UNIVERSITI TEKNOLOGI MARA

FORENSIC TOXICOLOGICAL STUDY OF CITALOPRAM LETHAL POISONING USING BIOLOGICAL AND ENTOMOLOGICAL SAMPLES

SITI AISYAH BINTI SHAMSUDDIN

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ABSTRACT

Entomological evidence plays a significant role in most cases of decomposed body which provide beneficial information related to forensic investigation, especially in estimation of the minimal post-mortem interval as well as the cause of death. This study was designed to investigate the effect of citalopram on the decomposition rates of rabbit carcasses and faunal succession as well as the development rates of blowfly *Chrysomya megacephala* and *Chrysomya rufifacies*. The goal of the study was also to develop and optimized QuEChERS extraction method and applied the validated method to determine the concentration of target analytes in biological and blowflies specimens. Correlation between both of the samples were also analysed to relate the suitability of the entomological specimens used in toxicological analysis. For indoor decomposition, six New Zealand White rabbits weighing between 2.5 kg to 3.0 kg, were equally divided into control and test groups. The control group was sacrificed by isoflurane while test group was force fed with two lethal doses of citalopram, T1 (800 mg/kg) and T2 (1600 mg/kg) before euthanized with isoflurane. Toxicological analysis by high performance liquid chromatography coupled with diode array detector was performed using C_8 column under isocratic elution of 1 mL/min running through the mobile phase consisting of 60% (v/v) 10 mM ammonium acetate buffer (pH 7) and 40% (v/v) acetonitrile at 40°C. Study revealed that the decomposition rates of the treated-citalopram rabbit carcasses were accelerated from control carcasses. Entomofauna attracted to the carcasses were also found abundant on the citalopram treated group compared to control. The study found that the development rates of the treated larvae were faster than the control. The length and weight of the treated larvae were observed bigger and attained maximum size earlier than control. This clearly proved that citalopram could disturb the PMI estimation based on the decomposition rates and blowflies development rates. Modification of QuEChERS method has successfully optimized and validated to obtain highest linearity of regression coefficient ($R^2 > 0.999$) estimated from the calibration curve range from 0.05 µg/mL to 50.0 µg/mL, with the high precision (RSD <5%) and accuracy (75% – 110%). The method was revealed high sensitivity with limit of detection (LOD) and limit of quantification (LOQ) range between 0.02 µg/mL to 0.15 µg/mL and 0.08 µg/mL to 0.34 µg/mL, respectively. The target analytes of citalopram and its metabolites desmethylcitalopram and didesmethylcitalopram were successfully achieved using QuEChERS method analysed by high performance liquid chromatography diode array detector. Study indicated that the entomological sample could be valuable as alternative specimens used in toxicology for qualitative analysis, but unreliable in quantification.

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