Abstract

Serum copper and zinc were measured by atomic absorption spectrophotometer in (101) patients with atopic dermatitis they were (59 females and 42 males, with age range of 3-65 years) and (50) healthy volunteers. All patients were attending the Department of Dermatology and Venerology, Medical City Hospital in Baghdad during the period between 1997 and 1998. The mean serum copper of patients (127.66 µg/dl) was significantly higher than that of controls (109.08 µg/dl) (P<0.001). There was no significant differences between patients and controls in the concentrations of serum zinc and albumin. These findings suggest that the copper can be utilized as an additional test for the diagnosis of atopic dermatitis patients.

Introduction

Atopic dermatitis (AD) is a chronic and relapsing inflammatory skin disease, which may occur at any age, approximately 48-75% of patients would manifest the disease by age of (6) months and 80-90% by age of (5) years. AD is a genetically determined disorder, it is one of the clinical manifestations of a topic syndrome. It is characterized by a number of immunological and non-immunological abnormalities [1,2]. Zinc is an active element in the body and behaves as a co-factor for many enzymes. It is required for DNA, RNA and protein synthesis as well as for cell metabolism.

References
2. Immunology, Al Musiab Technical College.
3. Dermatology and Venerology, College of Medicine, University of Baghdad.
mediated immunity, reproduction and development of epidermis [3]. Zinc level in body fluids and tissues varies according to age, sex and nutritional status. Circulating zinc level in serum does not accurately reflect whole body zinc because circulating zinc is in part bound to albumin, about 60-70% of serum zinc is loosely associated with serum albumin and 30-40% is more bound to globulins [3]. Depression of plasma zinc has been noted in both animal and human infections partly due to redistribution with an accelerated of zinc from the serum into the liver [4]. Measurement of serum zinc has resulted in conflicting data both reduced [5] and normal levels being reported [6,7].

Copper is an integral component of enzymes, Copper level in tissues and body fluids depends upon diet, sex, age and state of health. Serum copper concentration increases during infections or inflammations [8], the increase in serum copper may provide increased antioxidant activity against O2− free radicals. Serum copper has been reported as increased in patients with AD [6,9]. The role of copper and zinc in skin disease has been more widely investigated. The aim of this study is to assess the levels of zinc and copper in Iraqi AD patients.

**Subjects and Methods**

**Patients**

We studied (101) patients (59 females and 42 males; mean age is 16.34±2.18 years, range 3-65 years).

The diagnosis of AD patients is confirmed by dermatologist in clinical basis. None of these patients received corticosteroids, antihistamines, or other systemic therapy at the time of study, and one month earlier. The patients were divided into two groups according to the severity of their dermatitis, (Table 1).

- Mild dermatitis group (<10% surface area involvement) which included 36 patients (23 females and 13 males). Their ages ranged between 3-56 years mean age 19.25±1.61 years.
- Severe dermatitis group (>10% surface area involvement) which included 65 patients (36 females and 29 males). Their ages ranged between 4-65 years mean 14.12±2.84 years.

**Control**

The control group consisted of (50) healthy volunteers, (26) females and (24) males. Their ages ranged between (4-58) years, with no symptoms and history of AD, (Table 1).

Venepuncture was carried out between 0.900 and 11.00 hours avoiding the effect of diurnal variation of the serum copper and zinc concentrations [10,11]. Blood samples were collected in polyethylene tubes, after centrifugation at 3000 rpm for 10 min, serum was removed and collected in polyethylene tubes then stored at −20 °C to be assayed.

Serum copper and zinc were measured by atomic absorption spectrophotometer [12] and albumin was measured by a dye-binding procedure employing bromocresol green [13].
Statistical Analysis

Statistical analysis involves calculations of mean values (M), standard deviation (SD) and student t-test to find the significance of probability level (P) for the biochemical among the different groups. Levels of significance were established at (P<0.05) and (P<0.01).

<table>
<thead>
<tr>
<th>Group</th>
<th>Diagnosis</th>
<th>No.</th>
<th>Age in Years</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Mean</td>
</tr>
<tr>
<td>TG</td>
<td>Total AD pat.</td>
<td>101</td>
<td>16.34</td>
</tr>
<tr>
<td>SG</td>
<td>Severe AD</td>
<td>65</td>
<td>14.12</td>
</tr>
<tr>
<td>MG</td>
<td>Mild AD</td>
<td>36</td>
<td>19.25</td>
</tr>
<tr>
<td>CG</td>
<td>Control</td>
<td>50</td>
<td>15.68</td>
</tr>
</tbody>
</table>

Results

The present study shows a significant increase in serum copper concentration among all groups of the patients as compared to the control group (P<0.01) (Table 2).

As shown in Table(2) there are no significant differences in the mean zinc concentration between patients and controls (P>0.05). Circulating zinc levels in serum does accurately reflect whole body zinc and since circulating zinc is in part bound to albumin so albumin concentration was measured in this study.

Statistically there are no differences in serum albumin concentration values among the various groups of AD patients as compared with that of control values (P>0.05) (Table 2).

Table-2: The [M±SD] of serum copper, zinc and albumin among patients and control with their significance.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Control group (N= 50)</th>
<th>Mild group (N= 36)</th>
<th>Severe group (N= 65)</th>
<th>Total group (N= 101)</th>
<th>T (test)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper</td>
<td>Mean</td>
<td>SD</td>
<td></td>
<td></td>
<td></td>
<td>P&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>109.08 ±21.17</td>
<td>125.81 **±44.69</td>
<td>128.69 **±38.02</td>
<td>127.66 **±40.55</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zinc</td>
<td>Mean</td>
<td>SD</td>
<td></td>
<td></td>
<td></td>
<td>NS</td>
</tr>
<tr>
<td></td>
<td>95.70 ±10.07</td>
<td>93.88 ±21.02</td>
<td>92.69 ±18.02</td>
<td>93.28 ±19.14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Albumin</td>
<td>Mean</td>
<td>SD</td>
<td></td>
<td></td>
<td></td>
<td>NS</td>
</tr>
<tr>
<td></td>
<td>4.004 ±0.218</td>
<td>4.013 ±0.310</td>
<td>4.075 ±0.296</td>
<td>4.053 ±0.302</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**: significant differences
NS: non significant

Discussion
High serum copper concentration of the present results is consistent with the finding of [6]. David et al., (1990) [9] who mentioned that the patients with AD had significantly higher serum copper concentration and there was no significant correlation between copper concentration and surface area affected by eczema. The present result disagreements with report of DiToro, 1987, which shows normal levels of serum copper, found in eczematous children [7]. Over 90% of copper in serum is bound to ceruloplasmin an acute phase reactive protein [14], and it has been suggested that the increased concentrations of copper and cerulopasein are attributable to the inflammation associated with the skin disease [6,9]. AD is a chronic inflammatory condition stimulates the release of leukocyte endogenous mediators and this polypeptide mediator is secreted by granulocytes, the action of leukocyte endogenous mediators may cause the elevated serum copper during the acute phase [15,16], so it can be assumed that copper can be used as an additional assay for the diagnosis of AD.

Our results are in disagreement with the studies of [9,17] who show a reduction in zinc level among AD patients. In contrary, the result of the present study is consistent with the reports of [6,9,7].

Normal level of serum albumin was documented by DiToro et al., (1987) [7] in 21 children with AD also Hinks et al., (1987) [6] in 24 eczematous adult and David et al., (1990) [9] noted normal level of albumin in serum of 134 children with AD. Present results of serum albumin Table (2) support our results of serum zinc concentration, since there is a linear relationship between albumin concentration and zinc concentration in the blood and circulating zinc is in part bound to albumin [8,18].

References