Complete Blood Count in Athletic and Nonathletic Persons

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Abstract

The present study was conducted to have a clear integrative idea on the Complete Blood Count among adult athletic & nonathletic person.We conducted some Studies, such as; detection of Red blood cells(RBCs), Leukocytes (WBSs),Granulocyte(Gr#), Lymphocyte(Ly#), monocyte(Mo#) Granulocyte percentage (Gr), Lymphocyte percentage (Ly), monocyte percentage (Mo),Hemoglobin (Hgb),Hematocrit (Hct), Mean cell volume (MCV), Mean cell hemoglobin (MCH), Mean cell hemoglobin concentration (MCHC), Red cell distribution width (RDW), Platelet count(Plt), and Mean Platelet Volume (MPV), In comparison with the nonathletic.

Materials & Methods: Using CBC parameters are based on the Beckman Coulter method of counting and sizing. Using two groups; athletic group, included forty healthy subjects (males mean age 22 years) of an athletic footballers went through a long-term exercise program; nonathletic subjects (forty males with mean age 23.5 years).

Results & Conclusions: among the athletics it was noticed a significant increase in red blood cell (RBC) in comparison with non-athletic subjects with (P value < 0.0074) and Significant decrease in (WBSs)with (P value < 0.0075), Granulocyte (GR#) with (P value < 0.0354), Mean cell volume (MCV) with (P value < 0.005) , and, Mean cell hemoglobin concentration (MCHC)with (P value < 0.0004), in compression to their limits in non-athletics .

Introduction

Blood serves as transpiration system. It carries vital materials to all the cells of the body and carries away the wastes that cells produced, but blood does more than passively move its precious cargoes [1]. The average human adult has more than 5 liters of blood in his or her body [2] constituting about 8% of the total body weight. Blood is composed of a cellular portion, called formed elements, and a fluid portion, called plasma. Formed elements constitute approximately 45% of the total blood volume (a measurement called the hematocrit), and the plasma accounts for the remaining 55%. [3] About 8% of the plasma volume consists of solutes, the remainder being water & Plasma proteins [4].

Platelets are cell fragments that arise when portion of large bone-marrow cells called megakaryocytes break off [5] sometimes called thrombocyte are essential to blood clotting [6] a single megakaryocyte typically produces about 1.000 platelets an average of 250.000.000 platelets are normally present in each milliliter of blood (range of 150.000 to 350.000mm^3) platelets remain functional for an average of 10 days [1].

Blood which brings oxygen and nutrients to each of our cells and carries a waste away. Its white blood cells help protect as against disease. Causing organisms, and it's clotting mechanisms help protect from us from blood loss when a vessel is damaged, in addition, buffers in the blood regulate the acid-base balance of body fluids, blood also regulate body temperature by absorbing heat produced in metabolically active regions and distributing it cooler regions and to the skin [7]. Studies observed significant deference in full blood count parameters of Hb, Hct, MCV, MCH, MCHC and RDW of healthy Anatolian males who were 18-45 years old [8]. Studies observed that the training and exercise caused significant decreases in PCV and hemoglobin concentration and significant increases in total WBC count [9].

Materials & Methods

This study has been performed during the May / 2009 in which a total of 40 blood samples(2-4 milliliters of venous blood) of athletic person(males mean age 22 years of an

athletic football club underwent a long-term exercise program) have been collected in addition to 40 blood samples for non-athletic, (males with mean age 23.5 years).

The methods used to derive CBC parameters are based on the Beckman Coulter method of counting and sizing, in combination with an automatic diluting and mixing device for sample processing, and a single beam photometer for hemoglobinometry [10,11].

Results

General Aspects

A total of 40 athletic and nonathletic persons among the age of (18-40) participated in this study [all are male], with mean age 22, 23.5 respectively.

Complete Blood Count Assay

The (Table 1.) showed the frequency of observation values for full blood count parameters in athletic persons in comparison with their limits in non-athletic subjects: Red blood cells(RBCs), Leukocytes (WBSs),Granulocyte(Gr#), Lymphocyte(Ly#), monocyte(Mo#) Granulocyte percentage (Gr), Lymphocyte percentage (Ly), monocyte percentage (Mo),Hemoglobin (Hgb),Hematocrit (Hct), Mean cell volume (MCV), Mean cell hemoglobin (MCH), Mean cell hemoglobin concentration (MCHC), Red cell distribution width (RDW), Platelet count(Plt), and Mean Platelet Volume (MPV).

Table 1. The observed numbers is the frequency of observation values for complete blood count parameters among athletic and non-athletic groups.

Parameters	Mean of non-athletic ± SE of mean	Mean of athletic ± SE of mean	*P value*
WBC Count	7.423±0.408	6.123±0.241*	0.0075
Lymphocyte %	33.630±1.394	33.158±1.569	0.8227
Monocyte %	6.015±0.497	5.439±0.318	0.3324
Granulocyte %	60.205±1.562	59.367±1.400	0.6908
LY #* 10^3 /uL	2.345±0.106	2.118±0.076	0.0847
MO# * 10^3 /uL	0.430±0.036	0.351±0.022	0.0653
GR # * 10^3 /uL	4.548±0.360	3.650±0.215*	0.0354
RBC * 10^6 /uL	5.104±0.085	5.477±0.106*	0.0074
Hgb g/dL	13.730±0.205	13.475±0.183	0.3555
MCV fL	85.333±0.816	79.748±1.753*	0.0050
MCH pg	26.540±0.574	25.160±0.523	0.0794
MCHC g/dL	31.670±0.078	30.870±0.204*	0.0004
RDW %	12.420±0.108	13.190±0.495	0.1322
Plt *10^3 /uL	276.050±10.469	263.730±11.782	0.4368
MPV fL	7.490±0.137	7.793±0.184	0.1920
Hct %	43.533±0.689	43.635±0.558	0.9082

Discussion

This study showed that athletics showed a significant increasing in the mean of (RBCs) (P value < 0.0074) and a decrease of Granulocyte (Gr#) (P value < 0.0354) ; leukocytes (WBSs) (P value < 0.0075) ; Mean cell volume (MCV) (P value < 0.005) ;and Mean cell hemoglobin concentration (MCHC) (P value < 0.0004).and non-significant difference in, Lymphocyte (Ly#), monocyte (Mo#) Granulocyte percentage (Gr), Lymphocyte percentage (Ly), monocyte percentage (Mo), Hemoglobin (Hgb), Hematocrit (Hct), Mean cell hemoglobin (MCH), Red cell distribution width (RDW), Platelet count (Plt), and Mean Platelet Volume (MPV).In comparison with mean of their limits in non-athletic persons.

In athletic this study, it was noticed that significant increase in mean of red blood cell (5.477±0.106) with (P value > 0.0074) this result is in agreement with the study which published by the El-Sayed MS, et al. (2005) [12] our finding differs from the study published Boyadjiev N and Taralov Z (2000) [13].

Generally In athletic subjects this study showed that the decreasing mean of leukocyte (WBCs) 6.123±0.241 with (P value > 0.0075) This result is similar with that found by Natale VM et al (2003) [14] and defers with Nemet D, et al. (2004) [15,16]. Davis MS, et al. (2008) observed that training and strenuous exercise lead to an increase in the total WBC count in racing sled dogs [17]. This study observed that decrease the mean of granulocyte number (Gr#) less than non-athletics with mean (3.650±0.215) with (P value > 0.0354) this result is in agreement with Natale VM et, al. (2003) [14] disagree with that found by other studies [15,18,19].

This study showed that decrease of Mean cell volume (MCV) in athletic in comparison with non-athletics with mean (79.748±1.753) and (P value > 0.005). Boyadjiev N and Taralov Z (2000) found that there are no differences in the mean of the corpuscular volume in athletic person [13] while El-Sayed MS, et al (2005) showed that mean corpuscular volume at ten weeks of training[12] the same result found by Wehrlin J, et al(2006) [20]. In this study the Mean cell hemoglobin concentration (MCHC) was one of other parameter which decreased in athletics with mean (30.870±0.204) and significant (P value > 0.0004) this result agree with the results that are published by El-Sayed MS, et al. (2005) after 3 week of training [12] and agree with Boyadjiev N, and Taralov Z. (2000) [13] while Wehrlin J, et al. (2006) published deferent result [20] about this parameter.

We also observed that other parameters had no significant difference among athletic and non-athletic persons such as lymphocyte Ly# and lymphocyte percentage [21] also Davis MS, et al.(2008) found that training and exercise were not found to have significant effects on absolute numbers or fractions of CD4+ or CD8+ lymphocytes [17] this result disagree with Zhang X, et al.(2006) showed that Exhaustive exercise induced a 4.8-fold increase in peripheral blood NK cells[22] and Nemet D, et al.(2004) observed increase of all lymphocyte subpopulations mostly were natural killer cells .but Natale VM, et al. (2003) observed that the both resistance and peak aerobic exercise resulted in a significantly longer-lasting decrease in the CD4+/CD8+ ratio [14]. In this study we also observed that there are no significant difference in monocytes among athletic and non-athletic this result differ with that noted by other studies which observed rising amount of monocytes [23, 15].

The hemoglobin (Hgb) was one of no significant parameters among athletic and non-athletic persons this result were agree with some studies [13,12] have shown that hard

physical training first lowers, then gradually raises the total amount of hemoglobin [16]. While Wehrlin J, et al. (2006) found that Hgb mass will be increased in athletic [20]. Also there were no significant difference in hematocrits (Hct) and platelets (Plt) among athletic and non-athletics , while El-Sayed MS (2005) observed that increasing of both hematocrits (Hct) and platelets (Plt) in athletics [12] but Wehrlin J, et al.(2006) observed increasing only in hematocrits (Hct) [20].

Finally some studies observed that these parameters defers with the normal values after growing in the age up to (25 -40) and more [24, 25, 26, 27, 28, 29].

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