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Comparison of the Hemoglobin Amount between Old and Young Persons in Bosnia and Herzegovina

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Abstract

Hemoglobin is a unique protein, which is responsible for oxygen and carbon dioxide transportation all the body. The protein location is inside the erythrocytes and the special oval shape makes it easily pass through blood walls to supply oxygen to the tissues and organs. It is supposed that the hemoglobin amount could change depending on the person`s age, gender or nationality. We designed a research to see the molecular differences among Bosnian and Turkish young person`s whose age interval is 18-23 and old person`s age interval is 43-65. Totally 300 person`s, 50 from each Bosnian/Turkish Female/Male and 50 old male and 50 old female were selected for the research. The students` the hemoglobin amount has been recorded individually and presented in a table. As a result of the measurement, The Turkish females average has the lowest hemoglobin Turkish males average shows the maximum amount of hemoglobin, 12.01 g/dl and 14.65 g/dl respectively. When the female gets older their the hemoglobin amount increase in their blood, 7.3% in Bosnian and 12.2% in Turkish. On the other side, the male blood the hemoglobin amount is almost similar by aging, Bosnian male hemoglobin just increase 0.74%, but in Turkish male 1.3% decrease. The result shows that female the hemoglobin amount is affected by age more than male.

Keywords: Hemoglobin; Erythrocytes; Dehydration; Biostatistical studies

Introduction

Hemoglobin (Hb) is a kind of protein, which is found in red blood cells that is responsible for delivery of oxygen to the tissues. For normal level tissue oxygenation, an optimum hemoglobin level must be maintained. The amount of hemoglobin in the blood is presented in grams per deciliter (g/dl). While the normal Hb level for males is 14 to 18 g/dl, for females is 12 to 16 g/dl [1]. If the hemoglobin level is low, the problem is called anemia and the level above the normal is called erythrocytosis, too many red cells [1]. Understanding the amount of hemoglobin in the blood is called a complete blood cell (CBC) test which is used to check for conditions such as anemia, dehydration, and malnutrition [2]. The hematocrit shows the volume of red blood cells if it is compared to the total blood volume (red blood cells and plasma [1]. While the normal hematocrit for men is 40 to 54%, it is 36 to 48% for women and the value can be determined directly by microhematocrit centrifugation or calculated indirectly [1]. A hematocrit test is also part of a complete blood count (CBC) and if it shows lower hematocrit number it is suggested as anemia or massive blood loss [2]. Statistically, the amount of hemoglobin level mean is different in men and women`s levels in health in venous blood – women have mean levels approximately 12% lower than men [3]. Testosterone hormone is the main reason why men have higher hemoglobin concentrations than women, which results in both larger body size and larger erythrocyte amount in the blood [4]. Since the red cell mass and the venous hemoglobin levels differ between the sexes, but the microcirculatory hematocrit does not, or does so to a significantly less extent, it is probable that it is the red cell mass or the venous hemoglobin level that has evolved to different levels between the sexes [3]. It is known that the hemoglobin amount decrease by aging in different sex because of repletion, such as premenopausal women have mean hemoglobin levels approximately 12% lower than age and race matched men [5-8]. Although the mean circulating erythropoietin level is similar between men and women, and in women does not differ between pre and postmenopausal women [5,6]. It demonstrates that the sex difference is constitutive and the women do not achieve male levels in health [5-7]. Biostatistical studies help us to understand many things from cancer studies to human physiology and life sciences [9-12].

Materials and Methods

To measure the hemoglobin amount in the young and old person`s, the measurement item and its strips were used. The blood samples were taken by the permission of person`s from 200 young and 100 old experimental person`s for the research. Taking samples have been done in a sterilized condition from the finger of selected person`s. The device was applied to the sterilized finger and pressed the button to collect 10 μL blood from capillary and transferred the blood to the strip. Immediately, the strip was inserted to the device to see the number of hemoglobin and HCT on the screen digitally. Totally 300 person`s, consisting of 50 Bosnian female, 50 Bosnian male and 50 Turkish female, 50 Turkish male and 50 old male/female person`s, blood samples were taken and applied to the device. Then the each group blood drops were detected individually and registered as age, sex, nationality, the hemoglobin amount and hematocrit (HCT). According to each person`s hemoglobin and HCT amount, from 1 to 50, a table has been designed to see all values in different male and females students who are member of different nationality. So, each data was registered and made a table for Bosnian female/male, Turkish female/male and old male/female. After the preparation of the table with values, it has been applied to the statistical program to reveal the significance of the data. Finally, the collected all data were applied to SPSS statistical program which analyzed the data in descriptive and correlation methods. SPSS gave us the four groups descriptive statistical results, minimum, maximum, mean and standard deviation of the hemoglobin amount of

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Bosnian and Turkish female and male students (Table 1). After the first result, the data have been analyzed based on Pearson correlation and significance of the data is separated into 0.01 level (2-tailed) and 0.05 level (2-tailed). The correlation results have been presented by black and gray in Figure 1. While 0.01 significant data were presented in black, 0.05 level significant data were presented in gray color.

Result

Young and old person`s hemoglobin measurement data firstly were applied to the SPSS to find their descriptive characteristics. Minimum the hemoglobin amount belonged to the young Turkish female 9.30 ml/m^3 and the maximum hemoglobin belongs to old male 17.70 ml/cm^3. The maximum mean of the hemoglobin was detected in Turkish male 14.96 and minimum was in the 12.01 in Turkish female (Table 1). On the other hand, The HCT minimum amount was 27 in Turkish female and maximum was 57 in Bosnian male. While the minimum HCT belongs to Turkish female 27, maximum HCT belongs to old male 57. Bosnian female hemoglobin deviation is the minimum 1.21, the maximum deviation hemoglobin belongs to old female 3.59 (Table 1). The all measured data were applied to the SPSS program to find the potential correlation. The highest Pearson correlations were observed between hemoglobin and HCT values in the four groups (Figure 1). Bosnian male hemoglobin and Bosnian HCT have the highest correlation 0.998, Bosnian female and Turkish female hemoglobin and HCT 0.997, and Turkish male hemoglobin and HCT correlation have the lowest value 0.995 if they are compared with each other (Figure 1). In addition to that, Bosnian HCT and Turkish male hemoglobin have 0.285 and Turk male and Bosnian male HCT have 0.280 value that are grouped in low correlation. As a result of the measurement, The Turkish female average has the lowest hemoglobin Turkish male average shows

		Bosnian Male Hemoglobin	BOM HCT	Turkish Male Hemoglobin	TURMHCT	Bosnian Female Hemoglobin	BOSFHCT	Turkish Female Hemoglobin	TURFHCT
Bosnian Male Hemoglobin	Pearson Correlation	1	.998	.265	.260	.028	.030	.216	.228
	Sig. (2-tailed)		.000	.062	.068	.848	.837	.132	.111
BOMHCT	Pearson Correlation	.998	1	.285	.280	.029	.030	.224	.236
	Sig. (2-tailed)	.000		.045	.049	.843	.835	.117	.100
Turkish Male Hemoglobin	Pearson Correlation	.265	.285	1	.995	-.045	-.043	-.074	-.088
	Sig. (2-tailed)	.062	.045		.000	.757	.765	.609	.543
TURMHCT	Pearson Correlation	.260	.280	.995	1	-.062	-.061	-.085	-.098
	Sig. (2-tailed)	.068	.049	.000		.668	.674	.559	.500
Bosnian Female Hemoglobin	Pearson Correlation	.028	.029	-.045	-.062	1	.997	-.008	-.030
	Sig. (2-tailed)	.848	.843	.757	.668		.000	.958	.834
BOSFHCT	Pearson Correlation	.030	.030	-.043	-.061	.997	1	-.011	-.034
	Sig. (2-tailed)	.837	.835	.765	.674	.000		.939	.813
Turkish Female Hemoglobin	Pearson Correlation	.216	.224	-.074	-.085	-.008	-.011	1	.997
	Sig. (2-tailed)	.132	.117	.609	.559	.958	.939		.000
TURFHCT	Pearson Correlation	.228	.236	-.088	-.098	-.030	-.034	.997	1
	Sig. (2-tailed)	.111	.100	.543	.500	.834	.813	.000	

Figure 1: Correlation of hemoglobin among university students.

Bosnian Male	**Minimum**	**Maximum**	**Mean**	**Std. Deviation**
Hemoglobin	12.00	19.30	14.65	1.31
HCT	35.00	57.00	43.12	3.92
Age	19.00	27.00	20.96	1.76
Turkish Male	**Minimum**	**Maximum**	**Mean**	**Std. Deviation**
Hemoglobin	12.70	17.40	14.96	1.30
HCT	37.00	53.00	44.04	3.96
Age	18.00	26.00	22.10	1.85
Bosnian Female	**Minimum**	**Maximum**	**Mean**	**Std. Deviation**
Hemoglobin	9.90	14.70	12.56	1.21
HCT	29.00	43.00	36.92	3.54
Age	18.00	35.00	21.56	3.60
Turkish Female	**Minimum**	**Maximum**	**Mean**	**Std. Deviation**
Hemoglobin	9.30	14.60	12.01	1.23
HCT	27.00	43.00	35.30	3.67
Age	18.00	28.00	21.12	2.53

	Minimum	**Maximum**	**Mean**	**Std. Deviation**
Old Male Hemoglobin	10.30	17.70	14.76	1.46
Old HCT	31.30	53.20	44.08	4.20
Old Age	54.00	65.00	59.78	2.81

	Minimum	**Maximum**	**Mean**	**Std. Deviation**
Old Female Hemoglobin	10.00	17.00	13.48	3.59
Old F HCT	32.40	50.70	38.73	5.50
Old F Age	43.00	55.00	48.99	2.97

Table 1: University student the hemoglobin amount and comparision.

the maximum amount of hemoglobin, 12.01 g/dl and 14.65 g/dl respectively. When the female gets older their the hemoglobin amount increases in their blood, 7.3% in Bosnian and 12.2% in Turkish. On the other side, the male blood the hemoglobin amount is almost similar by aging, Bosnian male hemoglobin just increase 0.74%, but in Turkish male 1.3% decrease.

Discussion and Conclusion

The hemoglobin amount is one of the key factors in the blood to see the abnormalities in the human body. If the number is higher or lower than normal, clinicians should interpret the blood analysis result. It is obviously known that the hemoglobin amount changes during the years and gender. To understand this, the research has been completed by taking 300 person`s blood samples. Since the hemoglobin is responsible for transporting oxygen throughout the body, it relates the physical activation of the person`s. The result shows that female the hemoglobin amount is affected by age more than male. The decreasing hemoglobin in female and almost stable in male results may be related to the hormones changing in the female and male. Androgen and testosterone are two important stimulators for bone marrow and menopausal time is the key time for female hormones and hemoglobin relation. The sex hormones are the main reason for muscular and physical activation, it is quite known that there is a relation between hemoglobin and the sex hormones. It is the fact that direct stimulatory effect of androgen in men in the bone marrow in association with erythropoietin, and an inhibitory effect of estrogen on the bone marrow in women [13,14]. The fact has been approved in vitro and understood that there was a direct link *in vivo* that androgens raised the hemoglobin levels in males and females [15-17]. It is another fact that the person`s hormones change with aging. Therefore, the changing hormone amount in the blood negatively affects bone marrows and production of blood cell level in male and female.

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