retrospectively evaluating complete blood cell counts of patients who underwent coronary angiography with coronary artery disease (CAD) early diagnosis. Files of 267 patients, 113 women and 154 men over the age of 18, who came to Namık Kemal University Research and Practice Hospital in August 2011 and January 2012 and underwent coronary angiography with CAD early diagnosis, were scanned retrospectively. Patients were grouped as angio-negative (ANG) and angio-positive (APG) according to coronary angiography results. Gensini Scoring was done in APG patients according to angiography results. Hemogram values studied before coronery angiography as well as age, gender and other diseases of patients in both groups were recorded. When ANG and APG erythrocytic parameters were compared, Hb and Htc values did not differ significantly between groups while a significant difference was observed in mean corpuscular volume (MCV) and mean corpuscular hemoglobin (MCH) values. White blood cell count, neutrophil, lymphocyte and monocyte counts were significantly higher in APG compared to ANG. Eosinophil and basophil values and thrombocytic parameters did not differ significantly between groups. A positive correlation was observed between Gensini Score and MCV, MCH, WBC (leukocyte), neutrophil, lymphocyte and monocyte. Consequently, our findings suggest that erythrocyte has a role in CAD pathogenesis like other blood cells or factors in CAD pathogenesis might affect erythrocyte morphology.

Key words: Gensini score, coroner artery disease, erythrocyte indices, leukocyte count

Pozitif Gensini Skorlu Koroner Arter Hastalarında MCV ve MCH Değerleri

ÖZET

Bu çalışma koroner arter hastalığı (KAH) ön tanısı konulup, koroner anjiyografisi yapılmış hastaların tam kan sayım sonuçları retrospektif olarak değerlendirilerek; hemoglobin (Hb), hematokrit (Htc), eritrosit ve bunlar üzerinden yapılan hesaplamalı testler ile beyaz küre ve alt gruplarının gensini skorlaması ile ilişkisinin olup olmadığını araştırmak amacı ile planlandı. Çalışmamızda Ağustos 2011 ile Ocak 2012 tarihleri arasında Namık Kemal Üniversitesi Uygulama ve Araştırma Hastanesi Kardiyoloji Kliniğine KAH ön tanısı ile gelen ve koroner anjiyografi yapılan 18 yaş üstü 113 kadın ve 154 erkek toplam 267 hastanın retrospektif dosya taraması yapıldı. Koroner anjiyografi sonuçlarına göre hastalar anjiyo negatif grup (ANG) ve anjiyo pozitif grup (APG) şeklinde ikiye ayrıldı. APG hastalarda anjiyografi sonuçlarına göre Gensini Skorlaması yapıldı. Her iki grubun koroner anjiyografi öncesi çalışılan hemogram değerleri ile birlikte yaşı, cinsiyeti ve diğer hastalıkları kaydedildi. ANG ile APG eritrositik parametreler karşılaştırıldığında eritrosit, Hb ve Htc değerlerinde gruplar arasında fark görülmezken ortalama eritrosit hacmi (MCV) ve ortalama hemoglobin konsantrasyonu (MCH) değerleri arasındaki farkın istatistiksel olarak anlamlı olduğu gözlendi. Beyaz küre sayısı, nötrofil, lenfosit ve monosit sayıları APG'da ANG göre anlamlı derecede yüksekti. Eozinofil ve bazofil değerlerinde gruplar arasında anlamlı bir fark gözlenmedi. Trombositik parametrelerde de iki grup arasında anlamlı fark tespit edilmedi. Gensini Skoru ile MCV, MCH, WBC (lökosit), nötrofil, lenfosit ve monosit arasında pozitif korelasyon olduğu gözlendi. Sonuç olarak bulgularımız, eritrositin de diğer kan hücreleri gibi KAH patogenezinde rol aldığını ya da KAH patogezinde rol alan faktörlerin eritrosit morfolojisini etkilediğini desteklemektedir.

Anahtar kelimeler: Gensini skoru, koroner arter hastalığı, eritrosit indeksi, lökosit sayısı

INTRODUCTION

Coronary artery disease (CAD) is caused by atherosclerosis and has a high rate of mortality and morbidity. Various factors are considered to be effective in the development of atherosclerosis. Especially, high cholesterol is a significant factor. Cigarette smoking also triggers the development of atherosclerosis due to its negative effect on lipid metabolism and immune system with toxic contents of cigarette (1). Obesity and sedentary lifestyle lead to the development of atherosclerosis as well (2). It is also claimed that some genetic factors might contribute to the development of CAD (3).

Studies on pathophysiology of atherosclerosis showed that both humoral and cellular immune system play a significant role (4). Inflammatory cells and cytokines have an active role in every phases of atherosclerosis (5). It is also stated that blood levels of leucocyte and its subgroups differed (6). Recently, it has been suggested that there might be a relationship between hemoglobin level and CAD (7).

This study aims to research whether gensini scoring of white blood cells and their subgroups and hemoglobin (Hb), hematocrit (Htc), erythroscyte and their computational tests are related, through retrospectively evaluating complete blood cell counts of patients who underwent coronary angiography with CAD early diagnosis.

MATERIALS AND METHODS

Study design and population

Files of 267 patients, 113 female and 154 male patients over the age of 18, who came to Namık Kemal University Research and Practice Hospital in August 2011 and January 2012 and underwent coronary angiography with CAD early diagnosis were scanned retrospectively. 8 female and 5 male patients were omitted because their hemogram results did not exist in their files. Thus, 254 of 267 patients were included in the study. Patients were grouped as angio-negative (ANG) and angio-positive (APG) according to coronary angiography results. Gensini Scoring was done in APG patients according to angiography results. Hemogram values studied before coronery angiography for both groups were obtained using retrospective method. Ages, genders and other diseases of patients were also recorded. Patients who had coronary artery by-pass graft surgery and patients

who had percutaneous coronary operation before surgery and lacking coronary angiography results were not included in the study. Complete blood cell count was determined by using Roche Sysmex XT-2000i autoanalyser and the same commercial kits.

Gensini Scoring

This is a scoring system which is done according to the extent of stenosis in coronary artery lumen (8). It helps to determine the significance of CAD. Scores given according to the extent of stenosis are as follows: If the percent of stenosis is between 1-25% 1 point, between 26-50% 2 points, 51-75% 4 points, 76-90% 8 points, 91-99% 16 points and if 100% 32 points.

Statistical analysis

PASW 18 Statistics for Windows was used to record and analyze data on computer. Paired comparison of groups was done using in dependent sample t test. Pearson correlation was used to determine whether there is a relation between variables. P<0.05 value was accepted as statistically significant.

RESULTS

Demographics of patients are given in table 1. Erythrocytic parameters from blood counts are in table 2, data for white blood cells and their subgroups are in table 3, data for thrombocyte parameters are in table 4. When ANG and APG erythrocytic parameters were compared, Hb and Htc values did not differ significantly between groups while a statistically significant difference was observed in MCV and MCH values. White blood cell count, neutrophil, lymphocyte and monocyte counts were significantly higher in APG compared to ANG. Eosinophil and basophil counts and thrombocytic parameters did not differ significantly between groups.

After the correlation analysis, a positive correlation was

Table 1. Demographics of the groups

	AGN	AGP
n	82	172
Age, years, (Mean±SD)	60±12	61±10
Gender, F/M,n	34/48	71/101
Smoking, n(%)	31(37)	89 (51)
Diabetes, n(%)	21(26)	49 (28)
Hypertension, n(%)	47 (57)	123 (71)

Table 2. Erythrocytic parameters of the groups

	RBC (10³/μL)	Hb (g/dL)	Htc (%)	MCV (fL)	MCH (pg)	MCHC (g/dL)
AGN	4.7±0.6	13.4±1.9	40.2±4.5	84.8±5.1	28.1±2.2	33.1±1.5
AGP	4.7±0.6	13.5±1.7	40.4±4.4	86.7±5.6	28.9±2.2	33.4±1.3
p value	0.75	0.52	0.79	0.015	0.0053	0.14

observed between Gensini Score and MCV (p=0.019), MCH (p=0.033), WBC (p=0.008), neutrophil (p=0.036), lymphocyte (p=0.013) and monocyte (p=0.004).

DISCUSSION

CAD is an inflammatory disease characterized by plaque formation in arteries. Macrophage, lymphocyte and neutrophils play a role in the formation of atherosclerotic plaque. Neutrophils are responsible for the initial and progression phases of atherosclerosis and CAD (6, 9). Naruko et al (10) stated that they found neutrophils in atherosclerotic lesions of patients with CAD. Results of animal model research also showed that neutrophils contribute to the formation of atherosclerotic lesions (11, 12). In addition, neutrophils were suggested to be critical in the progression phase of atherosclerosis (13). In another study, an increase was observed in oxidative activity and neutrophil aggression in coronary sinus of patients with CAD (14). Madjid et al (15) suggest that neutrophils can occlude capillary in coronary microcirculation during reperfusion of ischemic myocardium, can intensify ischemia and enlarge ischemic area.

In addition, correlation was reported between CAD and peripherial leucocyte count (16, 17). Linden et al (18) reported that leucocyte counts were higher in patients with acute MI compared to MI patients with CAD and CAD patients without MI history. It was observed that among patients followed in cardiac intensive care unit, those who died had a higher leucocyte count compared to those who survived (19). In addition, it is suggested

that myeloperoxidase, a leucocyte enzyme, activity and CAD were related and high enzyme level and occluded coronary artery were correlated (20). Kocaman et al (21) found total leucocyte count was significantly higher in patients with 2-3 occluded arteries compared to control group while they did not observe a significant difference between patients with single occluded artery and control group. In this study, APG average leucocyte count was found to be significantly higher compared to ANG.

Monocytes, one of basic inflammatory cells, also contribute to the development of atherosclerosis. Lee et al (22) reported that they found a high monocyte count both in blood and atherosclerotic plaque. In addition, it is suggested that various mediators such as interleukin-1, a product of monocyte, and tumor necrotizing factor are higher in patients with coronary artery disease (23-26). In this study, it was also observed that monocyte count in circulation in APG group was significantly higher compared to ANG group.

In previous studies, lymphocytes were shown to have a role in the formation and progression of plaques (6, 27, 28). White blood cells have a major role in inflammatory process of atherosclerosis (29) In addition, some studies stated a relation between increased leucocyte count and death in patients with acute MI, and increased ischemic conditions (30, 31). Recently, the number of studies on the relation between erythrocyte parameters and both CAD and some ischemic diseases has increased (32, 33).

In this study, MCV and MCH values were observed to be

Table 3. White blood cell and its subgroups for the groups

	WBC (10³/μL)	Neutrophil (10³/μL)	Lymphocyte (10³/μL)	Monocyte (10³/μL)	Basophil (10³/μL)	Eosinophil (10³/μL)
AGN	8.0±1.7	4.9±1.3	2.1±0.6	0.67±0.19	0.17±0.14	0.13±0.15
AGP	8.7±2.6	5.5±2.2	2.3±0.7	0.80±0.31	0.20±0.17	0.20±0.22
p value	0.016	0.023	0.022	0.019	0.180	0.220

Table 4. Thrombocytic parameters for the groups

	PLT (10³/μL)	MPV (fL)	PDW (fL)	PCT (%)	P-LCR (%)
AGN	247 ± 63	10.5 ± 0.9	12.5 ± 2.0	0.26± 0.06	29. 0 ± 6.2
AGP	259 ± 84	10.4 ± 0.9	12.2 ± 2.1	0.30± 0.08	27.4 ± 6.5
p value	0.27	0.15	0.21	0.36	0.06

significantly higher in APG compared to ANG. The reason why these values were higher in APG and the reason for positive correlation are not clear. Although a significant difference was not observed between erythrocyte, Hb and Htc values were observed to be significantly high, which might suggest that erythrocyte morphology and the amount of hemoglobin erythrocyte includes can be significant in the development of CAD. MCV is a parameter related to the volume of erythrocyte while MCH is an indicator of the amount of hemoglobin erythrocyte includes. These results might suggest that erythrocyte plays a role in CAD pathogenesis like other blood cells or factors effective in CAD pathogenesis also affect erythrocyte morphology.

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