Effects of Uvc Radiation on Some Physiological Traits in Whites Swiss Mice

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Abstract

The present study aimed to elucidate the effects of VUC including follow-up of developments in the concentration of enzymes carrier for a total of Secretary in the liver, heart and kidney organ of mice were assessed. Animals were exposed to a single stimulation (8 h) of UVC as (254 nm and thereafter sacrificed at different times (1,2,3,5 weeks after beginning the exposure). Significant increase GOT ,GPT in the liver values was observed on the 35th and decrease (significant on the 7^{th}, 14^{th} and 21th d), the GOT in kidneys and heart showed decrease (significant on the 7^{th}, 14^{th} ,21^{th} and 35th d), and Significant increase GPT all the weeks .

This indicates that artificial UVC radiation significantly affected the renal function and heart ($P<0.05$), while the hepatic functions were affected significantly ($P<0.05$) just on the 35th d of the exposure.

Keywords: UV, GOT, GPT

Introduction:

Ultraviolet : radiation (200–400 nm), an important part of the solar energy, is divided into three groups according to wavelengths. It is classified as UVA (400–320 nm), UVB (320–290 nm), and UVC (290–200 nm) [1]. The most powerful and dangerous one is UVC [2] . UVC and UVB are especially absorbed by nucleic acids, and nucleic acids and proteins less absorb UVA but it causes oxidative events. Because of these different properties, UVC and UVB radiations stimulate the release of stress proteins more effectively than UVA [3]. Biochemical changes cover the release of histamine and the derivative products of arachidonic acid, cyclooxygenases and lipoxygenases, kinins, and cytokinins, [4]. that UV radiation generated oxidative stress [5,6.7] and an increase in radiation dose caused functional changes in various physiological systems in animals[8].The biological effects of UV radiation were examined in calves ,[9] humans [10,11,12] mice, [5,13] pigs, [14] and sheep [8] It was determined that UV radiation causes important physiological and biochemical changes in the body's systems.

These studies are mostly carried out with UVA and UVB, and this one, which concerns UVC radiation in mice [15]. The harmful effects from exposure to ultraviolet radiation can be classified as acute or chronic.[16]

Transaminases also called aminotransferase, which catalyze the conversion amino acids to the corresponding α-keto acid and vice versa transfer of amino group (NH_2) from one molecule to another [17]. and most important of these enzymes Serum glutamic oxaloacetic transaminase (sGOT) , is a pyridoxal phosphate dependent transaminase enzyme (EC 2.6.1.1), It catalyzes the reversible transfer of a α-amino group between aspartate and glutamate and, as such, as an important enzyme in amino acid metabolism. GOT is found in the liver, heart, skeletal muscle, kidneys, brain, and red blood cells, and it is commonly measured clinically as a marker for liver health[18].

Serum glutamic pyruvic transaminase (sGPT) (EC 2.6.1.2) an enzyme that is normally presents in liver and heart cells [19]. It is released into blood when the liver or heart is damaged. The blood sGPT levels are thus elevated with liver damage or with an insult to the heart [19]. Due to the technological development of new technologies and increased our use of and ultraviolet radiation, so the aim of the study was to study outwardly changes after laboratory animals exposed to this radiation level study GOT and GPT enzyme in the liver, kidney, heart.

Materials and Methods

Experimental Animals

Specimen collection: A total of 25, female and male, 5-10 weeks of age Swiss albino mice, weighing 30-25 g were used in this study. Specimens of mice were collected from the Samarra Drug Industries

Before the experiment, mice were kept in the laboratory for 10 days at a stable temperature (20±2 Celsius degree) in order to make them obtain adaptation to the new environment.

All procedures were performed in strict accordance with the international guidelines for care of experimental animals.

- **UV-C exposure & source:**

The wavelength of UVC light spread out from the lamp was determined as 254 nm and its energy as 0.00014 joul/cm² per second. The animals were exposed to UVC for 8 h daily taking the sunlight as base (8 h between 4:00 and 12:00) [20].

Before the radiation (control group) and on the 7th, 15th, 21th, , and 35th d after the radiation started, each comprising 5 mice .

Phosphate buffer saline solution (PBS):

Dissolve 8g NaCl, 0.2g KCl, 1.44g Na_2HPO_4 and 0.24g KH_2PO_4 in 800ml of distilled water. Adjust to pH 7.4 with HCl. Add water to 1 liter. Dispense into aliquots. Sterilize by autoclaving [21].

Enzymatic Assays :(GOT, GPT)

The laboratory animals (mice) were taken and then I explained to them eradicated following organs (liver, heart and kidney).

The sample preparation through the addition of (3 mL) of solution (PBS) and then mash using homogenizer each member individually.

The sample was separated by centrifugation device using the device type Bnderf 1500 r / min for 10 minutes clear where taking been saved under a temperature of 20 C until use.[22]

Measure the effectiveness of both the enzymes GOT and GPT

The effectiveness of the enzymes have been identified by the way in which (Reitman .et al) [23] use two test tubes for each sample, the first is a sample and the other is a blanck, the first control sample and the second sample was prepared according to the method described by the company processed Randox,U.K was to know the effectiveness of the two enzymes by using a special table for each enzyme of these enzymes

Statistical analysis

statistical analysis were done using (SPSS) program, which means indicating significant differences, were tested using Duncan's multiple range

RESULTS AND DISCUSSION

Results showed in the 14thd and 21thd ; here is a significant decrease in the concentration of an enzyme GOT in the liver compared with the control group, while there is less decline in 7thd, there has been a clear increase in the level of previous weeks and at the level of the control group also for enzyme GPT.

The change on concentration of aminotransferees is Evidence to hepatic cellular damage where the rise in liver disease such as of the liver Cirrhosis, acute hepatitis Acute hepatitis, liver tumor , lack of blood to the liver and the arrival of liver damage cell, and the enzyme ALT rises in liver disease [24].

For these reasons, we think that mice would be a better model to evaluate the effect of UV radiation on blood parameters The exposure to UVC for 35 days may lead to suppression in the activity of some hematopoietic tissues [25].

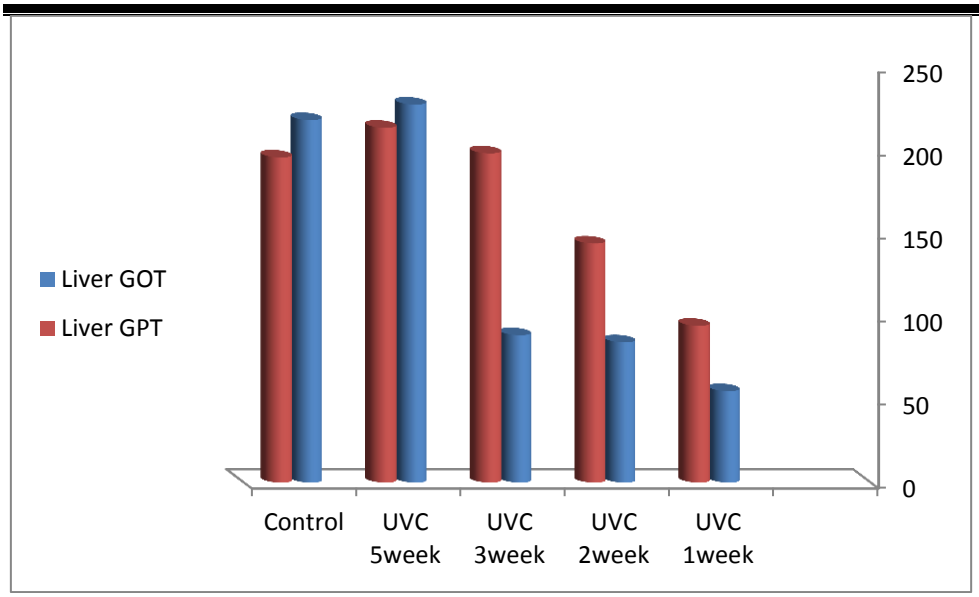

Fig (1) GOT & GPT Liver levels in control group and7, 14, 21 and 35 days and after UVC exposure

It is the outcome of **kidney** measurements for the enzyme GOT decline in 7d with an increase few in the 14th d when compared with the 7th d but the decline stays when compared with the control group and the low margin significantly in the 21th d from the previous weeks, with the survival of the decline clearly compared with the control group either 35d is noticed a significant rise in comparison with the previous weeks and drop a few to compare with the control group

The GPT enzyme concentration is high in the 7th d and the 14th d compared with the control group in either there, is a big difference with the decline in the 7th d and the 21th d in the 35th d it is a clear decline compared with the control group(Fig.2)&(Table 1). effect of the radiation on enzyme activity, because it is reported that UV radiation decreased serum ALP level [26] These two enzymes are related to the endothelial cell membranes, which are arranged through hepatic gall channels and it can be thought that they are more easily affected by the cytoplasmic enzymes (AST and ALT). It is thought that endothelial cell death caused by radiation is connected with apoptosis, and these cells are too sensitive to radiation and the basal membrane that can protect the cell from the radiation [13].

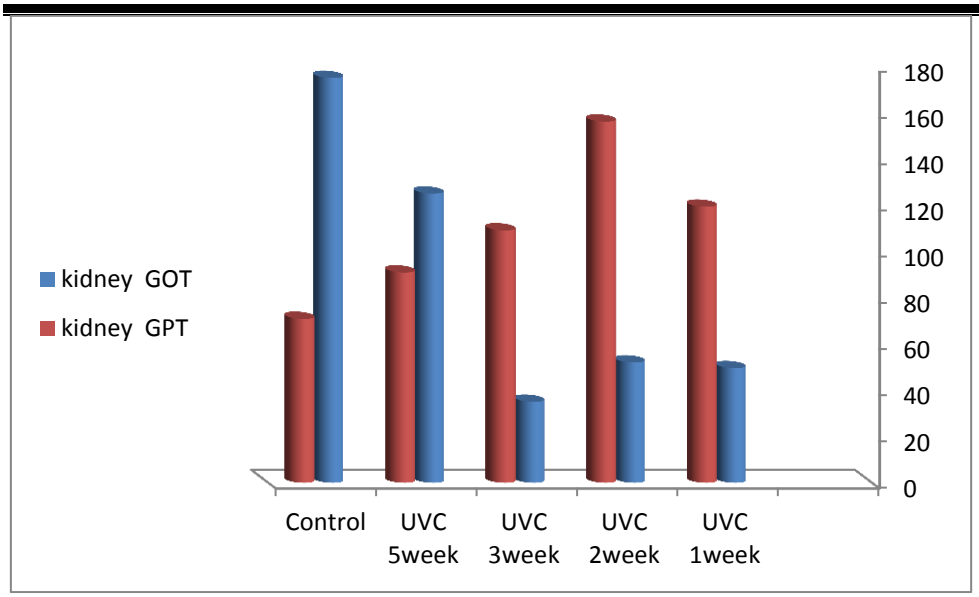

Fig (2) GOT & GPT Kidney levels in control group and7, 14,21 and 35 days after UVC exposure

The results obtained in this research with the selected UVC doses show that this radiation induced changes in the hematological and biochemical values, which reflect alteration of physiological. Some researchers with UVA or UVB exposures [27] previously recorded similar changes in hematological and biochemical variables. In addition, the enzymes are labile biochemical system, precisely reflecting the condition of the organism and the changes happening to it under influence of internal and external factors[28].

The GOT enzyme concentration in the heart notes is low in the 21th d compared with the control group, but a clear difference in the fall with the control group and the focus is the same in the 7th d ,14 and35 d ratios to the control group .

The GPT concentration results are elevated 35th d compared with the control group and increased focus in the 14th d and 21d , while the decline is evident in the 7th d(Fig. 3)&(Table.1)

It is reported that the effects of radiation can be different, depending on the animal species, dose, and way and time of application. It is demonstrated that the increase in doses of long-term UVB radiation causes functional alterations in different physiological systems of animals. These alterations observed in early stages of exposure in sheep are related to the adaptation to new environmental conditions. The functional alterations observed in late stage, are related to different sensitivity of various body systems to UVB radiation [8]

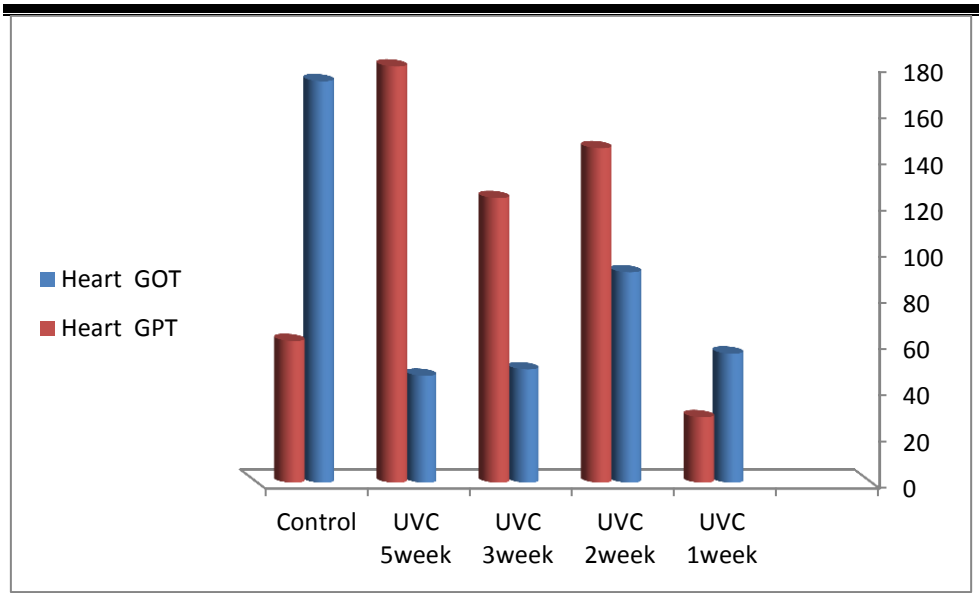

Fig (2) GOT & GPT Heart levels in control group and7, 14,21 and 35 days after UVC exposure

Table(1). Changes in GOT and GPT parameters levels (Mean±SD) in the Swiss albino mice exposed to UVC 254 nm for 35 days.

	Parameters (IU/L)	Control	UVC 1week	UVC 2week	UVC 3week	UVC 5week
Liver	GOT	218 ± 28.213*	55.0 ±1.275*	84.33 ±11.75*	88.66 ±12.10*	227.33±19.66*
	GPT	195.53±4.346*	94.33±68.235*	143.80±44.57*	198.00±7.636*	213.40±5.656*
Kidney	GOT	175.0± 23.0*	49.56±17.08*	52.0 ±5.26*	35.0 ±5.26*	125.0±9.00*
	GPT	70.866±23.96*	119.33±7.139*	156.100±54.50*	109.100±56.491*	90.90±7.210*
Heart	GOT	173.63±37.99*	55.83±7.09*	91.00±38.63*	49.0±7.088*	46.22±5.73*

Differences * is significant (P<0.05) in compared rows

CONCLUSION: In conclusion, UV radiation exposure in mice was documented to cause some biochemical changes along the experiment. There had been a significant decrease and increase GOT & GPT in liver, heart and kidney . some changes of biochemical values were recorded during the UVC experiment. These results indicated that UVC radiation had more suppressive effects on biochemical parameters.

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