

Seasonal effect on Physiological Parameters and Pulmonary Function Test

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Abstract

Considerable information are accumulated about normal composition of blood. (80) males and (50) females attended this study aged from 18-40 years to investigate the effect of season on some blood parameters. The samples of venous blood were collected at the October 2007 to May 2008. All blood parameters hemoglobin (Hb), packed cell volume (P.C.V.), red blood cells (RBCs), mean corpuscular volume (MCV), mean cell hemoglobin (MCH) of males and females were within normal range of healthy subjects and also MCHC mean cell hemoglobin concentration was normal. There were significant different differences between the male and female students. There was no significant effect of season on blood parameters. The pulmonary function test included the measurement of peak flow meter and respiratory volume. There are significant differences in the value of pulmonary function between male and female students.

التأثير الفصلي على مقاييس الدم وعلى فحص وظائف الرئة

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المستخلص

تم جمع معلومات كافية عن مكونات البحث. تراوحت أعمار الذين أجريت عليهم الدراسة بين 18-40 والذين بلغ عددهم 80 من الذكور و 50 من الإناث. تهدف الدراسة إلى تأثير الفصول على مقاييس الدم. عينات من دم الوريد تم تجميعها من شهر أكتوبر 2007 لغاية أيار 2008. كل مكونات الدم من خضاب الدم و كريات الدم... الخ للذكور و الإناث كانت في المستوى الطبيعي للأشخاص السليمين. هناك فروقات واضحة بين الطلاب الذكور و الإناث. لا يوجد هناك تأثير واضح للفصول على مكونات الدم. فحص ووظائف الرئة كذلك تم دراسته و وجد انه ليس هناك فروقات مميزة بين الذكور و الإناث.

Introduction

The normal adult level of the blood parameters being reached at 14 years of age. This level is maintained until old age. At which time there is usually gradual drop⁽¹⁾. However, women have a lower erythrocyte count than men, but there is no significant difference before puberty or in old age⁽²⁾. Blood is a suspension of red cells, white cells, platelets in a complex solution (plasma) of gasses, lipids⁽³⁾. A minor degree of diurnal variation occur. The hemoglobin (Hb) level is slightly higher in the morning than in the evening. Day to day variation occurs to greater degree and most pronounced in women⁽⁴⁾.

Materials and Methods

Hundred and thirty (80 males and 50 females) from the Tikrit Teaching Hospital were subjected to this study.

There age range between 18-40 years old. All female students who were at the manse period or pregnant excluded out of this study. This study was carried out from beginning of October 2007 to May 2008. Five to six ml of venous blood from middle forearm vein collected in K2EDTA tubes for hematological investigation; red blood cells (RBCs), Hemoglobin (Hb), Packed cell volume (PCV) estimation. Blood cells counting was made by using improved Neubaur hemacytometers, while hemoglobin (Hb) estimation by using sahli method and packed cell volume (PCV) by microhematocrit. Statistical analysis was carried out by using student T-test in the value $P < 0.05$ indicates the significant differences between the season. Mean cell volume was calculated according to the formula:

$$\text{MCV (in femtoliter)} = \frac{\text{PCV \%}}{\text{RBCs counter (L)}} \quad (5)$$

Mean cells hemoglobin (MCH) was calculated according to the formula:

$$\text{MCH (in picogram)} = \frac{\text{Hb (g/L)}}{\text{RBC count (L)}} \quad (5)$$

Calculation of mean cell hemoglobin concentration (MCHC) was performed according to the formula:

$$\text{MCHC (g/dl)} = \frac{\text{Hb (g/dl)}}{\text{PCV (\%)}} \quad (6)$$

Pulmonary function test was examined for the 130 subjects by measuring the peak expiratory flow rate (standard wright peak flow USA) and (inspiratory volume, Harlow londering measuring, (voldyne 3000 USA)

Results

All blood parameters (RBCs count, Hb concentration and PCV percent-tage) of male and female students were within the

normal range of healthy subjects. However, there were no significant differences between the value of RBCs count from October to May as shown in table (1 and 2), but there were significant differences in Hb & PCV values ($P < 0.05$). RBCs count, Hb concentration & PCV percentage (value) showed significant differences between male and female ($P < 0.01$) as shown in table (3). Mean \pm SD values of pulmonary function

test of male and female students as shown in table 4.

Table (1): Blood Parameters of Male Students

	November, December, January	March, April, May
Hb (g/dl)	15.66 ± 2.70	15.80 ± 2.45
PCV (%)	44.75 ± 8.28	46.12 ** ± 4.40
RBCs (million/mm ³)	5.35 ± 2.32	5.15 ± 0.40

Table (2): Blood Parameters of Female Students

	November, December, January	March, April, May
Hb (g/dl)	12.5 ± 1.30	13.2 * ± 1.37
PCV (%)	37.92 ± 4.66	39.63 ** ± 4.03
RBCs (million/mm ³)	4.95 ± 0.24	4.80 ± 0.25

* P< 0.05

** P< 0.01

Table (3): Blood Parameters of Male and Female Students

Sex	Season	Hb (g/dl)	PCV (%)	RBCs Million/mm ³
Male	November, December, January	15.65 ± 2.70	44.73 ± 8.26	5.33 ** ± 2.33
	March, April, May	15.82 ± 2.46	46.16 ± 4.3	5.11 ± 0.40
Female	November, December, January	12.4 ± 1.36	3.90 ± 4.66	4.97 ± 0.20
	March, April May	13.2 ± 1.30	39.63 ± 4.05	4.88 ± 0.28

Sex	MCV ()	MCH (pg)	MCH (g/dl)
Male	60.70	22.53	37.16
	± 6.95	± 3.90	± 0.66
Female	78.040	26.84	34.370
	+ 8.50	+ 3.19	± 1.41

Table (4): Results of Pulmonary Function Test. Mean + SD

	Male	Female
Peak Flower Meter (liter)	400.2 ± 72.60	386.30 ± 66.35
Inspiratory volume (liter)	2230 ± 28.55	2096.35 ± 368.21

Discussion

Blood consists of red blood cells (RBC), white blood cells (WBCs), platelets in a complex solution (plasma) of gases, protein, carbohydrates, and lipids (6). A considerable amount of information about the normal range of blood parameter is accumulated (2, 3). However, the establishment of the normal for a given data or measurement depend on the accuracy and precision of the methodology and the criteria used to define a health normal person. Most investigations use random, apparently health subjects. Some use subjects who have been on supplementary iron (9). This could explain the difference in RBCs count between male and female. In the present study, significant differences in RBCs count between male and female students was found. It is likely that sub clinical nutritional deficiencies account for these differences in which cause such persons cannot be considered hematological normal, or due to the fact

that RBC count in males were higher than females (2). In the present study, there were significant differences in RBCs, Hb concentration and PCV (%) between males and females. All blood parameters in the present study were than in the range measurement and agreed with the previous works (2,3). Surprisingly, there was no significant effect of climate on blood parameters and pulmonary function test. This result could be explained as all students had not read exposure to cold climate or there were acclimatized to stress (5). Hb level was higher in the morning than in the evening. This lead to high level of cortisone found in the morning and return to less level in the evening. The level of peak flow meter and inspiratory volume measurement were within the normal range and it is slightly more in male than in female. This may be because anatomical description of the chest except that the level of peak flow meter measurement and inspiratory volume is less in some smokers than non-

smoker and also it was less in older subjects. In the present study, smoking has an effect to the lung function and make respiratory symptoms. ^(10, 11)

References

1. Velller, O.D. Studies of Hemoglobin Values in Norway in Old Man and Women. *Acta.med.Scared.* (1976), 182: 681
2. Ghai, C. L. Textbook of Practical Physiology. 4th edition. (1990). Taypee brothers medical publishers. New Delhi.
3. Wintrobe, M.M. Boggs. D. R. & Lukens. *Clinical hematology.* 8th edition (1981). Lea and Febger, Philadelphia.
4. Dacie, J.v. and Lewis, S.M. *Practical Hematology.* 6th edition (1984). Churchill Livingstone.
5. Badi, M.B. & Cold on Acclimatized and Acclimatized Glass Workers. *Saudi medical. J.* (1981). 2: 27
6. Berne, Levy. *Principles of Physiology.* (1999) p. (188)
7. Frances Fitchbach, RN, MSN. *A Manual of Laboratory and Diagnostic Tests.* 6th edition.
8. Richard, Ravel. *Clinical laboratory medicine, Clinical Application of Laboratory Dated.* Printed in USA, 1995: 23-239
9. Garby, L. The Normal Hemoglobin Level. *Br.d. Hematology.* (1970). 19: p.429
10. Lange, D. Groty, S., Nynboe, J. Mortenson, J. , Appleyard, M., Sensen, G. and Schnoher, P. Effects of Smoking and Changes in Smoking Habits on the Decline of FEV. *Eur. Resp. S.,P.* (1989) 811-816
11. Peat, J.K, Wollcock, A. G. and Cullen, K. Decline of Lung Function and Development of Chonic Air Flow Limitation a longitudinal Study of non Smokers in Buselton, Western Australia, *Throax.* 1990: 45: 32-37.