The Investigation of the Impact of Antioxidant Vitamin C on Changes in Estrogen and Progesterone Hormones in the Treated Mice with DELTAMETHRIN

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ABSTRACT

Introduction: With regarding to the importance of pest control in terms of hygiene and the food supply, human society has always been looking for economic and harmless ways to solve of this problem and use of them have led to many problems .that is including infertility and decreased sexual desire. Considering to the importance of topic and increasing use of these chemical materials seems necessary to find the harmless antioxidant materials in order to decrease consequences of these pesticides that it is considered as the most important objective of this present research. The work method: In this study, 63 adult female Wistar rats were divided into nine groups of seven .The samples in size of 0/5 ml, each day8 am for 14 days were injected intraperitoneally. The control group did not receive any medication. The control group(1) including of saline ,the control group(2) 20 mg / kg body weight of vitamin C, experimental groups 1, 2 and 3, respectively, doses of 2.5, 5 and 10 mg on kg of deltamethrin body weight, experimental groups 4, 5 and 6, respectively, doses of 2.5, 5 and 10 mg on kg of body weight and with 20 mg on kg vitamin C body weight were received. After completion of the research, all groups of mice were bled and estrogen and progesterone hormonal changes were examined and then by testing of ANOVA (One- way analysis of variance) and Duncan data test were statistically analyzed.In the significance level(P<0/05) was determined by SPSS version 15. Results: The estrogen hormone in experimental group of 1has shown the significant decrease compared with the control group(2) and in experimental group of 4, 5 showed the significant increase compared with the experimental group of 3.Also the experimental group of 3 showed the significant decrease compared with the control group. The progesterone concentrations in all of experimental groups except the experimental group of 1,have the significant decrease compared with the control group. Respectively. Right and left ovaries weight in all of experimental groups have the significant decrease compared with the control group, respectively. Conclusion: The present study results suggest that deltamethrin causes the reduction of concentration of the estrogen and progesterone hormones in the rat and vitamin C due to antioxidant properties makes the increase of these hormones secretion in treated groups with deltamethrin.So the use of vitamin C in order to reduce the deltamethrin effects is recommended on the sexual hormone.

INTRODUCTION

Every year lots of different pesticides to enter to the environment through different ways. These pesticides are distributed in the environment and are transported to remote areas. To predict the effects of these chemical materials on ecosystems, in addition to knowledge of their toxicity, must be known the importation of them, distribution and behavior of these compounds in nature [1]. The human with making chemical pesticides has been decided to control of its environment, in order to its agricultural products that grow the food supply is protected against pests. The date of chemical control of pests and plant diseases backs to more than a thousand years of B.C. [2]. According to the World Health Organization , annual about 3 million people are poisoned by these pesticides and every year 200 thousand people are died. Unfortunately, in our country there is no accurate statistics in this field, but certainly the manner of the relationship of people and even professionals to deal with pesticides and spraying that is very non-conservative, can be lead to the toxification and death of the people.

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Moreover, eating food contaminated with pesticides, enter to sprayed fields, the use of contaminated water, inhalation of toxins particles, any encounter with toxins can cause abnormalities and organic diseases. The long deal with these pesticides can be to establish the various diseases, including cancer, miscarriage, birth defects, allergies, neurological diseases, adverse effects on the endocrine glands that are the controller many vital functions in animals and humans [3]. Deltamethrin is a part of the second group of pyrethroid that is generic name of deltamethrin (Deltamethrin) and its other name is Decamethrin (Decamethrin) and it is the class of insecticides. Its impact works is related to stomach and contact insecticide which is against leafminer of fruit trees and sugar beet are used [4, 5]. It is a kind of insecticide that with opening of the sodium channel in the nervous system causing death [6]. The appearance form of this toxin is odorless and colorless crystals and its main technical is 98%. This toxin has no teratogenic and mutagenic effects and influences through the way of ingestion, skin and eye and respiratory [3]. Deltamethrin causes necrosis of gill tissue and also lead to epithelial hypertrophy, edema, capillary dilation and epithelial hyperplasia as well. In the liver, makes significant increases in hypertrophy of liver cells and also poor circulation, necrosis, nuclear pyknosis [7]. The deltamethrin pesticide causes weight loss, libido, ejaculate volume, sperm concentration, and the primary fluid seminal fructose and increased abnormal sperm [8].

Vitamin C in terms of pharmacological classification is considered as soluble vitamins in water and it is the essential components for the construction and maintenance of collagen and peripheral tissue of inter-cells. The consumption of this medicine makes to strengthen the immune system and speed up wound healing, prevents the formation of carcinogenic nitrosamine and nitrous. Most of animals not only make their own vitamin by themselves, but also some of the mammals like humans are obtained these vitamins in their diet [9]. Vitamin C prevents from oxidation of the present fatty cells in the cell membrane by oxidizing agents and this is an antioxidant factor; With continuing of the oxidation of fatty cells and changes in the cell and the genetic material causes some cancer [9]. The amount allowance daily dosage of vitamin C for adults are 60 mg, smokers 100 mg, pregnant women 70 mg daily, nursing mothers 90-95 mg, infants and children 30-60 mg, and for long-term hemodialysis patients 100-200 mg daily are permissible of vitamin C. In various diseases, amount and manner of consumption of these vitamins are different.

Ascorbic acid in oxidation plays a role in the reduction of cellular respiration and different metabolic processes and resistance to infection and it is essential for establishing and maintaining intercellular matrix and collagen [9]. In the studies indicate that the ovarian has a cycle of tissue changes and as well steroid secretion and peptid that is associated with vitamin C. The ovarian is the main position storage of vitamin C with the highest concentration of interior Dortkay, granulosa and luteal section has been known [10, 11]. With regard to the antioxidant property of vitamin C and deltamethrin multiple effects on different systems, this research aimed to investigate the antioxidant effect of vitamin C on amount of estrogen and progesterone hormones secretion in recipient mice of deltamethrin was performed.

Table 1: The grouping of animals based on different doses of deltamethrin.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Number (n)</th>
<th>Consumption amount of deltamethrin</th>
<th>Consumption amount of vitamin C</th>
<th>Infusion period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control (O)</td>
<td>7</td>
<td>--------</td>
<td>20mg/kg</td>
<td>14 days</td>
</tr>
<tr>
<td>Control (S1)</td>
<td>7</td>
<td>Saline</td>
<td>14 days</td>
<td></td>
</tr>
<tr>
<td>Control (S2)</td>
<td>7</td>
<td>--------</td>
<td>20mg/kg</td>
<td>14 days</td>
</tr>
<tr>
<td>Experimental group 1 (D2)</td>
<td>7</td>
<td>2/5mg/kg</td>
<td>14 days</td>
<td></td>
</tr>
<tr>
<td>Experimental group 2 (D5)</td>
<td>7</td>
<td>2/5mg/kg</td>
<td>14 days</td>
<td></td>
</tr>
<tr>
<td>Experimental group 3 (D10)</td>
<td>7</td>
<td>2/5mg/kg</td>
<td>14 days</td>
<td></td>
</tr>
<tr>
<td>Experimental group 4 (D2/5 + C)</td>
<td>7</td>
<td>2/5mg/kg</td>
<td>14 days</td>
<td></td>
</tr>
<tr>
<td>Experimental group 5</td>
<td>7</td>
<td>2/5mg/kg</td>
<td>14 days</td>
<td></td>
</tr>
<tr>
<td>Experimental group 6 (D10 + C)</td>
<td>7</td>
<td>2/5mg/kg</td>
<td>14 days</td>
<td></td>
</tr>
</tbody>
</table>

After completing the course, all groups of mice were bled in the way of directly from the heart and which was isolated the serum and were analyzed the changes in estrogen and progesterone hormones by ELISA. For comparison between treatments was used of One-way ANOVA variance analysis. The significant level (P<0.05) were considered. For data analysis and statistical tests were used of SPSS version 17.

The study method:

In this study, 63 adult female Wistar rats, approximately age of 75 days and approximately weighing of 190±15g have purchase from the breeding center and maintenance of laboratory animals of Shiraz Medical School and were divided into nine groups of seven. After one week, the trial period began for injections, this
one week was due to that the animals get used to the new environment. For animal feeding of prepared intensive dishes were used of livestock and poultry company, 2 ± 22 °C ambient temperature maintained at 12 h light and 12 h dark cycle were held. The water and food for the mice throughout the experiment time, without any restrictions were placed on them.

Deltamethrin pesticide was prepared of Moskhfam company. Deltamethrin is soluble in water. The entire test period lasted 14 days. Deltamethrin lethal dose equal to 20 mg per kg body weight of rats was determined. The minimum, average and maximum doses, were chosen for the injection. The rats were randomly divided into 9 groups of 7 as is shown in Table(1).

Findings:
The obtained results of measurements of estrogen hormone among the different groups shows that the experimental group of 1 was observed the significant decrease compared to the control group of 2 and in the experimental groups of 4 and 5 showed the significant increase compared to the experimental groups of 3. Also in the experimental groups of 3 showed a significant decrease compared to the control group (Fig.1).

Fig. 1: The comparison of case-study groups in terms of Estrogen.

The obtained results of the measurement of progesterone hormone among the different groups shows that all of the experimental groups except of the experimental group of 1, have significant decrease compared with the control group(Fig.2).

Fig. 2: The comparison of case-study groups in terms of Progesterone
Discussion:
However, the many researches have been conducted in the field of the investigation of different antioxidant on the pyrethroid toxin with different doses on the various organs in variation animals that each of this have been different results. The obtained results in this study that shows the antioxidant effect of vitamin C on the toxic effects of deltamethrin on the estrogen and progesterone hormones in the rat, can be fulfill the existing data on antioxidant effects of this kind of vitamin on the toxic effects of deltamethrin on the previously studied species. According to the diagram [1] the amount of estrogen hormone in the experimental group of 4 and 5 compared with the experimental group of 3, have significant increase and also in the experimental group of 3 compared with the control group and in the experimental group of 1, was observed the significant decrease compared with the control group of 2. The progesterone hormone concentration among the different groups shows that all experimental groups except the experimental group 1, have the significant decrease compared to the control group (Fig. 2). As it is clear that the existing active oxygen species play an important role in sperm maturation and follicular fluid and steroid hormone production in the ovaries. But with this descriptions, the woman reproduction (breeding) system especially the ovarian are sensitive towards of activated oxygen species and free radical and if the amount of them exceed the definite range, it leads to the infertility. Despite high levels of active oxygen species in ovarian follicles makes loss of the follicular fluid antioxidant system and directly damage into the oocyte (egg) [13, 12].

Since the estrogen and progesterone hormones are secreted from ovarian tissue, so it is logical that the reduction in its secretion is due to damage to the ovarian tissue, because of active oxygen species, therefore in order to more accurate information, the studies of histological is essential and important. On the other hand, the ovarian dysfunction can also be attributed to the effect of nitric oxide mediated that this effect in male rat as it is expressed, has been demonstrated. In the other researches suggest that deltamethrin causes decrease of testosterone levels and increase of non-fertile and died sperm [14]. In addition in the other researches that has also been conducted on other toxins of Pyrethroid, indicated that these toxins makes impair of testosterone synthesis in the testes (16, 15), which can be expressed in the present study as well as decrease of female sex hormones levels (Estrogen and progesterone) may also be due to deltamethrin destructive properties. It can be assumed that the damaging effects of this toxic is dependent on dose, which in previous studies have also suggested that the effect of this toxic is dependent on dose (14).

In addition to considering of previous studies, have also been stated some other toxins from Class II, pyrethroid causes inhibiting of progesterone synthesis through cAMP production and inhibiting of protein which are called Star. STAR (Steroidogenic acute regulatory) and PBR (Peripheral benzodiazepine receptor) play a major role in regulating the transport of cholesterol into the mitochondria [15, 16]. According to this research, these both of proteins are present in the mitochondrial outer membrane of steroidogenic cells [17, 18]. The lack of these proteins strongly reduces the production of steroids. In the previous studies have shown that the toxins similar to deltamethrin and pyrethroid group, mRNA expression related to PBR and mRNA related to Star was significantly reduced [16, 18, 19]. In the present research, the amount of variations related to estrogen hormone in the experimental group of 4 and 5 shows that these experimental groups compared with the experimental group of 3 have the significant increase (Fig. 1). In the past times was expressed that vitamin C, is component of the soluble vitamins in water that has antioxidant properties that is considered as the most important elements of antioxidants vitamins which have been introduced in previous studies (20). So, the reason of the related changes can be attributed to the antioxidant properties of vitamin in reducing risks linked to deltamethrin.

Conclusion:
According to the mentioned subjects, it can be assumed that vitamin C might decrease the effects of deltamethrin on the hormonal changes in estrogen and progesterone, so its use as an antioxidant material to reduce the sexual effects of deltamethrin, is recommended.

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