Toxicology: The Basis for Development of Antidotes

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Editorial

Toxicology is the study of poison. Sources of poisons include animals, microorganisms, plants and chemicals. Although, Paracelsus who was a lecturer at the University of Basel, Switzerland in 1520s had hypothesized that the ability of an agent to cause poisoning is dependent on the dose of that agent. It was on this basis the median lethal dose (LD_{50}) was introduced in 1920. LD_{50} is the dose which has proven to cause death to 50% of the test group of animals [1]. It is an initial assessment of toxic manifestations and is one of the initial screening experiments usually performed with carcinogenic, anti-carcinogenic, venomous, anti-venomous, toxicogenic, anti-toxicogenic, immunogenic and anti-immunogenic compounds. An antidote is any is any substance that counteracts a poison by, (a) chemically destroying the poison, (b) mechanically preventing absorption, or (c) physiologically opposing the effects of the poison in the body after absorption [2]. The data from median lethal estimation serve as the basis for classification and labelling; provide initial information on the mode of toxic substance; help arrive at a dose of a new compound and help determine LD_{50} values that may indicate potential types of drug activity [3]. The different methods used in determination of LD_{50} include Arithmetical method of Karber [4], Lorke method [5], arithmetical method of Reed and Muench [6], graphical method of Miller and Tainter [7], graphical method of Litchfeld and Wilcoxon [8], revised up-and-down procedure [9], a modifed arithmetical method of Reed and Muench [6] and arithmetic-geometric-harmonic method. All the methods employ summation of the doses of toxicant that caused death in the test group of animals.

However, for Reed and Muench method, the sum of cumulative dead and cumulative survived of each dose is taken. The percent survival to two doses adjacent to LD_{50} is calculated and the LD_{50} determined [10]. In another report, LD_{50} is calculated using the data on percent mortality instead of percent survival [11]. Having noted the marked difference between the estimated LD_{50} from percent survival and percent mortality using Reed and Muench method, Saganuwan [1] modifed and validated the method using the average of median lethal dose (LD_{50}) and median survival dose (MSD_{50}) which gave a relatively ideal LD_{50}. The method was also validated by other authors with precision and accuracy. Kue et al. [12] used quick chick embryo chorioallantoic membrane (CAM) as an alternative predictive model in acute toxicological studies for cyclophosphamide, cisplatin, vincristine, carmustin, campothecin, aloin, mitomycin-C, actinomycin–D, melphalan and paclitaxel. The authors used the method of Reed and Muench modifed by Saganuwan [1], and determined LD_{50} of all the anticancer agents and there was signifcant correlation between the ideal LD_{50} for the CAM and LD_{50} for mice. Signifying the versatility of the revised Reed and Muench method using CAM model as a replacement for toxicological studies in rodents.

World Health Organization (WHO) [13] has patented sodium silicate complex (SSC) which comprises trimeric sodium silicate $(Na_2SiO_3)_3$

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