Physiological variation of serum alkaline phosphatase level in *damawi* and *balghami* males in a sample population

Dar\(^1\)* Farooq Ahmad, Zaidi\(^1\) Iqtidarul Hasan & Sherani\(^2\)

\(^1\)Department of Tashreeh wa Munafeul Aza; \(^2\)Department of Kulliyat, Ajmal Khan Tibbiya College, Aligarh Muslim University, Aligarh - 202 002, UP

E-mail: drfar_74@rediffmail.com

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It is well known that the individuals with different *Mizaj* (Temperament) have different morphological features and different psychological profiles. However, very little is known about the variations in their physiological capacities and the variations in their normal values of biochemical substances in the body. In this study, level of enzyme alkaline phosphatase in serum was estimated in 52 healthy males divided into different groups according to their temperaments. The serum alkaline phosphatase (ALP) level in *Damawi* (Sanguineous) volunteers was found significantly higher (p< 0.05) than their *Balghami* (Phlegmatic) counterparts. The mean values of ALP in *Damawi* and *Balghami* volunteers were found to be 7.85 ± 1.6 and 5.8 ± 0.62, respectively showing a relationship between temperament and the ALP.

**Keywords:** *Mizaj*, Serum Alkaline Phosphatase, *Damawi*, *Balghami*

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The concept of *mizaj* (temperament), an important principle of Unani Tibb, is the amalgam of a person’s physical characteristics and psychological attributes. It is responsible for personality features, both positive and negative, and also includes the predisposition (risk factors) towards particular disorders. The four dominant temperaments are Sanguineous (*Damawi*), Phlegmatic (*Balghami*), Bilious (*Safravi*) and Melancholic (*Saudavi*). In Unani Tibb, the measurement of temperament is highly relevant in helping to assess the predisposition to various diseases and to diagnose and treat specific ailments. In Unani literature, a person’s temperament is determined by using the somatic parameters relating to bone structure, muscle/fat mass and distribution, the person’s complexion, his or her emotional profile and response to climatic conditions, dietary preferences, and a number of other features. \(^1,2\) The persons with different temperaments are bound to differ in their physical features and psyche, therefore, their characterization is mainly based on these two entities and their related attributes. But it has also been claimed and largely appreciated in Unani Tibb that persons with different temperament also differ in their functional capacities. Since, every physiological process of the body is somehow dependent on enzymatic activity, therefore, the determination of enzymatic status may indicate the possible difference in functional capacity. Enzymes govern the rate of sequential and discrete biochemical reactions which are vehicles for physiological processes, a change therefore in the enzymatic activity due either to enzyme concentration or to varying concentration of circulating hormones, would certainly modify the nature of the physiological processes. The physiological processes are concerned mainly with the needs, apparent behaviour, and functions of a person. It is, therefore, obvious that varying enzymatic activity means the varying physiological processes, which would in turn modify the functions of the body and its various organs. In view of the above, it was hypothesised that if persons of different temperaments differ in their functions, there should also be difference in the enzyme levels. The present study has been designed to establish the relationship if any, between temperament and serum alkaline phosphatase (ALP). The enzyme alkaline phosphatase was chosen for this study for various reasons. Firstly, a major fraction of ALP is derived from liver and liver plays an important role in the formation

\(^{*}\)Corresponding author:
of temperament. Secondly, ALP shows variation according to sex\textsuperscript{3,4,5} and age\textsuperscript{6}, as does the temperament, and finally, the predisposition to diseases is determined by the temperament of a person and predisposition to some diseases has been shown to depend on a person’s blood group and secretor status. The blood group and secretor status in turn have shown to influence the presence of intestinal alkaline phosphatase in serum\textsuperscript{7-16}.

**Material and methods**

This study was performed on 52 male students at Ajmal Khan Tibbiya College, Aligarh Muslim University, Aligarh. The student volunteers aged between 20-33 yrs were selected from the college. Each volunteer was subjected to a detailed history taking and full clinical examination to confirm that he is healthy and not in the habit of smoking and alcoholism, and also is not taking any treatment. Height and weight of each student were measured and Body Mass Index [BMI:Weight (kg)/height$^2$(m)] was calculated. Height was measured in cm (centimetres) using an anthropometric rod. Weight was measured on scales with sensitivity of 500 gm, calibrated each day against a lever balance.

Volunteers with BMI more than 29.9 were taken as overweight and not included in this study. The selected volunteers were divided into different groups according to their temperaments. After determination of temperament, the volunteers were randomly called for venipuncture and their serum ALP estimations were done.

Kind and Kings Method\textsuperscript{17,18} was adopted to estimate the ALP. All volunteers were advised to remain at fast overnight before their blood samples were drawn. In all cases, the volunteers assumed the sitting position 30 minutes before venipuncture; the tourniquet was applied for not more than 30 seconds, and 5 ml of blood was drawn from median cubital vein through an 18-gauge needle; the blood specimens were allowed to clot at room temperature and then centrifuged within an hour of venipuncture; the sera obtained were assayed within 2 hrs of venipuncture.

**Results**

The results are shown in Tables 1 & 2 and Fig. 1. Table 1 shows distribution of volunteers as per their temperament and Fig. 1 shows characteristics of volunteers expressed as Mean. Table 2 shows ALP levels of volunteers expressed as Mean ± SD.

The means of age, height and weight in different mizaj groups were found not to differ significantly. However, mean BMI of Balghami group was significantly higher when compared with Damawi and Safrawi group. Mean ALP level in Damawi and Safrawi groups was almost equal and higher than the Balghami group, but ALP value only in Damawi group was found statistically significant.

**Discussion**

The mean ALP of both Damawi and Safrawi groups was found higher as compared to Balghami group, but statistically only the mean ALP of Damawi group was found significantly higher. One study has reported ALP activity to be significantly raised in overweight females but not in overweight males\textsuperscript{19}.

<table>
<thead>
<tr>
<th>Table 1 – Distribution of temperaments</th>
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<tbody>
<tr>
<td>Temperaments</td>
</tr>
<tr>
<td>Damawi</td>
</tr>
<tr>
<td>Balghami</td>
</tr>
<tr>
<td>Safrawi</td>
</tr>
<tr>
<td>Saudawi</td>
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<tr>
<td>Total</td>
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<table>
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<th>Table 2 – Serum ALP of volunteers expressed as Mean ± SD</th>
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<tr>
<td>Number of volunteers</td>
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<tr>
<td>----------------------</td>
</tr>
<tr>
<td>ALP (in KA Units)</td>
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<td>a= against Balghami</td>
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**Fig. 1 – Characteristics of male volunteers expressed as mean**
Similarly, another study found no significant correlation of ALP activity with total body weight in males\(^4\). Therefore, the difference in the mean BMI between the male Damawi, Balghami and Safrawi groups found in the present study may be assumed not to have any effect on the mean ALP of these three groups. Thus, the difference in the ALP levels found in our study is due to reasons other than difference in BMI. The exact reason for high mean ALP in male Damawi group cannot be explained at present, however, it may be said, that the difference in the mean ALP between these groups is more likely due to the difference in temperament.

Damawi individuals are usually more active than Balghami persons, whereas, Balghami persons are sluggish in their physical activities. Damawi persons also have a muscular built and wide bone structure. Based on these distinct temperamental features of the Damawi individuals, the probable reasons for a higher mean ALP of Damawi group may be higher amounts of circulating testosterone in their blood (Damawi persons being more muscular), which may consequently lead to higher serum ALP levels. As it has been demonstrated, that intestinal alkaline phosphatase level is normally under adrenal control and that hydrocortisone administration produces large increases in intestinal ALP activity\(^2\). There is sufficient evidence to consider enzyme induction as a process which could explain elevation in tissue and in serum alkaline phosphatase levels\(^2\). Once the adulthood is reached, the bone ALP almost remains constant. However, as in Damawi persons the skeletal frame is comparatively wider than other groups, the contribution of bone ALP to the serum may be higher. Another probable reason may be that Damawi persons have a physiologically increased entero-hepatic circulation (biliary alkaline phosphatase can be reabsorbed in an enterohepatic circulation\(^2\)) or there may be relatively more production of the enzyme ALP by bile canaliculi in the Damawi subjects.

Here, it is obligatory to mention that apart from genetic factors, many other factors are responsible for the inter-individual variations of enzymes, working from both inside and outside the body. These enzymatic variations are in turn reflected as differences in various physiological, biochemical or metabolic processes, collectively (with morphological and psychological peculiarities) called temperament. Therefore, the temperament-enzyme studies should be conducted in conjunction with various physiological, endocrinal and metabolic studies. However, such studies can be attempted separately, but any inference there from should invariably be made on holistic lines, as any conclusion on the basis of a single parameter could be misleading.

### Conclusion

From the findings of this study, it may be concluded that persons of Damawi temperament have physiologically higher levels of serum alkaline phosphatase.

### References