

13th INTERNATIONAL
CONGRESS
OF THE SERBIAN SOCIETY
OF TOXICOLOGY



1st TOXSEE
REGIONAL
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Present and Future of toxicology: Challenges and opportunities



10 - 12 May, 2023 Belgrade

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ABSTRACT
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VITAMIN B1 KAO POTENCIJALNI „ANTIDOT“ U LEČENJU JAPANSKIH PREPELICA TROVANIH HLORPIRIFOSOM

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Hlorpirifos (CPF) je hlorovani organofosfatni pesticid, odnosno insekticid, koji se već dugo sa uspehom koristio u poljoprivredi. Ovaj insekticid svoje delovanje kod sisara ostvaruje na najmanje tri načina: inhibicijom aktivnosti enzima acetilholinesteraze (AChE), izazivanjem oksidativnog stresa i izazivanjem funkcionalnog poremećaja endokrinih žlezda. Za vitamin B1 (tiamin) je poznato da spada u grupu hidrosolubilnih vitamina, kao i da poseduje antioksidativni efekat. Osim toga, tiamin preko acetil koenzima A (acetil-CoA) učestvuje u sintezi acetilholinesteraze pa njegov nedostatak potencira delovanje organofostata.

Cilj naših ispitivanja bio je da se na japanskim prepelicama, trovanih hlorpirifosom, ispita da li i u kojoj meri vitamin B1 utiče na parametre oksidativnog stresa, inflamacije (interleukina 1(IL-1) i interleukina 6 (IL-6)), apoptoze (inducibilne azot-oksidade (iNOS) i ciklooksigenaze-2 (COX-2)), kao i aktivnost enzima acetil i butirilholinesteraze (AChE i BChE). Rezultati ovih ispitivanja pokazali su da tiamin efikasno dovodi do oporavka aktivnosti AChE i BuChE u plazmi, jetri i mozgu, koja je značajno bila inhibisana dejstvom CPF-a. Osim toga, tiamin pokazuje i antioksidativna svojstva, pošto povećava ukupnu koncentraciju redukovano glutationa u mozgu, zatim smanjuje stepen lipidne peroksidacije, redukuje produkciju IL-1 i IL-6, snižava ekspresiju iNOS i COX-2. Dobijeni rezultati su pokazali da vitamin B1 ima povoljno dejstvo kod prepelica, trovanih hlorpirifosom.

KLJUČNE REČI: vitamin B1, japanske prepelice, organofosfatni pesticidi, hlorpirifos, parametri oksidativnog stresa



VITAMIN B1 AS A POTENTIAL "ANTIDOTE" IN THE TREATMENT OF JAPANESE QUAIL POISONED WITH CHLORPYRIFOS

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Chlorpyrifos (CPF) is a chlorinated organophosphate pesticide, i.e. insecticide, which was successfully used in agriculture for a long time. This insecticide exerts its action in mammals in at least three ways: by inhibiting the activity of the enzyme acetylcholinesterase (AChE), by causing oxidative stress, and by causing functional disruption of the endocrine glands. Vitamin B1 (thiamine) is known to belong to the group of water-soluble vitamins, and has an antioxidant effect. In addition, thiamine through acetyl coenzyme A (acetyl-CoA) participates in the synthesis of acetylcholinesterase, so its deficiency potentiates the action of organophosphates.

The aim of our work was to investigate whether and to what extent vitamin B1 affects the parameters of oxidative stress, inflammation (interleukin 1 (IL-1) and interleukin 6 (IL-6)), apoptosis (inducible nitric oxide (iNOS) and cyclooxygenase-2 (COX-2)), as well as the activity of the enzymes acetyl and butyrylcholinesterase (AChE and BChE) and cyclooxygenase (COX), in Japanese quail poisoned with chlorpyrifos. The results of these tests showed that thiamine effectively led to the recovery of AChE and BuChE activity in plasma, liver and brain, which was significantly inhibited by the action of CPF. In addition, thiamine also shows antioxidant properties as it increases the total concentration of reduced glutathione in the brain, then decreases the degree of lipid peroxidation, reduces the production of IL-1 and IL-6, and lowers the expression of iNOS and COX-2. The obtained results showed that vitamin B1 has a beneficial effect on quail poisoned by chlorpyrifos.

KEYWORDS: vitamin B1, Japanese quail, organophosphate pesticides, chlorpyrifos, oxidative stress parameters



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