



ASSESSMENT OF RENAL TOXICITY IN RATS EXPOSED TO COMMERCIAL FORMULATIONS OF FIPRONIL

Kartheek RM and David M*

Environmental Toxicology and Molecular Biology Laboratory, Department of PG Studies and Research in Zoology, Karnatak University, Dharwad- 580003, Karnataka, India.

ABSTRACT

Renal dysfunction as a consequence of pesticide exposure has been often discussed in scientific community. Nevertheless, literature support for same on new class insecticides have been in limited proportion. Fipronil (FPN), a new class phenylpyrazole insecticide is known for its action against insect pests that possess resistance ability over the conventional group of pesticides. An attempt was made in the current study to investigate the influence of FPN on biochemical and histopathological faction in kidney of Wistar rats. Experimental animals were divided in four groups; C, E1, E2 and E3 and received 0.0, 6.6, 12.12 and 32.33 mg/kg body weight of FPN respectively through oral gavage for 90 days. Results on antioxidant enzymes suggested significant decline ($*p < 0.01$) in catalase, superoxide dismutase and glutathione peroxidase activity in the kidney of exposed rats under groups E2 and E3 unlike E1 as compared to C. Similarly, a significant ($*p < 0.01$) elevation in malondialdehyde level was also noticed indicating oxidative damage potential of FPN in rats under E2 and E3. The outcome was verified through histopathological investigation which demonstrated anomalies including damaged proximal and distal convoluted tubule, increase in tubular lumen, fibrosis and necrosis. Based on the outcome, it can be inferred that FPN inflicts dose dependent damage on kidney of rats under subchronic exposure duration and hence poses a potential threat. It is therefore recommended that care should be taken whenever FPN is used or disposed under mammalian proximity.

Keywords: Fipronil, Kidney, Malondialdehyde, Nephrotoxicity, Xenobiotics.

1. INTRODUCTION

Indiscriminate pesticide use has resulted in unfavourable environmental conditions causing adverse health effects on non-target organisms (Schwarzenbach et al., 2010; Kartheek and David, 2016). Due to their extensive usage in agriculture and persistent nature, pesticides are known to pose a serious toxicological threat to integrity of environment and more importantly to its biota (David and Kartheek, 2015; Albuquerque et al., 2016). Previously, several studies have been carried out to understand the toxicity of conventional group of pesticides on non-target species (David and Kartheek, 2015). However, the toxicants evaluated have been with the objective of elucidating hepatic (Kammon et al., 2010; David and Kartheek, 2014), neuro (Lee et al., 2016), cardiovascular (Zafiroopoulos et al., 2014) and reproductive

systems (Sharma et al., 2014). Investigations on toxic potential of new class insecticides in causing renal dysfunction have been rarely reported so far.

Numerous pesticides have been identified to generate free radicals within biological system (Mansour and Mossa, 2009; David and Kartheek, 2016). Several chemically non-related compounds possess the ability to induce oxidative stress which has prompted the use of antioxidant and oxidative damage responses as non-specific, yet sensitive biomarkers, useful to characterize impacted environments with complex mixtures of contaminants (Viegas-Crespo et al., 2003; Ferreira-Cravo et al., 2007). There is a growing interest among researchers regarding the role of oxidative stress and reactive oxygen species (ROS) in the