Original Article

Assessment Of Kidney Function Indices In Female Albino Rats Against Toxicity By Administrated Bisbyribac Sodium

Afyaa Sabah Nasir*, Nihad Habeeb Mutlag, Muthik Abd-Muslim Guda
Department of Ecology and Pollution/ Faculty of Science / University of Kufa/Iraq
Email: afyaa.nasir@uokufa.edu.iq, nihad.alzerjawi@uokufa.edu.iq, meethakha.almithhachi@uokufa.edu.iq

Abstract

The aim of this study was to evaluate the biochemical parameter changes, histopathological changes, and hematological parameters of commercial bispyribac-sodium toxicity in albino female rats. This study was carried out in the laboratories of the College of Science, University of Kufa by using the herbicide Nominee (Bispyribac-sodium), which was treated extensively in the rice fields of the research station in Mashkhab, Najaf, Iraq. The cytotoxic effects of bispyribac sodium in white rats after being administrated orally with 40, 80 mg/kg of bispyribac-sodium for 30 days were investigated. It was found that bispyibac sodium caused a significant decrease in the blood indices of albino rats, also elevated significance levels of lipid profile, bilirubin, creatinine, urea while a significant decrease in total protein and albumin. In conclusion, The herbicide Nominee (Bispyribac-sodium) has a dangerous effect on all web food cycles and living organisms (the female albino rats) if used for a long time to treat the rice in the field.

Keywords: Albino Rats, Bisbyribac Sodium, Herbicide, Kidney Function Index, Toxicity.

INTRODUCTION

Rice is one of the most important summer cereal crops in Iraq, and the spread of weeds is one of the main factors which causes poor rice quality, the extreme cases may lead to complete failure [1]. Weeds are consumed from crops (nutrients, moisture, light, air, space and other micro-environmental factors), which leads to interference in agricultural operations and this in turn leads to higher costs [2].

Pesticides are chemicals used in farmland in gardens, and along railways, in addition to other public areas [3]. Pesticide used is for increasing based on the world's growing population and the need for food supplies, that bioaccumulation through the food chain ultimately conveys toxic pesticides to mammals causing many harms [4]. Some parts of the pesticides that are sprayed may remain on agricultural land, but some enter the soil, water and air as artificial organic compounds [5].

The nominee pesticide that belongs to this group was registered to combat broad and thin leafy weeds in the year Rice fields [6]. The pesticide contains bispyribac sodium 10% W/V to control high-leaf and broad-leaved weeds. bispyribac-sodium, a herbicide for post-germination in rice [7].

Owing to industrial development, the entire populations have been exposed to many chemical substances such as pesticides, and metals. One downside is that in some or all of its phases, many of these chemicals can disrupt reproductive capacity, such as early embryogenesis, egg fertilization, and embryo implantation [1,2]. Pesticides are regarded as powerful pollution in the environment lead to several defects in all organisms in the ecosystems as reproduction disorders [3].

Address for correspondence: Afyaa Sabah Nasir, Department of Ecology and Pollution/ Faculty of Science / University of Kufa/Iraq
Email: afyaa.nasir@uokufa.edu.iq

Received date: 17 August 2022 Accepted: 19 September, 2022
Published: 07 October, 2022

How to cite this article: Nasir S A, Mutlag H N, Abd-Muslim Guda M, Assessment Of Kidney Function Indices In Female Albino Rats Against Toxicity By Administrated Bisbyribac Sodium, J Pharm Negative Results 2022;13(4):468-472

Access this article online	
Quick Response Code:	Website: www.pnrjournal.com
	DOI: 10.47750/pnr.2022.13.04.060

Pesticides are well established to traverse the placental barrier and may cause certain modifications in the formation of placental architectures. Placental injury caused by drugs or contaminants then results in retardation of fetal development, resoribtion, or teratogenicity [8]. Bispyribac-sodium is a pyrimidinylcarboxy herbicide, used to control grasses, sedges, and broadleaved weeds. Noncompetitively inhibition of acetoacetate synthase enzyme (ALS) is the main mechanism of this herbicide. This mechanism disrupts the synthesis of the amino acids valine, leucine, and isoleucine resulting in disruption of cell division and plant growth. Biochemical changes in fish were induced by BPS [5, 6].

The aim of this study was to evaluate the biochemical parameter changes, histopathological changes and hematological parameters of commercial bispyribac-sodium toxicity in albino female rats.

The results of the present study revealed that there was a significance change in total blood indices including mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), mean corpuscular hemoglobin concentration (MCHC), CI and VI in respect to control values. These results were compatible with the results obtained by Witeska [9]. Erythroposis process was affected by several factors include physiological and environmental as exposure to toxicant one of these pesticides [9, 10].

The results showed a significant increase in the lipid profile levels include total cholesterol (TC), triglycerides (TG) while significant decrease in the high density lipid (HDL) in the group of rats treated with bispyribac sodium at doses 40, 80 mg/kg for 30 days. These results were compatible with Elalfy et al. [11] who reported that the toxic effect of the nominee lead to inhibit the enzyme HMG-CoA reductase act as regulatory enzyme in cholesterol biosynthesis due to different mechanisms.

The results also revealed a significant decrease in the levels of total protein and albumin in the groups of rats treated with the nominee in compare with control group this attributed with liver dysfunction due to elimination of the nominee lead to disturbance of metabolism in the protein, carbohydrates and lipids in the liver these results were compatible with Zaahkook et al. [12]. Another studies were demonstrated the sub chronic administration orally of bispyribac sodium for 13 weeks lead to decrease the function of liver in the biosynthesis of total protein and albumin [13, 14]

Finally, the results of the current study demonstrated a significant increase in bilirubin, urea, and creatinine in the groups of rats treated with two doses of the nominee. This results indicates a significant nephrotoxicity and defect in the kidney resulting from elimination of bispyribac sodium via kidney [4].

Based on the findings of the study, the herbicide Nominee (Bispyribac-sodium) has a dangerous effects on all web food cycles and living organisms if it used for a long time to treat the rice in the field.

Study design

The aim of this study was to evaluate the biochemical parameter changes, histopathological changes, and hematological parameters of commercial bispyribac-sodium toxicity in albino female rats. This study was carried out in the laboratories of the College of Science, University of Kufa, Najaf, Iraq, by using the herbicide Nominee (Bispyribac-sodium), which was treated extensively in the rice fields of the research station in Al-Mishkhab Rice Research Station, Najaf governorate, Najaf, Iraq. The protocol of study and consent form were reviewed and approved by a local committee of ethics (Faculty of Science, University of Kufa, Iraq).

Nominee C19H17N4NAO8

Active material: Bispyribac sodium10% W / V

Producing Company: Kumiai Chemical Industry CO, LTD, JAPAN

Usage rate: 75 ml with 75 ml of the adjuvant per hectare

Uses: nominee is used to combat the most important weeds scattered in the rice fields, Such as: Echinochloa crus , Echinochloa colonum, Diplachine fusca and Cyperus rotundus.

Laboratory Animals

Nine female rats were obtained from the animal house in the faculty of science have weight about 220-260 gm and kept under the standard environment for one week for acclimation after the animals divided into three groups each group contain three rats: the first group received nominee at dose 40 mg/kg and the second group received nominee at dose 80 mg/kg and the last group received standard diet and normal saline as control group for 30 days. After the end of experiment the rats scarified for histological analysis [15]. Blood samples were collected from heart and divided into EDTA tubes for physiological parameters analysis [16]. The last part of the blood samples were put in gel tubes for serum collection to examine the biochemical tests like lipid profile, total protein, serum albumin, total bilirubin, serum urea, and serum creatinine according to standard biochemical methods [17].

Statistical Analysis

Statistical analysis was carried out using SPSS version 24.0 (SPSS, IBM Company, Chicago, IL 60606, USA).

Authors' Contributions

A.S.N. conceptualized the research, initiated the writing of research outline and the final manuscript, performed the statistical analyses and interpretation of results. N.H.M. arranged and reviewed all parts of the manuscript including

formatting and wrote the materials and methods and some parts of the results and discussion. M.A.G. carried out the experiments, contributed to sample preparation, and wrote some parts of the results and discussion. All authors provided critical feedback and helped shape the research, analysis, and manuscript.

Acknowledgements

Authors would like to express their sincere gratitude and thanks to the faculty of Science, University of Kufa, for the facilities provided to carry out the study.

Interest Conflicts

None interest conflicts.

Funding source

None

References

Kumar A, Bisht BS, Joshi, VD, Dhewa T. Review on bioremediation of polluted environment: a management tool. Int J Environ Sci 2011; 1(6):1079–1093.

Balasubramanian, P, Palaniappan, SP. Principles and Practices of Agronomy. Agrobios Publications, New Delhi; 2001.

Lozowicka B, Kaczynski P, Paritova AE, Kuzembekova GB, Abzhalieva AB, Sarsembayeva NB, et al. Pesticide residues in grain from Kazakhstan and potential health risks associated with exposure to detected pesticides. Food and Chemical Toxicology 2014; 64:238–248.

Liu XM, Shao JZ, Xiang LX, Chen XY. Cytotoxic effects and apoptosis induction of atrazine in a grass carp (Ctenopharyngodon idellus) cell line. Environ Toxicol 2006; 21: 80-89.

Lefrancq M, Imfeld G, Payraudeau S, Millet M. Kresoxim methyl deposition, drift and runoff in a vineyard catchment. Science of the Total Environment 2013; 442:503–508

Habib, SA, Faiq C. Evaluation of the efficiency of the Harmony Extra 75 WG in control of broad-leaved bushes and Chevalier 15 WG for broad-leafed bushes in wheat. Annual Book of the National Committee for the Registration and Accreditation of Pesticides, Ministry of Agriculture, 2002; 2 (1): 92-97.

Schmidt, LA, RE. Talbert, FL. Baldwin, JS. Rutledge, EF. Scherder, Wheeler CC. Performance of V-10029 (bispyribac–sodium) in rice weed control programs. Proc. South. Weed Sci. Soc. 1999; 52:49.

Liu X, You MS, Wei YZ, Liao JY, Ye LL, Chen J. Isolation of chlorpyrifos-degrading Aspergillus sp. and measurement of degradation efficiency. Chin J Appl Environ Biol 2003; 9:78–80

Witeska M. Stress in fish-hematological and immunological effects of heavy metals. Electron J Ichthyol 2005; 1: 35-41.

California Environmental Protection Agency. Data Review Summary for Bispyribac; 2001; p. 10.

Elalfy, M, Aboumosalam, M. Ali F. Biochemical, Hematological and Pathological Effects of Bispyribac Sodium in Female Albino Rats. J Vet Sci Technol 2017; 2017: 8:5.

Zaahkook SA, Helal EG, Fahmy N, Al-Shinnawy MS, El-Ghany AB. Physiological study about imidacloprid toxicity and the role of vitamin C as a protective agent on Japanese Quails. Egypt J Hospital Med 2009; 34: 183-197.

Bandara GI, Darren MR, Fahim M, Michael RS, Gregory M, et al. Acute human self-poisoning with bispyribac-containing herbicide Nominee®: A prospective observational study. Clin Toxicol (Phila) 2010; 48: 198-202.

Fathy, M., Mohamed, I, Farghal, A, Temerak, S. Sayed, A. Hemotoxic effects of some herbicides on juvenile of Nile tilapia Oreochromis niloticus. Environmental Science and Pollution Research, 2020; 12-24.

Bancroft JD, Stevens A. Theory and practice of histological techiniques. Churchill Livingston, New York; 1999.

Shirlyn, BS. Clinical Laboratory Hematology, 1st ed., University of Texas Science Center at San Antonio. U.S.A; 2004.

Burtis CA, Ashwood ER. Text book of clinical biochemistry. 3rd Edn. WB Saunders, Philadelphia; 1999; pp: 577-530.

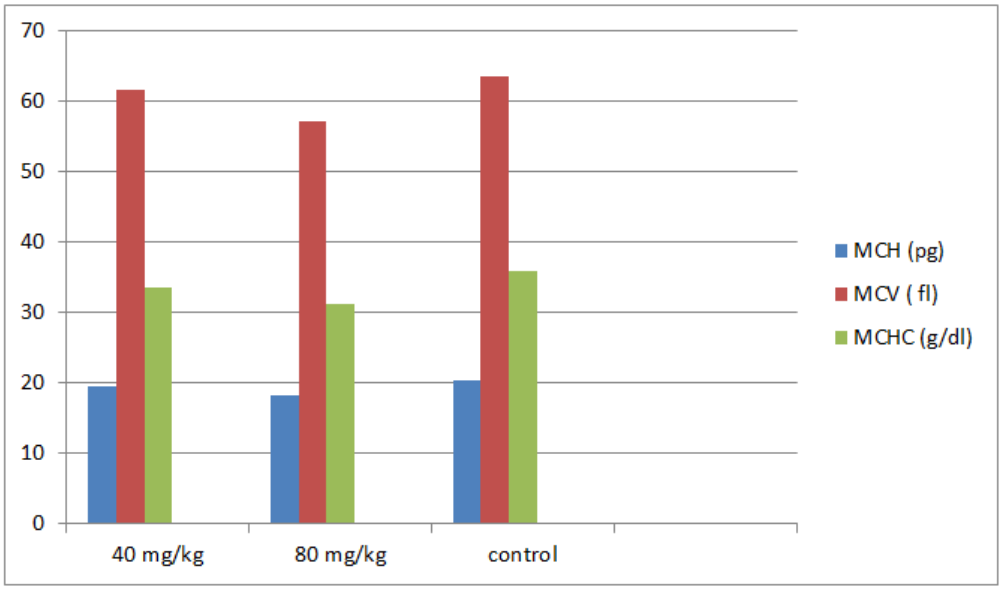

Figure 1: The effect of bispyribac-sodium on the blood indices for 30 days in female albino rats.

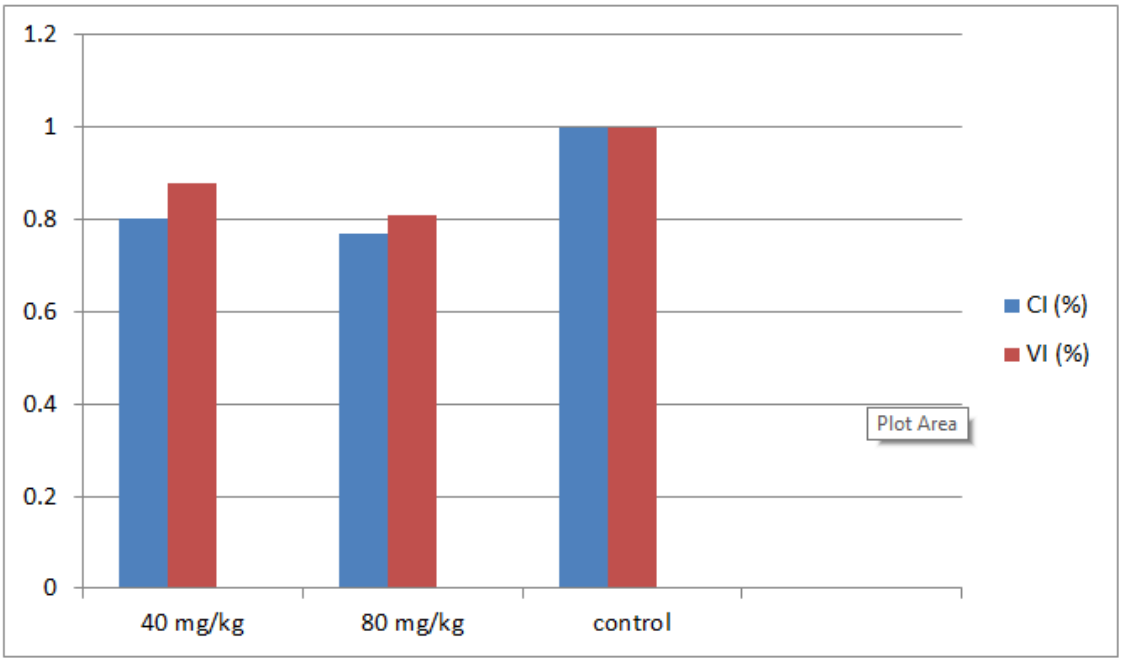

Figure 2: The effect of bispyribac-sodium on the color index and volume index of the RBCs for 30 days in female albino rats.

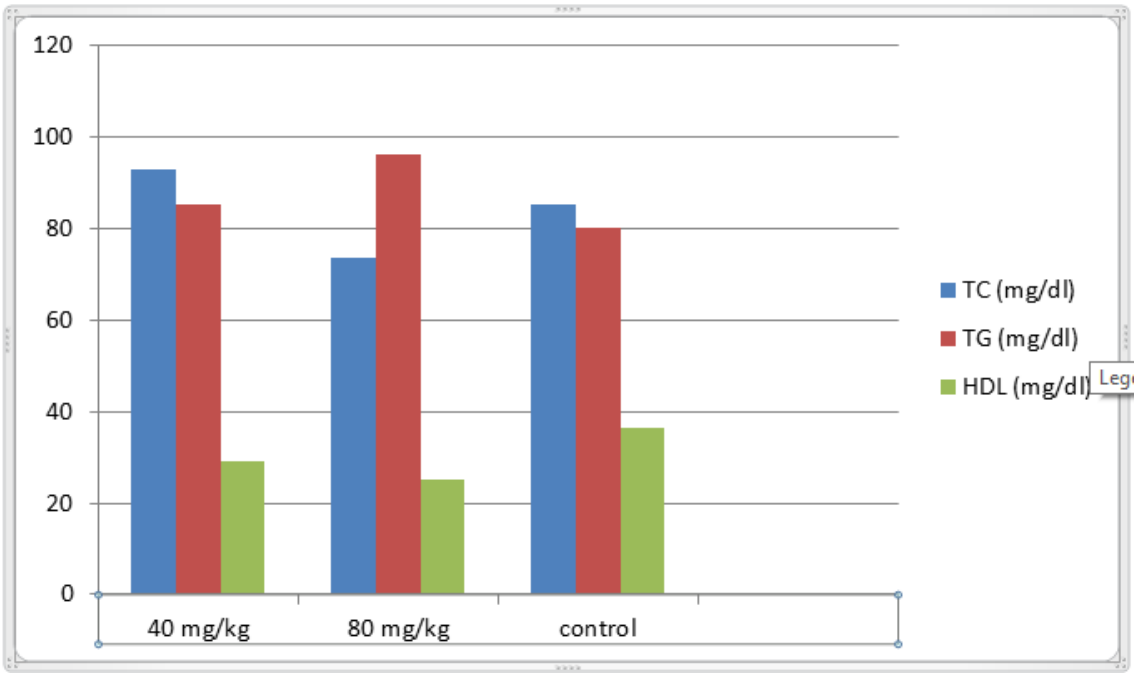

Figure 3: The effect of bispyribac-sodium on lipid profile for 30 days in female albino rats.

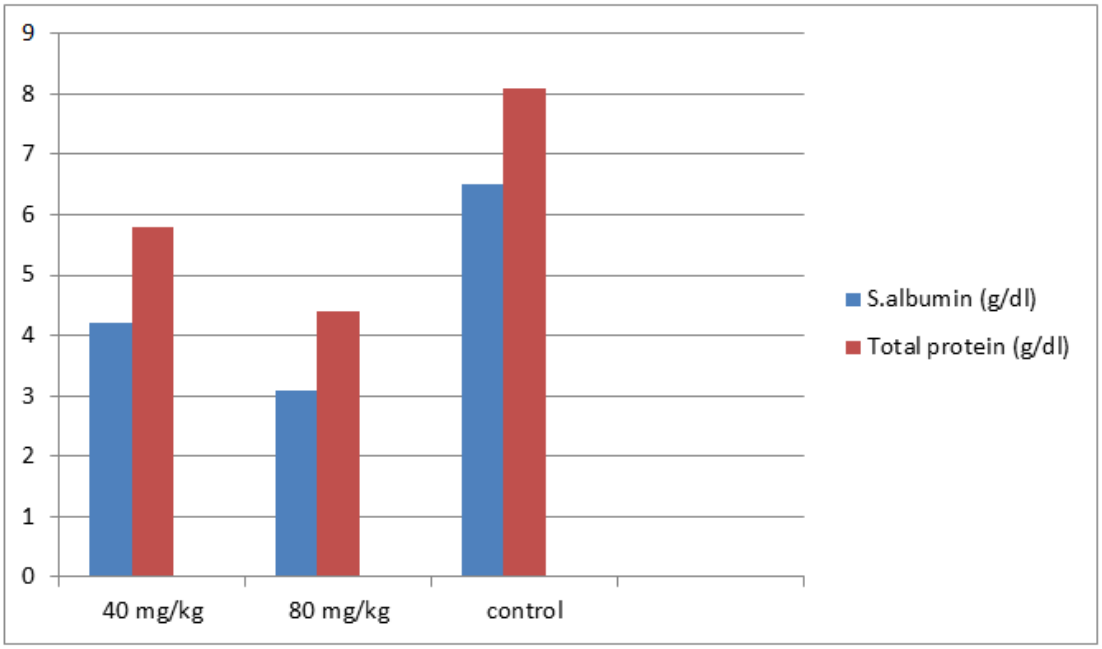

Figure 4: The effect of bispyribac-sodium on serum albumin and total proteins for 30 days in female albino rats.

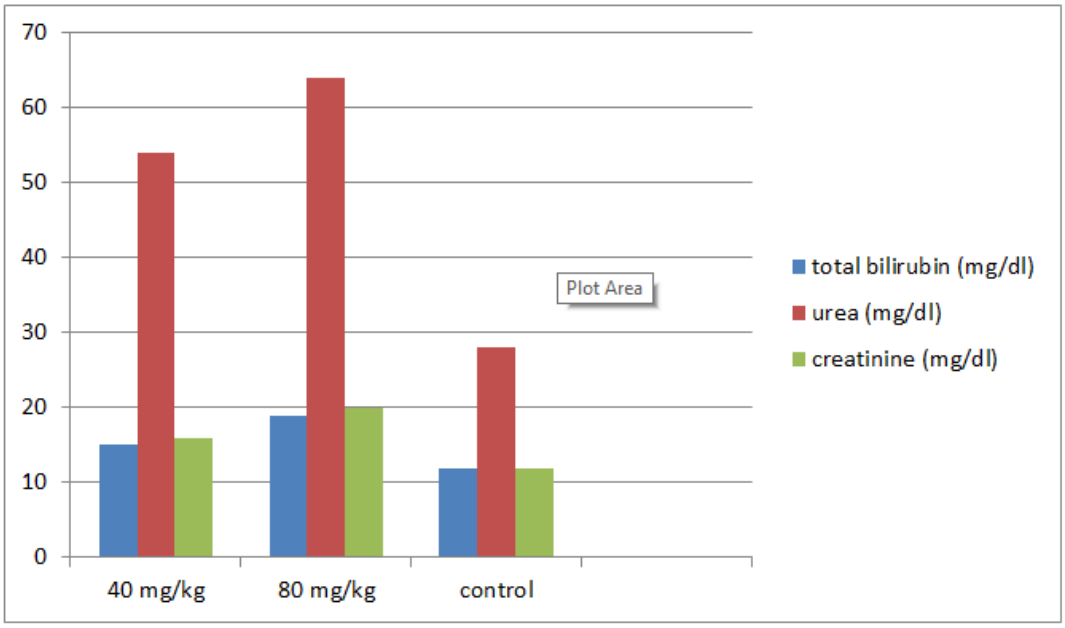

Figure 5: The effect of bispyribac-sodium on kidney function for 30 days in female albino rats.