Abstract:

The present study was carried out to investigate the protective effects of camel's milk on against hematological and biochemical parameters of male rats treated with zinc chloride. Male rats (130-150 g), (age 5-6 weeks) were divided into three groups of 6 rats: a control group treated (I.P) with normal saline for two weeks, the zinc chloride-treated group and the camel's milk-zinc chloride-treated group. The zinc chloride treated group received (I.P) a daily 1 ml dose a solution contains 0.5 mg/kg body weight of Zinc chloride for two weeks. The camel's milk-Zinc , chloride-treated group injection a daily 1 ml dose of a solution contains 0.5 mg/kg body weight of Zinc chloride +orally administrational of 1 ml Camel's milk for two weeks. I.P injection of zinc chloride caused a significant decreased (P<0.05) of GOT, GPT and triglyceride compared with control group. Also the data showed that the administration of zinc chloride resulted a different changes in hematological parameters compared with control group. In rats treated with camel’s milk after given zinc chloride, biochemical and hematological parameters were altered compared with male rats treated with zinc chloride only.

Key words: Zinc chloride, Camel's milk, hematological parameter Biochemical parameter, Rats.
Introduction:

Zinc is one of the essential trace elements and is necessary for the synthesis of DNA & RNA proteins and functions as a catalyst for several enzymes. Zinc stabilizes the structure of nucleic acid protein and thereby preserves the integrity of intracellular organelles such as mitochondrion. Ames et al., (1993) showed that Zinc participates in the regulation of cell proliferation in several ways, it is essential to enzyme systems that influence cell division and proliferation. MacDonald (2000), explained that Zinc is an essential nutrient that is required in humans and animals for many physiological functions, including immunological and antioxidant functions including normal growth and reproduction. SRuth and MacDonald, (2000) showed that the Zinc content is highest in muscle, bone, gastrointestinal tract, kidney, brain, skin, lung, heart, and pancreas. In plasma, two-thirds of the zinc is bound to albumin which represents the metabolically active pool of zinc. This pool of plasma zinc is frequently referred to as loosely bound zinc because albumin has the ability to give up bound zinc to tissues. Zinc is excreted in both urine and feces. Zinc is one of the most abundant trace metals in humans. It is found normally in all tissues and tissue fluids and is a cofactor in over 300 enzyme systems. Together, muscle and bone contain approximately 90% of the total amount of zinc in the body (~60 and 30%, respectively) (Wastney et al. 1986). High concentrations of zinc were also detected in the prostate, retina, and sperm (Bentley and Grubb 1991). Zinc levels may vary considerably from one individual to another.

Camel’s milk (CM) is an excellent source of well balanced nutrients and also exhibits a range of biological activities that influence digestion, metabolic responses to absorbed nutrients, growth and development of specific organs and resistance to diseases. These biological activities are mainly due to the presence of peptides and protein in milk (Yagil et al., 1984; Korhonen and Pihlanto, 2001). Casein is the principal protein component in most of the mammalian milk. Besides casein CM also contains lactoferrin protein. CM is low in fat, high in protein and vitamin C than cow’s milk. It also contains fat with a relatively large amount of polyunsaturated fatty acids and linoleic acids, which are essential for human nutrition (Gorbán and Izzeldin, 2001). There are high levels of linoleic acids (18:2) among the polyunsaturated fatty acids in camel milk (Crawford et al., 1976). The anticyotoxic and antigenotoxic effects of most of the CM constituents against the genotoxic effects of chemicals are being investigated (e.g. vitamin C: Krishna et al., 1986; Vijayalaxmi and Venu, 1999; Rao et al., 2001; Selenium: Hurna’ et al., 1997; Cabrera et al., 2003; Hassan et al., 2006, Zinc: Hurna’ and Hurna’, 2000; Casein: Van Boekel et al., 1993; Goephtar et al., 1997; Lactoferrin Konuspayeva et al., 2004). Camel’s milk is different from other ruminant milk; it is low in cholesterol, sugar and protein but high in minerals (sodium, potassium, iron, copper, zinc and magnesium), vitamins A, B2, C and E, and contains a high concentration of insulin. (Knoess, 1979) It has no allergic properties and can be consumed by lactase-deficient individuals and those with a weakened immune system. Therefore, the aim of this work is to study the possible protective role of camel milk against the genotoxic effects of zinc chloride on hematological parameter biochemical parameter of male rats. In fact, this milk is believed to have medicinal properties. In Sahara, fresh butter made from camel’s milk is often used as a base for medicines. Other products also developed with camel’s milk include...
cosmetics or pharmaceuticals. A series of metabolic and autoimmune diseases are successfully being treated with camel's milk. Furthermore in India, camel's milk is used therapeutically to treat dropsy, jaundice, problems of the spleen, tuberculosis, asthma, anemia, piles and diabetes. Rao et al. (1970) A beneficial effect of raw camel's milk has been observed in chronic pulmonary tuberculosis patients has been observed. Mal et al. (2001) in repeated trials, a 30-35% reduction in the daily dose insulin in patients of type 1 diabetes receiving raw camel's milk. Agrawal et al. (2002).

Materials and Methods:

Experimental animal:

Eighteen White male rats weighing (130-150) gm were used in this study. These rats aged between (5-6) weeks, all animals were obtained from animal house of biology department / college of sciences / university of Thi-Qar/ Iraq. The rats were divided randomly into three groups of six rats.

1- The First Group I: As control group given orally a daily dose of 1 ml normal saline for two weeks.

2- The Second Group II: Injection (I.P) a daily 1 ml dose a solution contains 0.5 mg/kg body weight of Zinc chloride for two weeks.

3- The Group III: injection a daily 1 ml dose of a solution contains 0.5 mg/kg body weight of Zinc chloride orally administrational of 1 ml Camel's milk for two weeks.

Biochemical Parameters:

At the end of the experiment, the over night fasted the animals were sacrificed under light ether anesthesia. Blood samples: 5 ml of blood collected by cardiac puncture. The first part (2 ml) put in test tube containing EDTA and to do blood picture, and the second part (3 ml) put in tube without EDTA and centrifugation at 3000 g for 15 minutes for obtained serum for biochemical parameters. The blood parameters included Hb. concentration total count of leukocytes, and differential count of leukocyte (Eosionphils, Basophils, Lymphocytes, Monocytes). The biochemical parameters included Alanine amino transferase (ALT), Asparatate amino transferase (AST), triglyceride (TG) and cholesterol.

Statistical analysis:

Statistical analysis was performed using one way analysis of variance (ANOVA). If a significance was found, differences among individual group means were tested by the least significant difference (LSD) test. Values were considered statistically significant at P≤0.05. Data are presented as Mean±Standard error.

Results and Discussion:

The present study indicated non significant differences (P<0.05) in Hb. concentration, total WBC, eosinophils count, and monocytes in the male rats treated with zinc chloride, and the male rats treated with zinc chloride and camel's milk compared with control group. There was a significant increased (P<0.05) in basophils count of male rats treated with zinc chloride and the male rats treated with camel's milk and zinc chloride compared with control group. Lymphocytes count decreased significant (P<0.05) in male rats treated with zinc chloride and it showed non significant differences compared with control group.

Table (2) explain the effect of camel's milk on the biochemical parameters of male rats treated with zinc chloride. The results show that the treated of male rats with zinc chlorides caused a significant decrease (P<0.05) in GOT, GPT, and triglyceride. While there was non significant difference in cholesterol compared with control group, While the rats treated with zinc chloride and camel's milk showed non significant difference (P<0.05) in
GOT, GPT and cholesterol compared with control group, While there was a significant increase (P < 0.05) in TG compared with control group. Also, there was a significant increase (P < 0.05) in GOT, GPT and TG in the rats treated with zinc chloride and Camel's milk compared with the rats treated with zinc chloride only. While there was no significant difference (P < 0.05) in cholesterol level in camel's milk and zinc chloride group compared with zinc chloride group.

### Table (1) explain the effect of Camel's Milk on hematological parameters of male rats treated with Zinc chloride.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Hb (g/dL)</th>
<th>Total WBC (x 10^6/L)</th>
<th>Eosinophils (%)</th>
<th>Basophils (%)</th>
<th>Lymphocytes (%)</th>
<th>Monocytes (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>9.38 ± 0.83</td>
<td>7.48 ± 0.61</td>
<td>1.00 ± 0.00</td>
<td>14.50 ± 1.33</td>
<td>83.33 ± 1.14</td>
<td>1.83 ± 0.40</td>
</tr>
<tr>
<td>Zinc</td>
<td>6.90 ± 0.49</td>
<td>7.73 ± 0.21</td>
<td>1.50 ± 0.22</td>
<td>28.50 ± 2.82</td>
<td>67.00 ± 4.27</td>
<td>2.16 ± 0.60</td>
</tr>
<tr>
<td>Zinc+Milk</td>
<td>10.93 ± 1.14</td>
<td>8.38 ± 0.36</td>
<td>1.33 ± 0.21</td>
<td>30.83 ± 1.53</td>
<td>70.00 ± 6.23</td>
<td>2.00 ± 0.44</td>
</tr>
</tbody>
</table>

L.S.D = 3.02  L.S.D = 1.50  L.S.D = 0.62  L.S.D = 7.02  L.S.D = 15.42  L.S.D = 1.71

### Table (2) explain the effect of Camels, Milk on biochemical parameters of male rats treated with Zinc chloride.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Got (U/L)</th>
<th>Gpt (U/L)</th>
<th>Triglyceride (Mg/dl)</th>
<th>Cholesterol (Mg/dl)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>53.16 ± 1.10</td>
<td>49.50 ± 0.56</td>
<td>16.16 ± 0.72</td>
<td>11.169 ± 0.30</td>
</tr>
<tr>
<td>Zinc</td>
<td>45.16 ± 1.81</td>
<td>46.83 ± 1.44</td>
<td>13.00 ± 0.63</td>
<td>11.16 ± 0.94</td>
</tr>
<tr>
<td>Zinc Milk</td>
<td>52.33 ± 0.55</td>
<td>52.00 ± 0.73</td>
<td>18.83 ± 0.60</td>
<td>9.83 ± 0.30</td>
</tr>
</tbody>
</table>

L.S.D = 4.43  L.S.D = 3.46  L.S.D = 2.37  L.S.D = 2.10

**Discussion:**

The results of the present study indicated that the treated of rats with zinc chloride in doses 0.5 mg/Kg daily for two weeks have shown a non significant decrease (P ≤ 0.05) in Hb concentration compared with control group (table 2). And these results referred to anemia which is regarded on the toxic signs of Zinc element. The above results corresponded with (Deolievera et al., 2001; Julie et al., 2003 and IRIS, 2005). It has been known that the causes of anemia may be due to copper deficiency which leads to an agonistic effect of Zinc on copper uptake from the gastrointestinal tract (GIT) (Julie et al., 2003). Anemia could result from a decrease in the ceruloplasmin secondary to the decrease of copper which is a component of ceruloplasmin (Chandra, 1984 and IRIS, 2005). Zinc toxicity also cases a defect of the hepatic cells that cause arduction of erythropoietin hormone (Guyton and Hall, 1981). Julie et al., (2003) suggest that Zinc toxicity causes an extensive Vacculation of erythrocyte precursors in
the bone marrow and that causes a defect of erythrocyte production which leads to anemia. The result showed non significant difference in the total WBC count and monocytes and Eosinophils and a significant increase in the lymphocyte count. Leukemia was observed in the present study may be considered as a defense mechanism against the inflammatory processes in the body especially in the liver and kidneys. The inflammation will stimulate the bone marrow to produce a large number of WBC. Zinc toxicity causes hepatospleenomegaly (De oliveira et al., 2001), which leads to the production of large numbers of the lymphocytes.

The present study showed that the treated rats with Zinc chloride toxicity in doses 0.5 mg/Kg daily for two weeks was a significant increase (P≤0.05) in the serum TG, where there was non significant differences in the cholesterol. The occurrence of the cholesterol may have resulted from the effect of Zinc toxicity on the thyroid gland which causes enlargement of the thyroid gland and cause hypothyroidism which leads to a decrease of the thyroid hormones thyroxin (T4) and Triiodothyronine (T3) in the blood stream (Biassoni et al., 1998). The decrease of the these hormones leads to a decrease of total cholesterol. Where as the increase of triglycerol have resulted due to Zinc toxicity as showed in the present study that will lead to the destruction of fatty acids and will prescience of the glycerol and helpoxaloacetate to from the triglycerol to produce energy (Guyton and Hall, 1981).

The protective effect of camel's milk could be attributed to its antioxidant activity and it may possibly have chelating effects on zinc. It has been reported that camel's milk contains high levels of vitamins A, B2, C and E and is very rich in magnesium (Mg) and other trace elements (Knoess 1979). These vitamins are antioxidants that have been found to be useful in preventing tissue injury caused by toxic agents. Mg protects cells from heavy metals such as aluminum, mercury, lead, cadmium, beryllium and nickel, which explains why re-mineralization is so essential for heavy metal detoxification and chelating. In fact, Mg deficiency has been associated with production of ROS (Martin et al., 2003). Additionally, Mg protects cells against oxyradical damage and assists in the absorption and metabolism of vitamins B, C and E (Barbagallo 1999) which are antioxidants important in cellular protection. Recent evidence suggests that vitamin E enhances glutathione levels and may play a protective role in Mg deficiency induced cardiac lesions (Barbagallo 1999). Magnesium protects the cell against oxy radical damage and assists in the absorption and metabolism of B vitamins, vitamin C and E (Barbagallo 1999), which are antioxidants important in cell protection. Recent evidence suggests that vitamin E enhances glutathione levels and may play a protective role in magnesium deficiency-induced cardiac lesions (Barbagallo 1999). Also, it has been reported that magnesium is very essential for biosynthesis of glutathione, because the enzyme Glutathione synthetase requires γ-glutamyl cysteine, glycine, ATP and magnesium ions to form glutathione (Virginia et al., 1971). Vitamin C is a strong antioxidant (Rao, 1997; Sato et al., 1997). The detoxification effect of vitamin C is manifested by the removal or minimization of free radicals produced by mercury (Gebhart, 1984; Herbacynska et al., 1995). Also, vitamin C protects DNA from oxidative damage (Eylar et al., 1996; Antunes and Takahashi, 1999), reduces DNA damage exerted by irradiation (Green et al., 1994) and also reduces micronucleus (MN) frequencies in polychromatic erythrocytes of bone marrow in rodents exposed to heavy metals and radiation (Chorvatovicova´ et al., 1991; Konopacka et al., 1998). Furthermore, milk exhibits a range of biological activities. These biological activities are mainly due to peptides and protein in milk. Bioactive peptides are produced during the digestion of milk in the gastrointestinal tract (Korhonen and Pihlanto, 2001). The beneficial health effects of milk proteins can be classified as antimicrobial, antioxidative, antithrombotic, antihypertensive or immuno-modulatory (FitzGerald and Meisel, 2000).
References:


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