CHOOSING OF SOME BLOOD PARAMETERS AND HEPATIC ENZYMES AS INDICATORS FOR RADIATION EXPOSURE IN EXPERIMENTAL RABBITS

Hanaa Salman Kadhim
Department of Biology, College of Science, Basrah University, Basrah, Iraq
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ABSTRACT
Injection of 1 mg / kg of uranyl acetate caused an obvious changes in the numbers of white blood cells with progressing time of experiment, specially in the numbers of neutrophiles and monocytes which decreased significantly, while the numbers of eosinophiles has increased significantly after the first week of injection and then decreased significantly in the 2nd and 3rd week of exposure as compared with control group. Also, the injection caused significant decreasing in Hb and PCV values, while the activities of hepatic enzymes GPT, and GOT were not affected in comparison with control group.

So, it may be useful to use this variation of WBC percentage as a primary indication to persons who exposed to different doses of radioactive compound.

INTRODUCTION
Uranium is a heavy metal that contains radioactive isotopes (1). Researches conducted since 1991 Gulf war indicated that exposure to uranium may be mutagenic, cytotoxic, teratogenic, teratogenic, and neurotoxic (2).

Study in human and animal have shown that uranium can accumulate in the skeleton, liver, kidney, testes, and brain (3). In addition, animal experiment showed that uranium compounds cause leukemia, osteosarcoma, and carcinoma of lung, kidney, and reticulosarcoma of lung (4).

Studies over several decades have found that population with well above average occupational exposure to inhaled or ingested uranium suffer from increase rates of the cancer including leukemia which due to radiation (5, 6).

The blood changes in exposure have been well demonstrated, these changes include: increased nitrogen retention, decreased of serum albumin, largely unchanged serum protein, and increased serum ammonia creatinine. Blood urea, uric acid, concentration of sodium and chloride were lowered, and elevation in total lipid, cholesterol and blood glucose (7).
Uranyl acetate is one of the uranium compounds that are used in biological researches. This compound is used with lead citrate as a counter stains for staining techniques for electron microscopical examinations (8, 9).

As a result of exposure of many people in Iraq after Gulf war to different doses of radiation because of using of depleted uranium and which revealed as different types of cancers including blood cancer, this study was aimed to determine changes in different blood parameters including white blood cells to be as an indicators for uranium exposure. Also, since the important application of uranyl acetate in most important biological researches, this study also aimed to investigate the hematological effect of uranyl acetate on rabbits.

MATERIALS AND METHODS

Sixth male and female rabbits were injected with 0.5 ml containing 1mg /kg of uranyl acetate intravenously. Two rabbits left with out injection as a control group. Blood smear were made weekly from both control and injected animals for differential count of white blood cells. Each smear was stained with Gimso's stain for stain for counting of the 5 types of white bloe cells. Animals were dissected after three weeks of experiment after anesthetizing with chloroform, blood collected directly from heart in tubes with or with out (E.D.T.A.) anticoagulant according to (10) and (11).

Hemoglobin concentration, total count of white blood cells (W.B.C.), differential count of (W.B.C.), and packed cell volume (PCV) were done in the same day of collection.

Both Glutamate oxaloacetate transaminase (GOT) and Glutamate pyruvate transaminase (GPT) activities were measured according to (12).

RESULTS

Results of the present study showed that there are differences in each type of white blood cells numbers as comparing with control group after 1, 2, and 3 weeks of injection with uranyl acetate as ANOVA test analysis revealed. Numbers of neutrophiles were significantly decreased in comparison with control (P<0.01). Also, results showed that these cells were decreased in numbers between the first and third week of injection, but there was no differences between the second and third week of injection.

The numbers of lymphocyte were differed comparing with control group with progressing time. Also, there were significant changes among the treatment periods that concern the lymphocyte numbers.
Fig. (1): Effect of uranyl acetate on types of white blood cells with time.

Fig. (2): Effect of uranyl acetate on haematological parameters
Injection of uranyl acetate significantly decreased the number of monocyte among the treated groups compared with control group except the first week which was not differed from control, and there were no differences between the second and third week of treatment.

The treated animals showed no significant differences in eosinophil numbers as comparing with control group at both first and second weeks, the difference occur in the third week of exposure which differed significantly in comparison with the first and second weeks. The basophiles were increased significantly in treated animals (P < 0.01) in the first and second week of exposure but there was no significant differences in the third week as comparing with control, also numbers of the same cells was significantly differed in the second week compared with other period of exposing Fig.(1).
T- Test was done to the other blood parameters and to hepatic enzymes (GPT and GOT) and the following results were appeared:

There were significant differences in Hb values (P<0.01) and PCV value (P<0.05) as comparing with control. But there were no differences in GPT and GOT in comparison with control group fig. (2) & (3).

**DISCUSSION**

Uranium compound such as uranium oxide, uranium hexafluoride, uranium chloride, uranium nitrate, uranium acetate and others are produced when uranium burns, these compounds have different biological effect depending on their solubility in body fluids and their biological half life (13).

Results of the present study showed that all types of white blood cells affected specially after the third week of exposure to uranyl acetate, this may due to increasing of uranium effect with time because uranium consider as mutagenic compound and give many effects on genes, this effect may need a period to appear obviously.

Also this effect may due to the action of uranium on the division of haematopoetic cells leading to variation in W.B.C. types production. This effect also, related to the ability of uranium compounds to accumulate in different part of animal body leading to increase its cytotoxicity. A study found out that uranium has cytotoxic effect against many type of tissues including blood (3).

Filippova (1978) found out that increasing in exposure time of animals to uranium soluble compounds lead to different types of leukemia (4).

The chemical toxicity of uranium varies according to administration dose, chemical form of uranium, route of administration, and type of experimental animal (14). Study found out that increasing in exposure dose resulting in increasing of toxic and carcinogenic effect of uranium (2). Oral administration and inhalation of uranium compounds has less effect than subcutaneous and intravenous administration (15). Gilman found no effect of uranium on hematological and histopathological parameters in rats orally administered with uranium (15).

Also, experiment with inhalation of uranium have show no effect on blood cells (14), on the other hand study on the Veterans in 1999 who exposed to uranium in Gulf war indicated that those veterans who reported as injuries had high concentration of uranium in their body and revealed lower mean lymphocyte counts and lower mean monocyte percentage (16).

Animal experimental study showed that rabbits are more sensitive than rat and mice to uranium according to the other parameters such as Hb which reduce significantly in treated animals, this may due to that uranium compounds concentrated and bind with red blood cells (17, 18) resulting in reduction in hemoglobin concentration, also study found out that many soluble uranium salts including uranyl acetate
bind with different types of blood proteins (19). Studies found that soluble uranium compounds are more toxic and are easily in enter blood stream (14, 19).

Also uranium compounds are radioactive and may affect on DNA replication and then blocking cell division resulting in reduction in red blood cells by turn reduction in Hb concentration.

Results showed that each of GPT and GOT enzymes were less affected with uranium than other parameters, this slight effect of uranium may due to the toxic effect of uranium in causing a leakage in enzymes biosynthesis (20). These enzymes are responsible for the Hb synthesis in hepatic cells and are increase when there are lyses in these cells and uranium acetate may not effect on hepatic cells on this time of exposure.

اختيار بعض معايير الدموية والإرييزمات الكبدية كمؤشر للعوامل في الأشخاص المعرضين.

غش فاصل سالم كاظم

د. عمرو الحساب كلياً الطالب جامعة المصحة البحرية العراق.

الخلاصة

سبيح خال (1 mg/kg) من مادة عطرات ملحوظة في نسب اعداد خليالية الدم البيضاء بعدة جزء تجريبية حيث تشير إلى انخفاض معدلات GPT في حالة اعداد خليالية المحذوفة في حين انخفضت زيادة ملحوظة في اعداد الخلايا الخاضعة

بشكل كبير في الجدوع الأول بعد المحسست و لكن باعداد أكثر من اعدادها في مجاميع السيطرة. كذلك سبيح خال الملحوظة

GPT في حالة اعداد خليالية الدم HB ملحوظا في في عمد صندوق الأم PCV في حين لم تسبب الخلل أي تغيير ملموس في أرييزمات الكبد

بالمقارنة مع مجاميع السيطرة.

وذلك يمكن اعتبار التجربة في نسب خلايا الدم البيضاء كمؤشر أولي للعوامل المخترية لوجود من المواد المشعة و بذلك يمكن تقديم

المصدر الموفي.

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