

Research Article

A study of relationship between blood parameters with myocardial infractions

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Received: 27 October 2014

Accepted: 29 November 2014

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ABSTRACT

Background: The aim of this study was to find out the changes in blood parameters in a group of myocardial infarction patients in Jamnagar, Gujarat.

Methods: In this cross sectional study conducted at the medicine clinic in GGH general hospital, Jamnagar between May 2012 and April 2013, a total of 100 subjects were included. Parameters like hemoglobin, RBC count, WBC count, platelet count, hematocrit, ESR, Mean corpuscular volume, mean corpuscular hemoglobin, mean corpuscular hemoglobin concentration, packed cell volume, differential WBC count used.

Results: The results of present study revealed that WBC count, ESR, the differential leukocyte count (e.g. neutrophil cells) in patients increased significantly ($P < 0.01$) comparison to controls. While, the differential leukocyte count of lymphocyte & platelet count revealed to decrease significantly ($P < 0.01$) in patients.

Conclusion: Abnormal blood parameters are more common among diabetes patients. Elevated WBC count, ESR, neutrophils are present in patients as compared to control. While decreased in lymphocytes & platelets are seen in patients as compared to control.

Keywords: Myocardial infarction, WBC (white blood cells), RBC (red blood cells), MCV (Mean corpuscular volume), MCHC (Mean corpuscular hemoglobin concentration), MCH (Mean corpuscular hemoglobin), PCV (Packed cell volume)

INTRODUCTION

Ischemic Heart Disease (IHD) in the vast majority of cases, are caused by an imbalance between the myocardial oxygen demand and the blood supply.¹ The most common cause of ischemic heart diseases is the narrowing of the lumina of the coronary arteries by atherosclerosis.² Myocardial Infarction (MI) is almost always due to the formation of occlusive thrombus at the site of rupture or erosion of an athermanous plaque in a coronary artery. IHD are the single most common cause of death in economically developed countries of the world.³ The leucocytosis is usual, reaching peak on the first day. The Erythrocyte Sedimentation Rate (ESR) become raised and may remain so far several days.

Echocardiography is a very useful technique for assessing left and right ventricular function and for detecting complication such as thrombus, cardiac ventricular septal defect, mitral regurgitation and pericardial effusion.⁴

The chest pain is the most common symptom of acute myocardial infarction and is often described as a sensation of tightness, pressure, or squeezing. Pain radiate most often to the left arm, lower jaw, neck, right arm, back and epigastrium, where it may mimic heart burn.⁵ Clinically, a myocardial infarction can be further subclassified into a ST elevation MI (STEMI) versus a non-ST elevation MI (non-STMI) based on ECG changes.⁶

Electrocardiography (ECG) may show acute changes with elevation in the ST segment and T wave inversion. Within 1 or 2 days of infarction deepening of Q wave occurs, ST and T wave change will disappear over time. The Q wave changes remain and can be used to detect a past infarction. Systemic signs of inflammation occur; including fever, increasing leukocytes and increasing Erythrocyte Sedimentation Rate (ESR) begin about 24 hours after infarction and continue for up to 2 weeks.⁷ Elevated white blood cell count play important role in the vascular injury and atherogenesis, the development of an atherosclerotic plaque rupture, and thrombosis.

Cardiovascular mortality increases progressively as the presenting hemoglobin level falls below 14 to 15 g/dL; conversely, it also rises as the hemoglobin level increases above 17 g/dL. The increased risk from anemia probably relates to diminished tissue delivery of oxygen, whereas the increased risk with polycythemia may be related to an increase in blood viscosity.⁸ The important risk factors are previous cardiovascular disease, older age, tobacco smoking, high blood levels of certain lipids (triglycerides, low-density lipoprotein) and low level of High Density Lipoprotein (HDL), diabetes, high blood pressure, obesity, chronic kidney disease, heart failure, excessive alcohol consumption, and chronic high stress level.⁹

The aim of this study was to find out the changes in blood parameters in a group of myocardial infarction patients.

METHODS

The present study is observational clinical study, conducted in GGH government hospital, Jamnagar. The study duration is from year 2012 to 2013. The study has been approved by institutional ethics committee. In this study, 50 known cases of Myocardial infarction and 50 apparently healthy subjects as a control group were studied.

Inclusion criteria

Age more than 30 years, both male and female. Patient with chest pain diagnosed as ST elevation myocardial infarction.

The present study was conducted in GGH government Hospital in cooperation with department of physiology/department of medicine during period from May 2011 to April 2013. The patients were diagnosed by specialist physicians by positive troponin I tests, typical chest pain and changes in ECG. Subjects were explained the purpose and protocol of the study. After informed consent, blood sample were collected to measure following parameters: Hemoglobin, total RBC count, total WBC count, platelet count, mean corpuscular volume, mean corpuscular hemoglobin, mean corpuscular hemoglobin concentration, packed cell volume, differential WBC count. These all parameters were

measured by automated cell counter. Erythrocyte sedimentation rate by wintergreen's method.

Statistics

Mean & SD were calculated. Unpaired student's 't' test was applied to test difference between means. Pearson Correlation co-efficient (r) was calculated to test correlation between parameters. Statistical significance was accepted at P value of <0.05.

RESULTS

Study includes 100 Patient suffering MI and 100 age and sex matched controls. The subjects were divided into two groups.

Group - I: healthy control=100 group - II: patient with chest pain diagnosed as myocardial infarction=100.

Table 1: General characteristics of study groups.

	MI patients (N=100)	Control (N=100)
Age (years)	47 ± 11.11	47.01 ± 12.65
Sex ratio (male/female)	68/32	68/32

Table 2: Comparison of Hb, RBC, TLC & platelet between group I & group II.

Parameters	Diabetics (N=100)	Control (N=100)
	Mean ± SD	Mean ± SD
Hb (gm%)	13.25 ± 1.39	12.34 ± 0.74***
RBC (M/cumm)	4.76 ± 0.61	4.62 ± 1.11
TLC (T/cumm)	7.01 ± 1.77	11.34 ± 4.96***
Platelet (Lacs/cumm)	3.2 ± 0.59	2.58 ± 0.91***

***P <0.001

There is significant decrease (P <0.01) in hemoglobin & platelet count in patients as compare to control group, while significant increase (P <0.01) in total leucocytes count in patient as compare to control.

Table 3: Comparison of hematocrit & ESR between group I & group II.

Parameters	Diabetics (N=100)	Control (N=100)
	Mean ± SD	Mean ± SD
Hematocrit (%)	39.39 ± 3.98	37.94 ± 4.77
ESR (mm/1 st hour)	10.8 ± 4.21	22.11 ± 14.33***

***P <0.001

The ESR showed significant increase (P < 0.05) in patient's group comparison to the controls, while there is not much difference in haematocrit.

Table 4: Comparison of blood indices between group I & group II.

Parameters	Diabetics (N=100)	Control (N=100)
	Mean \pm SD	Mean \pm SD
MCV (fl)	83.23 \pm 7.43	85.16 \pm 8.38
MCH (pg)	27.63 \pm 3.63	28.43 \pm 4.13
MCHC (gm%)	32.91 \pm 1.72	32.93 \pm 2.67

There is not much significant changes in MCV, MCH, MCHC between patient & control group.

Table 5: Comparison of differential leucocytes count between group I & group II.

Parameters	Diabetics (N=100)	Control (N=100)
	Mean \pm SD	Mean \pm SD
Neutrophils (%)	58.83 \pm 6.27	73.19 \pm 10.58***
Lymphocytes (%)	32.25 \pm 5.16	18.69 \pm 10.26***

***P <0.001

There is significant increase (P <0.01) in neutrophil in patients comparison to controls. Whereas the lymphocytes showed significant decrease (P <0.05) in patients when compared with controls.

DISCUSSION

In this study value of hematological parameters like TLC, neutrophil and ESR are significantly higher in MI and as compared to normal subjects. Hb, hematocrit and platelet count are slightly higher in control group as compared to MI patient's group. There is no more change in RBC count, MCV, MCH, and MCHC in both the groups. Lymphocyte is lower in MI patients.

In the present study, the mean hemoglobin is significantly low in MI group than in control group.

Similar studies conducted by Zaid Alirhayim et al.,¹⁰ Toshio Kobayashi et al.,¹¹ Khalid Al-Fartosi et al.¹² and Alireza Yaghoubi¹³ found significantly lower level of haemoglobin in control MI group as compared to control group.

However the study conducted by Sreekanth KS et al.¹⁴ found no statistically significant change in MI group.

In the present study, the mean total RBC counts found no statistically significant change in MI group. Similar studies conducted by Khan HA et al.,¹⁵ Toshio Kobayashi et al.¹¹ and Khalid Al-Fartosi et al.¹² found no statistically significant change in total RBC count in MI group.

In the present study, the mean total WBC count is significantly higher in MI group than in control group.

Khan HA et al.,¹⁵ E. Zorio et al.,¹⁶ Khalid Al-Fartosi et al.¹² and Chafil Al-Shujiari¹⁷ found significantly higher level of total WBC count in MI group as compared to control group and that is comparable with present study.

Another study conducted by Tahir AM et al.¹⁸ found significantly lower level of total WBC count in MI group as compared to control group and that is comparable with present study.

In the present study, the mean total platelet count is significantly lower in MI group than in control group. Ly HQ et al.,¹⁹ Nirmala et al.,²⁰ L. Pizzulli et al.²¹ and Khan HA et al.¹⁵ found significantly lower level of total platelet count in MI group as compared to control group and that is comparable with present study.

In the present study, the mean hematocrit is slightly lower in MI group than in control group. However studies conducted by Khalid Al-Fartosi et al.¹² and Alireza Yaghoubi et al.¹³ found significantly lower level of hematocrit in MI group as compared to control group.

Another studies conducted by Toshio Kobayashi et al.¹¹ found significantly higher level of hematocrit in MI group as compared to control group and that is comparable with present study.

In the present study, the mean MCV, MCH & MCHC found no statistically significantly change in MI group. Similar studies conducted by E. Zorio et al.¹⁶ found no statistically significantly change in MCV, MCH & MCHC in MI group. While another study conducted by Toshio Kobayashi et al.¹¹ found no statistically significantly change in MCV in MI group. Study conducted by Kung-Ming Jan et al.²² found no statistically significantly change in MCV, MCH & MCHC in MI group.

In the present study, the mean neutrophil count is significantly higher & lymphocyte count is significantly lower in MI group than in control group.

Similar studies conducted by Khan HA et al.,¹⁵ Tahir AM et al.,¹⁸ Kirtane AJ et al.,²³ E. Zorio et al.¹⁶ and Chafil Al-Shujiari¹⁷ found significantly higher level of neutrophil in MI group as compared to control group and that is comparable with present study. Chafil Al-Shujiari¹⁷ found significantly lower level of lymphocyte in MI group as compared to control group and that is comparable with present study.

In the present study, the mean ESR count is significantly higher in MI group than in control group. However similar studies conducted by Khalid Al-Fartosi et al.,¹² Alireza Yaghoubi et al.,¹³ Chafil Al-Shujiari¹⁷ and Sreekanth KS et al.¹⁴ found significantly higher level of ESR in MI group as compared to control group and that is comparable with present study.

CONCLUSION

Patients suffer from MI have higher incidence of altered hematological parameters. Most common alterations are significant increases in ESR, total leucocytes count, Neutrophil count & significant decreases in hemoglobin, platelet count, lymphocyte count & hematocrit value. While there is not much changes in RBC count & blood indices.

Larger Sample size would be more conclusive. Study of other factors like effect of smoking, drinking & lipid modifying drugs may be helpful. We can also include other blood parameters like lipid profile & liver function test give more light in this subject.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the institutional ethics committee

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DOI: 10.5455/2320-6012.ijrms20150112

Cite this article as: Gajera N, Gohel V, Kansagra B, Parmar J. A study of relationship between blood parameters with myocardial infarctions. *Int J Res Med Sci* 2015;3:65-9.