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Original Article

The role of camel's milk on some physiological parameters of female rats injected with benzene induced leukemia

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ABSTRACT

The present study was carried out to investigate the role of camel's milk in body weight, weight of some organs and some hematological parameters of adult female rats treated with benzene induced leukemia. The results indicated a significant increase ($p \leq 0.05$) in total WBC, neutrophils, basophils, lymphocytes, monocytes, weight of liver and spleen) and a significant decrease ($p \leq 0.05$) in acidophils, body weight, weight of kidney and heart in leukemia groups (C and D) compared with control group (A) and camel's milk group (B). The treatment of female rats which treated with benzene to induced leukemia with camel's milk led to enhancement these parameters in protection groups (E and F) and treatment groups (G and H) to the normal levels.

Key word: Leukemia, benzene, camel's milk, body weight, hematological parameters

INTRODUCTION

Leukemia is a Greek word which means (leukos) means white and (aima) means blood, this word was derived from the disease's name intent high white blood cell counts that most leukemia patients have before treatment [1,2]. This disease is one of a wide range of diseases called hematological neoplasms [3]. The initial symptoms of the disease include leukemia: enlarged liver and spleen and weight loss [4,5]. Undue number of cells can also interfere with the level of other cells, causing a harmful imbalance in blood cells count, such as: low count of platelets and red blood cells [3,4,6]. Benzene cause hematological malignancies leukemia which includes acute myeloid leukemia and probably other hematological malignancies. As benzene also causes hematotoxicity these effects modulated by benzene-induced oxidative stress, aryl hydrocarbon receptor dysregulation and reduced immune surveillance, lead to the generation of leukemic stem cells and subsequent clonal development to leukemia [7,8,9]. The camel's milk is considered to have medicinal properties. The products developed also include cosmetics or pharmaceutical. 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 [10]. A beneficial effect of raw camel's milk has been observed in chronic pulmonary tuberculosis patients [11]. Also, in repeated trials, a 30-35% reduction in the daily insulin dose required by patients with type 1 diabetes was observed in response to treatment with raw camel's milk [12]. Camel's milk is used therapeutically against poisoning tetrachloride carbon CCl4 which cause damage to the liver [13]. also it used to treated a variety of diseases such jaundice, problems of the spleen and tuberculosis, asthma , anemia, diabetes [14].The present study aimed to investigate the role of camel's milk in body weight, weight of some organs and hematological parameters of female rats treated with benzene induced leukemia.

MATERIALS AND METHODS

Camel's milk: samples were collected in the morning from a herd of camel, from different parts of Nasiriyah, Thi–Qar province, Iraq by using hand milking in sterile screw bottles and then transferred directly mediated icebox refrigerated to the laboratory and keeping it in the refrigerator under temperature (2-5) C° until use.

Laboratory animals: Forty eight healthy female rats (*Rattus norvegicus*) weighting (200-250g) were

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and aged (8-10 weeks) used in the present study. Animals were housed in the animal house of Biology Dept. Science College, Thi-Qar University, Iraq. Under standard laboratory condition (12h light : 12h dark photoperiod cycle (LD) at (20±2)℃ and relative humidity (45-55)%.Animals were fed on standard rat pellet (*ad libitum*) and tap water, the animals left for two weeks for the purpose of acclimatization before the start of the experiment.

Induction of leukemia by benzene: The animals were weighted before starting the experimental, benzene was used to induced leukemia in female rats by using two doses (0.2ml/kg and 0.4ml/kg) for (4 months) by two (I.P.) injections /week.

The female rats divided into eight groups, each group contain (6) animals as following :

Group A	Control group that were treated orally with (5ml/kg) of physiological saline (0.85%) Nacl),for 4 months .
Group B	Milk group that were treated orally with (5ml/kg) of raw camel's milk , for 4 months
Group C	(leukemia group1) that were injected (I.P.) with(0.2ml/kg) of benzene for induction of leukemia by two doses for each week for four months.
Group D	(leukemia group2) that were treated with(0.4ml/kg) of benzene for induction of leukemia by two doses for each week for four months .
Group E	(Protection group1) that were treated with(0.2ml/kg) of benzene for induction leukemia with (5ml/kg) of raw camel's milk for four months .
Group F	(Protection group2) that were treated with(0.4ml/kg) of benzene for induction leukemia with (5ml/kg) of raw camel's milk for four months .
Group G	(Treatment group1) that were treated with(0.2ml/kg) of benzene for four months to induce of leukemia then treated with (5ml/kg) of raw camel's milk daily for 1months.
Group H	(Treatment group2) that were treated with(0.4ml/kg) of benzene for four months to induce of leukemia then treated with (5ml/kg) of raw camel's milk daily for 1months.

Blood collection: After the end of the experimental period the animals sacrificed by using of (5ml) dispossible syringe, then (1ml) of blood put in EDTA tube for measuring of hematological parameters which included total white blood cells(WBC), neutrophils ,basophils, eusionphils, lymphocytes and monocytes by using of hematology analyzer (Nihon Kohden) corporation (Japan) in the laboratories of the blood bank in Nassiriyah city, Thi- Qar province, Iraq. weight of body, spleen, liver, kidney and heart measured by using of sensitive balance, Denver(Germany).

Statistical analysis : ANOVA analysis and LSD test were used according (SPSS Version 16) program at the ($p \leq 0.05$) to find the mean between all treatments.

RESULTS AND DISCUSSION

The result in the table (1) showed non-significant difference ($p \leq 0.05$) in body weight of (B, E and G) groups compared with control group (A). While, there was a significant decrease ($p \leq 0.05$) in body weight of (C, D, F and H) groups compared with (A) group. Also, the result showed non-significant difference ($p \leq 0.05$) in spleen weight of (B, E, F,G and H)groups, compared with (A)group. While, there was a significant increase ($p \leq 0.05$) in spleen weight of (C and D) compared with (A) group. Also the result displayed a significant increase ($p \leq 0.05$) in liver weight of camel's milk group compared with (A)group. While, there was a significant increase ($p \leq 0.05$) in liver weight of (C and D)groups compared with (A)group. While, there was a non significant increase ($p \leq 0.05$) in liver weight of (E,F,G and H)groups compared with (A)group. The result showed non-significant differences ($p \leq 0.05$) in kidney weight of (B) compared with (A)group. while, there was a significant decrease ($p \leq 0.05$) in kidney weight of (C,D,E,F,G and H)groups, compared with (A)group. and there was result displayed significant increase ($p \leq 0.05$) in heart weight in camel's milk group(B), compared with (A)group. While, there was a significant decrease ($p \leq 0.05$) in heart weight of (C,D,E,F, and H)groups, compared with (A) group, and there was non significant decrease ($p \leq 0.05$) in (G)group compared with (A) group. The result in the table (2) showed non significant differences ($p \leq 0.05$) in total (WBC) of (B, E, F, G and H) groups, compared with (A) group. While, there was a significant increase ($p \leq 0.05$) in total (WBC) of (C and D)groups, compared with (A)group, and non-significant differences ($p \leq 0.05$) in percentage of neutrophils ,basophile, acidophils and lymphocyte of (B,E,F,G and H) compared with (A) group.

While, there was a significant increased ($p \leq 0.05$) in percentage of neutrophils of (C and D) groups, compared with (A)group. While, there was a significant increase ($p \leq 0.05$) in percentage of basophile of (C and D)groups compared with

(A)group . While, there was a significant decrease ($p \leq 0.05$) in percentage of acidophils of (C and D)groups compared with (A)group. While, there was a significant increase ($p \leq 0.05$) in percentage of lymphocyte of (D)group compared with (A)group . While , there was a significant increase ($p \leq 0.05$) in percentage of lymphocyte of (D)group compared with (A)group. Also, there was non significant increase in (C) group compared with (A)group. The decrease of body weight may be as a result of a decrease in food consumption or as a result of poisoning gradual resulting from exposure to benzene, where the impact of benzene on the brain and lead to tissue damage and thus lead to loss of control over food intake [15,16,17], and this results disagree with the [18].

The increased in body weight in protection and treatment groups (E,F,G and H) can be attributed to the effectiveness of camel milk anti-oxidants activity by containing milk on high levels of vitamins (A, B_2, C, E) and a very rich element (magnesium, sodium, chlorine, calcium, phosphorus, potassium and zinc) [19,20]. The increase in spleen weight in leukemia groups (C and D)may be due to splenomegaly was found with high peripheral WBC count similar relation was shown in the other study [21,22]. The treatment by camel milk in (E,F,G and H)groups led to protect spleen cells from damage because it contains a high proportion of the most important minerals (magnesium and zinc) and vitamins nature antioxidant that led to protect cells from damage resulting from benzene. The decrease of heart weight may be as a result of oxidative stress resulting from exposure to benzene which lead to cellular components break down and decay, leading to lower weight, this was confirmed by [23, 24]. The liver showed diffuse enlargement secondary to infiltration by leukemic lymphoblasts. In ALL (acute lymphocytic leukemia) and CLL (chronic lymphocytic leukemia), in the involvement of periportal spaces by neoplastic cells was common. hepatomegaly may also be the result of hypertrophy of hepatocytes in the leukemia and this corresponds with what he found [21,22,25,26,27].

The results also indicated that the treatment of female rats with camel's milk in (E,F,G and H)groups led to reduce damage resulting from poisoning of benzene and this corresponds with what he found [28,29]. The present investigation was taken to determine multifaceted effects of long term benzene administration on various enzymes involved in carbohydrate metabolism, brush border membranes and oxidative stress in the kidney, the effect of benzene administration was examined on enzymes of carbohydrate metabolism in various rat tissues to assess its effect on energy yielding reactions. The activities of various enzymes involved in glycolysis, TCA cycle and gluconeogenesis were selectively altered by benzene exposure [19]. The used of camel milk lead to reduce the damages resulting from poisoning is due to the fact that camel's milk is led to reduce the absorption of toxic because it contains many minerals (iron, calcium, zinc and magnesium), which reduces the absorption of matter and thus less damage caused to the kidney tissues [30,31]. The overproduction of WBCs in benzene groups especially at high dose imbalanced the differential count of WBCs [32,33]. The increase in the percentage of lymphocytes in (C and D)groups may be caused by examined immunotoxicity of benzene, and found that effects on humoral and cell-mediated immune responses are a result of the selective toxicity of benzene on B lymphocytes and suppressor T cells [34]. The increased of Monocytes that reflects a high increasing in the number of this type of cells and the cause may be related to a defect in the maturation process of this type ,These results are inconsistent with the [34,35,36]. The increase of monocytes reflected the change alteration of genetic material in stem cells, a fact that lead to change the proliferate and population of differentiated cells that a greatly expanded the total myeloid mass (promyelocytes, myelocytes and metamyelocytes) [3,37].

The decline of in WBC in the animals taken camel's milk may be due to the high level of vitamins in camel's milk, especially vitamin (C, E), which have important role in the improvement of total the WBC because they act to improve the situation of antioxidants through the fact that vitamin (E) is a line of defense against the harmful effects of free radicals such as superperoxides, peroxides for the purpose of protecting the cell membrane and especially unsaturated fatty acids of such damages, and that vitamin E prevents oxidation of various materials easy oxidation including vitamin a, which has a role in reducing the secretion of the hormone the catalyst for the adrenal cortex (ACTH), which affects the hormone corticosterone secreted from the adrenal gland authorized the vitamin E has a role in increasing the storage of vitamin a in the liver, and thus less than the number of white cells and less neutrophils ratio [38,39]. The decline of neutrophils and mononuclear one of the inflammatory cells may be due to the role of camel's milk as an organizer immunotherapy including contents of antibodies (immunoglobulins), which gives a important role in immune protection for the body against infections by reducing the effectiveness of exotic materials causing the increase in the number of inflammatory cells and help to reduce the numbers

of neutrophils and mononuclear cells, and this is identical to what touched him , Or may be the reason for this camel's milk to contain a high percentage of vitamins with antioxidant its including vitamins (E, C), which led to reduce stress factors and raise the immune response [40,41].

Conclusion

Our result demonstrated that benzene is capable of inducing marked alteration in some hematological parameters and some weight of organs oxidative damage and inhibiting the function of antioxidant. Drinking camel's milk could be beneficial for alleviating benzene toxicity.

Table (1): The role of camel's milk on weight of body and some organs of female rats infected with leukemia.

Groups	Body weight (gm)	Spleen weight (gm)	Liver weigh (gm)	Kidney weight(gm)	Heart weight(gm)
A	144.66^{a}±11.42	1.52^{c}±0.07	10.39^{d}±0.17	1.43^{a}±0.05	1.27^{b}±0.06
B	135.83^{a}±10.58	1.45^{c}±0.08	11.26^{c}±0.35	1.52^{a}±0.05	1.69^{a} ±0.08
C	90.00^{b}±3.42	2.49^{b}±0.18	12.38^{b}±0.32	1.10^{bc}±0.08	1.01^{cd}±0.03
D	26.33^{d}±1.40	5.02^{a}±0.48	14.00^{a}±0.33	1.02^{c}±0.08	0.66^{e}±0.11
E	139.33^{a}±.66	1.70^{c}±0.21	10.69^{cd}±0.24	1.27^{b}±0.02	0.68^{e}±0.01
F	63.33^{c}±5.43	1.91^{c}±0.23	10.78^{cd}±0.28	1.11^{bc}±0.09	0.92^{d}±0.02
G	141.50^{a}±3.25	1.86^{c}±0.25	10.85^{cd}±0.19	1.21^{b}±0.03	1.17^{bc}±0.06
H	70.33^{c}±3.60	1.94^{c}±0.29	10.88^{cd}±0.19	1.07^{c}±0.08	1.01^{cd}±0.04
LSD	19.63	0..63	0.66	0.18	0.21

♣Values are means ±S.E.

- ♣The different letters refer to a significant differences at (p≤0.05) .

♣The same letters refer to non significant differences at (p≤0.05).

Table (2) the role of camel's milk on hematological parameters of female rats infected with leukemia.

Group	WBC Total (10^3/mm^3)	Neutrophils (%)	Basophils (%)	Acidophils (%)	Lymphocyts (%)	Monocytes (%)
A	6.94^{c}±0.52	17.44^{c}±0.28	0.22^{c}±0.01	4.79^{a}±0.29	69.42^{b}±0.47	8.17^{b}±0.43
B	6.77^{c}±0.35	16.51^{c}±0.47	0.23^{c}±0.02	5.09^{a}±0.29	69.04^{b}±0.39	8.06^{b}±0.40
C	10.83^{b}±0.41	19.48^{b}±0.56	0.34^{b}±0.19	3.19^{b}±0.23	70.57^{b}±0.31	9.04^{ab}±0.37
D	16.64^{a}±0.71	23.26^{a}±0.84	0.58^{a}±0.53	2.92^{b}±0.23	82.22^{a}±1.65	10.08^{a}±0.47
E	6.86^{c}±0.37	16.71^{c}±0.41	0.20^{c}±0.05	4.92^{a}±0.31	69.18^{b}±1.48	8.33^{b} ±0.43
F	7.40 ^{c}±0.39	17.23^{c}±0.36	0.19^{c}±0.00	4.99^{a}±0.30	68.61^{b}±2.07	8.32^{b}±0.43
E	6.78 ^{c}±0.37	16.57^{c}±0.72	0.22^{c}±0.08	4.90^{a}±0.34	69.13^{b}±1.89	8.02^{b}±0.43
H	7.48^{c}±0.27	17.18^{c}±0.67	0.20^{c}±0.01	4.96^{a}±0.33	68.15^{b}±2.02	8.00^{b}±0.44
LSD	1.12	1.43	0.06	0.75	3.66	1.06

♣Values are means ±S.E .

♣The different letters refer to significant differences (p≤0.05).

♣The same letters refer to non significant differences (p≤0.05)

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