



Impact of different doses of Malathion on the selected blood parameter in albino rats (*Rattus norvegicus*)

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Abstract

Malathion is an organophosphate pesticides commonly used to eradicate the pest of agricultural crops. It is routinely used to protect the ornamental and home gardening plants. Malathion is found in market by its trade name called cythion. In Indian scenario farmers and spray men use pesticide in their fields ignoring its toxicological effects. The main target organs of any toxicant in human body are liver and kidney. Present study is based on the effects of different dose of Malathion on blood biochemical parameter like blood sugar, blood urea, creatinine and bilirubin. These four parameters are used to observe the behavior of liver and kidney in albino rats. Four doses of Malathion has been selected as 25 mg, 50mg, 75mg and 100mg per kilogram body weight per day for 7 days and 15 days of treatment. Findings indicate that at normal condition the value of sugar was 121.54 ± 14.44 mg/dl, blood urea 41.27 ± 3.13 mg/dl, blood bilirubin 0.76 ± 0.10 mg/dl and value of creatinine was observed as 0.85 ± 0.52 mg/dl. with different doses of Malathion after 7 and 15 days the value of blood sugar significantly decreases upto 78.52 ± 10.25 mg/dl at higher dose while blood urea value significantly increased up to 50.88 ± 4.8 mg/dl, the value of creatinine significantly increased 1.05 ± 0.18 mg/dl and bilirubin also increased significantly 2.20 ± 0.64 mg/dl. The fluctuation in parameter represents the abnormal behavior of liver and kidney of albino rats due to the toxicity of pesticide.

Key words: Blood sugar, Blood urea, Bilirubin Creatinine, Malathion

Introduction

With the introduction of pesticides, agricultural practices have undergone revolutionary changes leading to the incredible possibility that hunger can be banished from the earth. Better agricultural techniques have contributed in varying ways to the general uplift of mankind. As a consequence, a great part of the population is exposed to these compounds. In spite of their extensive use, knowledge on the health risks associated with prolonged exposure is rather poor, and major uncertainties still exist. More and more new compounds have been synthesized in different countries. Thus, Pesticides are indispensable in modern agriculture, veterinary and human health programs. Their indiscriminate and injudicious uses may adversely affect human beings and livestock. As per the study of Mehrdad *et al.* (2011) endosulfan induces the number of leucocytes and statistically RBCs, lymphocytes and platelets has got decreased as compared to control group.

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The extent of these problems varies depending upon the physicochemical characteristics and pharmacological activity of these chemicals. Gross impact of pesticides may occur from time to time as a result of accident or carelessness involving chemical concentrations. Therefore, now a days man has become more conscious of the ways in which the environment is becoming polluted by pesticides. The organochlorine, organophosphate and carbamate insecticides have been on the top, as a major cause of anxiety to the ecologists. It is not only because of their persistence for longer periods in the environment, but also due to readiness with which they are taken up by the tissues of living organisms. Researchers of biological fields, find out the hepatic and renal dysfunction in occupational workers (sprayers) and haematological parameter also. As per Sabina Tos-Luty *et al.* (2003) ultrastructure and histopathology of liver and kidney heart and lungs changes due to toxicity of Malathion. Blood is the liquid connective tissue normally carried by the Arteries and veins. Blood makes up from 8 to 10 percent of the total body weight. It is the main functioning



fluid connective tissue. It performs some important functions, necessary for body activity i.e. transport of water contents, transport of gases, distribution of food, regulation of body temperature, transmission of chemical substances, maintenance of acid base balance etc. Blood is composed by organic substances like Protein, Sugar, Blood Urea, Serum Creatinine, Serum Bilirubin, etc. and Inorganic components like ions of Na, K, Cl, Mg etc. Any toxic substances enter in the body of animal first of all reach in to blood. Due to pesticide toxicity mainly Protein, sugar, Urea, Creatinine, Bilirubin Acid Phosphatase etc. get disturbed because pesticide affect the normal metabolism of the animal. Blood sugar play important role in metabolic mechanism in cellular system. But some chemicals from environment introduced inside body and cause metabolic disturbance. When level of sugar increases it is called hyperglycemia. i.e. diabetic condition and decrease amount of sugar in blood is called hypoglycemia. Jamal *et al.*, (2016) in their study concluded that the value of bilirubin and blood urea, sugar decrease slightly and creatinine also decline in routine workers of mango sprayers.

Materials and Methods

Malathion pesticide was selected for the present study because it is commonly use in practice. It belongs to the organophosphorus type of Pesticides group. It is available in the trade name cythion or Malathion in liquid form in local market. Malathion is used to control insects of apicultural and ornamental purpose. Malathion is commonly used in medicinal practice to control lice's of human head and ticks and mites of various domesticated animals. Sexually mature albino rats (*Rattus norvegicus*) of controlled breed were procured from Hamdard Institute of Medical Science Delhi and kept under controlled condition in laboratory of Zoology Department D.N.(PG) College Meerut U.P (India). Animals of body weight 60 to 200gm. were used for study purpose. Before commencement of experiment the animals were acclimatized under laboratory conditions for a week on normal diet and water ad-libitum. Properly acclimatized animals were divided into five groups containing 8 rats in each group. One group consider as normal group and rest four were as experimental groups for 7

days and 15 days. Doses of Malathion were administered orally in fixed as 25, 50, 75 and 100 mg. /kg. body weight/day for 7 and 15 days respectively in each group. Animals of each group were sacrificed after 7 days and 15 days of treatment to study the biochemical parameter of rats' blood. The selected blood biochemical parameters of experimental rats syudies includes blood sugar, blood urea, bilirubin and creatinine. Calorimetric method was applied with kit method sold by Oscar Medicare Pvt. Ltd. (New Delhi). Blood sample for study was collected by heart puncture and separate serum by homogenize method by centrifuge. Statistical analysis (Student 't' test and Standard deviation) of the collected data were performed to find out the significance value of result.

Results and Discussion

During the present study the experimental animals show decreased sugar level in both the groups treated with all the doses - 15 days and 30 days of treatment i.e. condition of hypoglycemia, was observed contrary to the observations in experimental animals as shown in table 1. These observations are contradictory to the observation of Kumar *et al.* (2012) who documented facilitators of hepatic glucose output via glycogenolysis and gluconeogenesis. Organophosphate pesticides are most likely to elicit hyperglycemic responses in humans during exposure. Rahimi *et al.* (2007). suggested that hyperglycemia was induced by organophosphate pesticides and similar findings were noticed by Seifert (2001), who observed that high dose of Diazinon pesticide cause hyperglycemia in mice. Our findings are in agreement with that of Lasram *et al.* (2008) who observed that single dose of malathion initially increases and after that decreases the glucose level in rat. Rukmani (2011) also reported that acute dose of malathon increases the level of blood glucose and decreases the antioxidant stress. Blood urea is the main important waste material of metabolic product of nitrogenous waste. Higher proportion of urea in blood causes uremia. Urea represents the main end product of protein metabolism in mammals. During the experiment in experimental animal's blood urea is significantly increased in both the groups of experimental animals as shown in table 1.



Table1: Effects of different dose of Malathion on selected blood parameter

Doses	Blood Sugar mg/dl		Blood Urea mg/dl		Bilirubin mg/dl		Creatinine mg/dl	
	7 days	15 days	7 days	15 days	7 days	15 days	7 days	15 days
Normal	121.54 ±14.44	121.54 ±14.44	41.27 ± 3.13	41.27 ± 3.13	0.76 ± 0.10	0.76 ± 0.10	0.85 ± 00.52	0.85 ± 00.52
25 mg/kg	91.66 ± 8.96 ***	90.05 ± 10.01***	43.81 ± 3.06	44.40 ± 2.93*	0.80 ± 0.05	0.85 ± 0.05	0.84 ± 0.63	0.80 ± 0.66
50 mg/kg	75.32 ± 10.60***	68.57 ± 5.92 ***	44.60 ±4.54	46.21 ±4.14 **	0.83 ± 0.09	0.88 ± 0.10**	1.05 ±0.36	1.42 ±0.34**
75 mg/kg	78.52 ± 5.80***	76.59 ± 5.72***	45.67 ±5.83	45.97 ±3.99**	0.87 ± 0.11	0.90 ± 0.11**	1.43 ±0.27 **	1.41 ±0.37**
100 mg/kg	78.52 ± 10.25***	76.27 ± 9.36***	48.82 ±5.16***	50.88 ±4.80	1.0 ± .16***	1.05 ± .18***	1.64 ±0.32	2.20 ±0.64***

* insignificant change; ** moderate change; *** Significant Change

These findings are similar to findings of Faris (2020) who reported that the 3 and 6 mg dose of pesticide malathion increase the blood urea and creatinine level but decrease the protein and cholesterol level in rats. Similar changes were observed by Mahmoud *et al.* (2012) who reported that oral dose of malathion increase the level of serum creatinine urea and uric acid in Japanese Quail *Coturnix Japonica*. Koul *et al.* (2006) reported that the exposure of Monocrotophos a organophosphate pesticide slightly increased the value of plasma sugar, serum creatinine and serum bilirubin, alkaline phosphatase but reduce the plasma glucose, lipid peroxidation and protein. Bilirubin is a bile pigment and is obtained as result of haemoglobin break down in the liver. In present work significant rise of bilirubin in blood was observed in albino rats treated with different dose of Malathion. The level of bilirubin was elevated significantly after 7 days as well as 15 days of treatment. Bansal *et al.* (2008) reported that bilirubin interfere with mitochondrial respiration and cause uncoupling oxidative an impairment in liver functioning. Shater (2003) reported and suggested that an organophosphorus pesticide parathion effects on biochemical and hematological parameter of male rats. Benjamin *et al.* (2006) concluded that organophosphate pesticide cause

changes in liver and kidney. Hasheesh (2002) present similar finding on bilirubin and reported that increase in blood bilirubin due to destruction of erythrocytes. Mahmoud *et al.* (2012) reported that after oral administration of Malathion dose the concentration of pesticide find in liver, kidney and muscles. Pathologically the values of bilirubin and glucose level were increases but significantly decrease in total protein and other parameters like serum creatinine, urea and uric acids. Creatinine is derived from the catabolism of the muscular proteins in the liver tissues. The concentration of creatinine in blood plasma indicates renal and hepatic diseases. During the present work the creatinine level in blood of experimental animals increased significantly. These findings show that somehow or other this pesticide affects the renal function. Similar findings were observed by Atef (2010) who reported that exposure of malathion in rats increased the level of creatinine and urea. Similar results were observed by Mazadi *et al.* (2003) and Van *et al.* (2001), who reported neurotoxicological effects in rats due to organophosphate pesticide. Selmi *et al.* (2015) reported that LSEO is effective to cure the toxicity cause by different dose of Malathion as metabolic and renal abnormalities in mice especially oxidative stress. Choudhary and Joshi (2002) also reported



that tremendous use of pesticides cause significant increase in creatinine and urea in male rats. Rasha Abdel-Ghany *et al.* (2016) reported that level of Albumin and hepatic glycogen increases due to exposure fenitrothion in rats.

Conclusion

Present study focuses on the Malathion pesticide toxicity in albino rats. At present time Malathion is used as a common pest control agent. Indirectly it is introduced in human body with food and cause serious changes in blood. It has raised several problems which can only be talked after research. Our findings in albino rats indicates that the blood sugar level decreased after administration of different doses of Malathion and the blood Urea, bilirubin and creatinine level significantly increases after administration of high dose of Malathion.

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This blood parameter indicates the abnormal changes in the kidney and liver of rats. Gross impact of pesticides may occur from time to time as a result of accident or carelessness involving chemical concentrations. According to the findings of biochemical parameters of blood indicates that there are compulsory need to aware against pesticides.

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Impact of different doses of Malathion on the selected blood parameter

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