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ESTIMATION OF HEMOGLOBIN CONCENTRATION AND ESR IN INDIVIDUALS OF *MIZAJ-E-DAMWI*

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ABSTRACTS

Hemoglobin is the protein molecule in red blood cells that carries oxygen from the lungs to the body's tissues and returns carbon dioxide from the tissues back to the lungs. Hemoglobin is made up of four protein molecules (globulin chains) that are connected together. The erythrocyte sedimentation rate is the rate at which red blood cells sediment in a period of one hour. It is a common hematology test. It is a commonly measured indicator of disease, but is subject to several non-disease influences As per Unani literature, *Mizaj* is characterized by physiological, physical and psychological parameters. Keeping in mind the physiological parameters, this study was designed to find out the relation of total erythrocytes and total leucocytes with *Mizaj-e-Damwi*. For this study, 88 volunteers were randomly selected from Ajmal Khan Tibbiya College and other colleges of Aligarh and Hemoglobin concentration was estimated by using Sahli's Hemoglobinometer and ESR were estimated by using Westergren's Tube.

KEYWORDS: Hemoglobin, ESR, *Mizaj*, *Mizaj Damwi*, Sahli's Hemoglobinometer, Westergren's Tube.

INTRODUCTION

Hemoglobin (Hb) is the protein molecule present in red blood cells that carries oxygen from the lungs to the body's tissues and returns carbon dioxide from the tissues back to the lungs.It is made up of four protein molecules (globulin chains) that are connected together. The normal adult hemoglobin molecule contains two alpha-globulin chains and two beta-globulin chains. In fetuses and infants, beta chains are not common and the hemoglobin molecule is made up of two alpha chains and two gamma chains. As the infant grows, the gamma chains

are gradually replaced by beta chains, forming the adult hemoglobin structure (Guyton & Hall, 1996).

Each globulin chain contains an important iron-containing porphyrin compound termed heme. Embedded within the heme compound is an iron atom that is vital in transporting oxygen and carbon dioxide in our blood. The iron contained in hemoglobin is also responsible for the red color of blood. Hemoglobin also plays an important role in maintaining the shape of the red blood cells. In their natural shape, red blood cells are round with narrow centers resembling a donut without a hole in the middle. Abnormal hemoglobin structure can, therefore, disrupt the shape of red blood cells and impede their function and flow through blood vessels (Guyton & Hall, 1996).

An erythrocyte sedimentation rate (ESR) is a type of blood test that measures how quickly erythrocytes (red blood cells) settle at the bottom of a test tube that contains a blood sample. Normally, red blood cells settle relatively slowly. A faster-than-normal rate may indicate inflammation in the body. Inflammation is part of your immune response system. It can be a reaction to an infection or injury. Inflammation may also be a sign of a chronic disease, an immune disorder or other medical condition. Raised ESR is also found when the hemoglobin concentration is decreased (Guyton & Hall, 1996).

Mizaj (temperament) is a unique and characteristic feature of Unani medicine. It plays a major role in the diagnosis, prevention and treatment of diseases. According to Unani System of Medicine, there are four types of *Mizaj* i.e. *Safrawi* (bilious), *Damwi* (sanguine), *Balghami* (phlegmatic) and *Saudawi* (melancholic) (Azmi, 1995). The persons having these different temperaments greatly vary in their physical, physiological and psychological characteristics (Majoosi; 1902).

The *mizaj* is defined as the new state of a matter having quality different from that present in the elements or compound before coming into *imtizaj*; which results from the action and reaction among the diverse qualities and powers in the minute particles of different elements (Rushd, 1980). When they are combined together the resultant new quality in a uniform state or the state of equilibrium emerges after the combination of more than one element is called *mizaj*. Every person has a unique temperament, which represents his physical characteristics, physiological profile, psychological and emotional status (Zaidi et al., 1999). As per Unani

description Hb concentration should be higher in individuals of *Damwi Mizaj* and also ESR should be slower in them (Ahmad, 1980).

The present study was conducted on individuals of *Damwi Mizaj*. The study was started with following objectives.

1. To find the correlation between Hemoglobin and ESR with temperament, if any.
2. To find out physiological limits of Hemoglobin and ESR for individuals of *Damwi Mizaj'*
3. To institute Hemoglobin and ESR as a parameter of temperament assessment.

MATERIAL AND METHODS

This study was carried out in the Department of Kulliyat at Ajmal Khan Tibbiya College, Aligarh Muslim University, Aligarh

Selection of Volunteers

Eighty eight (88) healthy male and female volunteers of *Mizaj-e-Damwi* were selected randomly from the student's fraternity of Ajmal Khan Tibbiya College and some other departments of studies of Aligarh Muslim University and colleges of Aligarh city. Preference was given however, to the students of Ajmal Khan Tibbiya College as they were easily available for the study.

Inclusion Criteria

Only healthy volunteers of *Mizaj-e-Damwi* of both the sexes in the age group of 15–45 years were included in this study.

Exclusion Criteria

Following volunteers were excluded from the study.

• Those having *Balghami*, *Safrawi* and *Saudawi* temperament.
• Volunteers below 15 years and above 45 years of age.
• Volunteers suffering from any physical, mental or psychiatric disorder.

For the selection of healthy volunteers, detailed clinical history, physical, general and local examinations were done (Annexure I).

Informed Consent

A multi-lingual informed consent form was provided to all the subjects included in the study (Annexure-II). The purpose of the informed consent form was to obtain permission from each of the volunteers and confirm their willingness to take part in the study. The form indicated

exactly what the study demands, what the volunteers expect from the study, the risks and benefits of their participation, and guaranty of confidentiality. It stated clearly that a volunteer may withdraw himself/herself from the study at any time without citing any reason.

Determination of *Mizaj* (Ibn Sina, 1993)

The assessment of temperament (mizaj) of the volunteers was made on the basis of *Ajnas-e-Ashra* (ten determinants), mentioned in classical Unani literature. A tabular proforma designed to assess the temperament was given to the volunteers (Annexure-III). The assessment was made on the basis of information they filled in the proforma.

After determination of *Mizaj*, individuals of *Mizaj-e-Damwi* were selected for the study and rest were rejected. Also after determination of *Mizaj*, erythrocyte and leucocyte counts were estimated.

Estimation of Hemoglobin Concentration (Guyton & Hall, 1996)

Hb concentration was estimated by Sahli's Haemoglobinometer also known as Acid Haematin Method.

Principle: Anticoagulated blood is added to the 0.1 N HCl and kept for 5-7 minutes to form acid haematin. The color of this acid haematin should be matched with the solution, present in the calibration tube. Distilled water is added to the acid haematin until the color matches and the final reading is directly noted from the graduation in the calibration tube.

Requirements: Sahli's haemoglobinometer, Hydrochloric acid, distilled water.

Procedure: Place N/10 HCL in diluting tube up to the mark 20. Take blood in the haemoglobin pipette up to 20-cubic-mm-mark and blow it into diluting tube and rinse well. After 10 minutes add distilled water in drops and mix the tube until it has exactly the same color as the comparison standards. Note the reading, which indicates the percentage of haemoglobin.

Normal Hb concentration

Females: 12-16 gm/dl

Males: 14-17.4 gm/dl

Estimation of ESR (Westergren,1957)

The Erythrocyte Sedimentation Rate (ESR) is a common hematological test for nonspecific detection of inflammation that may be caused by infection, some cancers and certain autoimmune diseases. It can be defined as the rate at which Red Blood Cells (RBCs) sediment in a period of one hour.

Principle of ESR

When anticoagulated blood is allowed to stand in a narrow vertical glass tube, undisturbed for a period of time, the RBCs – under the influence of gravity- settle out from the plasma. The rate at which they settle is measured as the number of millimeters of clear plasma present at the top of the column after one hour (mm/hr). This mechanism involves three stages.

- **Stage of Aggregation**: It is the initial stage in which piling up of RBCs takes place. The phenomenon is known as Rouleaux formation. It occurs in the first 10-15 minutes.
- **Stage of Sedimentation**: It is the stage of actual falling of RBCs in which sedimentation occurs at constant rate. This occurs in 30-40 minutes out of 1 hour, depending upon the length of the tube used.
- **Stage of packing**: This is the final stage and is also known as stationary phase. In this, there is a slower rate of falling during which packing of sedimented RBCs in column occurs due to overcrowding. It occurs in final 10 minutes in 1 hour.

Westergren's Method

This method was used in the present study. The reading obtain is magnified as the column is lengthier. The Westergren's tube is open at both ends. It is 30 cm in length and 2.5 mm in diameter. The lower 20 cm are marked with 0 at the top and 200 at the bottom. It contains about 2 ml of blood.

Requirements

Anticoagulated blood (0.4 ml of 3.13% trisodium citrate solution + 1.6 ml blood)
Westergren's tube Westergren's stand Rubber bulb (sucker)

Procedure

1. Mix the anticoagulated blood thoroughly.
2. Draw the blood into the tube upto 0 mark with the help of rubber bulb.
3. Wipe out blood from bottom of the tube with cotton.

4. Set the tube upright in stand. Make sure the pipette fits snugly to eliminate possible leakage and that the pipette is in vertical position.
5. Leave the tube undisturbed for 1 hour.
6. At the end of 1 hour, read the result.

NORMAL VALUE

For Males: 0-10 mm/hr

For Females: 0-15 mm/hr

OBSERVATIONS AND RESULTS

This study was carried out in PG Lab, Department of Kulliyat, Ajmal Khan Tibbiya College, Aligarh Muslim University, Aligarh. One hundred twenty male and female volunteers in the age group of 15-45 years of *Mizaj-e-Damwi* were selected for the study, out of which thirty two volunteers could not fulfill the inclusion criteria and hence were left out of the study and 88 volunteers were finally included in the study. The volunteers, suffering from Malnutrition, Diabetes Mellitus, Hyperthyroidism, Hypothyroidism and Tuberculosis or other psychological diseases were excluded from the study. The assessment of temperament of the volunteers was made on the basis of *Ajnas-e-Ashra*, mentioned in classical Unani literature. Data obtained in this study was statistically evaluated which are as follows.

Table 01: Age Distribution.

Age Group	Frequency	Percentage	Cumulative Frequency	Percentage
15-25	11	12.50	11	12.50
25-35	28	31.80	39	44.30
35-45	22	25.00	61	69.30
30-35	12	13.30	73	82.90
35-40	09	10.20	82	93.20
40-45	06	6.80	88	100.00
Total	88	100		

	Mean Age	Median Age
From Raw Data	28.09	27.00
From Frequency Table	27.82	27.14

In the present study, 88 volunteers of age 15- 45 years were selected randomly. Out of which maximum (28) were of the age group of 20-25 while minimum (6) were of the age group of 40-45 (table o1). From the raw data the mean age was 28.09 while the median age was 27. Also from Frequency table the mean age was 27.82 while the median age was 27.14.

Table 02: Sex Distribution.

Sex	Frequency	Percentage
Male	81	92.05
Female	07	7.95
Total	88	100

In the present study, 81 volunteers (92.05%) were male while 07 7.95% were female. (Table-02).

Table 03: Average Mean of Hemoglobin Concentration in gm/dl of Blood.

Age Group	Frequency	Hb Concentration
15-25	39	13.88
25-35	34	12.94
35-45	15	12.65
Total	88	13.02

In the present study, mean hemoglobin concentration was maximum 13.88 gm/dl in the age group of 15-25 while the mean hemoglobin concentration was minimum 12.65 gm/dl in the age group 35-45. The total mean of hemoglobin concentration in all individuals o*f Damwi Mizaj* was found to be13.02gm/dl. (Table-03).

Table 04: Average Mean Value of Hemoglobin Concentration in gm/dl of Blood two Genders.

Gender	Frequency	Hb Concentration
Male	81	14.12
Female	07	12.65
Total	88	13.02

Also the total mean of hemoglobin concentration in male volunteers was higher (14.12 gm/dl) than female volunteers (12.65 gm/dl). (Table-04)

Table 05: Average Mean Value of ESR (in mm/hr).

Age Group	Frequency	ESR
15-25	39	7.82
25-35	34	8.78
35-45	15	11.44
Total	88	8.86

In the present study, mean ESR was maximum 11.44 mm/hr in the age group of 35-45 while the mean ESR was minimum 7.88 mm/hr in the age group 15-25. The total mean of ESR in all individuals o*f Damwi Mizaj* was found to be 8.86 mm/hr. (Table-05).

Table 06: Average Mean Value of ESR (in mm/hr) in two genders.

Gender	Frequency	ESR
Male	81	7.48
Female	07	10.32
Total	88	8.86

Also the mean of ESR in male volunteers was lower (7.48 mm/hr) than female volunteers (10.32 mm/hr). (Table-06).

DISCUSSION

Mizaj occupies a very important place in Unani Medicine. It forms the basis in the pathology, diagnosis and treatment of the diseases. The temperament of the person to be treated is expressed by the Galenic concept of its being *Damwi* (Sanguine), *Balghami* (Phlegmatic), *Safrawi* (Bilious) and *Saudawi* (Melancholic) according to respective preponderance of the humour (Galen, 2008). The most distinguishing feature of the *mizaj* is its approach of individuality. The temperament of an individual is a morpho-physio-psychological state that comes in to existence as a consequence of a dynamic interplay between his genes and the environment. Actually temperament is an empirical expression describing the humoural composition that governs and regulates the physiological, psychological and pathological changes in human body (Shah, 1972).

Keeping in mind the features of individuals of *Damwi Mizaj* this study entitled "Estimation of Hemoglobin Concentration and ESR in Individuals of *Mizaj-e-Damwi*" was designed. In this study, Hemoglobin Concentration was estimated by Sahli's Hemoglobinometer and while ESR was estimated by using Westergren's Tube.

Mean hemoglobin concentration in all individuals of *Mizaj-e-Damwi* was 13.02 gm/dl of blood and mean hemoglobin concentration in males of *Mizaj-e-Damwi* was 14.12 gm/dl of blood while mean total erythrocytes count in females of *Mizaj-e-Damwi* was 12.65 gm/dl of blood. In this study it was also found that mean hemoglobin concentration was maximum in age group of 15-25 years and mean hemoglobin concentration was minimum in age group of 35-45 years.

Mean ESR in all individuals of *Mizaj-e-Damwi* was 8.86 mm/hr and mean ESR in males of *Mizaj-e-Damwi* was 7.48 mm/hr while mean ESR in females of *Mizaj-e-Damwi* was

10.32mm/hr. In this study it was also found that mean ESR was maximum in age group of 35-45 years and mean ESR was minimum in age group of 15-25 years..

CONCLUSION

From the above study it can be concluded that hemoglobin concentration and also of ESR in individuals of *Damwi Mizaj* is near upper limit of normal range of both hemoglobin concentration and ESR. Also, there is inverse relation between hemoglobin concentration and ESR. The study validated the Unani concept that individuals of *Damwi Mizaj* are rich in components of *Khilt-e-Dam*.

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