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Letter to the Editor

Before Pesticides can be Held Responsible for Fatal Poisonings, their Toxic Concentrations in Body Fluids or Tissues must be Proven

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Letter to the Editor

We read with interest the article by Dogan *et al*. on a retrospective study analyzing 51 fatal pesticide poisonings documented by the First Court of Forensic Medicine of Turkey between January 2013 and December 2022 [1]. In 57% of the cases, a pesticide product was identified at the scene, and toxicological analyses confirmed pesticide exposure in 31% of the cases [1]. Aluminum phosphide and methomyl were the most frequently detected substances [1]. Discrepancies between circumstantial evidence and toxicological results were mostly due to the volatility of the substances, their rapid metabolism, delayed sampling, prior medical interventions, and the limited availability of suitable samples [1]. Although the study is interesting, some points require further discussion.

The first point concerns the retrospective study design [1]. Retrospective studies have several disadvantages, such as poor data quality, missing data, the inability to prove causality (only association), susceptibility to memory and selection biases, difficulties in controlling extraneous variables and a generally lower level of evidence compared to prospective studies [2].

The second point is that the classification of pesticide poisonings was based on suspicion rather than evidence in most cases [1]. Pesticide poisoning was confirmed by toxicological analyses in only 31% of cases [1]. "Strong circumstantial evidence" does not prove that pesticide poisoning led to death. Patients in whom no toxic serum level of a pesticide was documented should be excluded from the study.

The third point is that no threshold values were specified above which a pesticide concentration is classified as toxic [1]. To assess whether the concentration of aluminum phosphide, methomyl, malathion, zinc phosphide, fenoxaprop-P, endosulfan, and 2,4-D was actually toxic, measurements of pesticide concentrations in tissues or body fluids must be performed, and threshold values must be specified for each substance. As long as such threshold values are not specified, it cannot be determined whether an individual case was actually caused by pesticide poisoning or not.

The fourth point concerns the lack of information in the methods section regarding whether the methods for measuring pesticide concentrations in body fluids or tissues were consistent throughout the entire observation period [1]. Since the 51 included cases were recorded over a period of 10 years, it is conceivable that at least some of the analytical methods may have changed over time. Knowledge of this fact is essential, as different methods can lead to different results.

The fifth point concerns the detection of pesticides in stomach contents. This detection does not necessarily mean that the affected person was actually poisoned. Since serum and tissue levels depend strongly on the amount of pesticide absorbed via the intestine, poisoning should be confirmed by measuring the concentration of the respective pesticide in body fluids or tissues.

The sixth point concerns the discrepancy between the finding that 44 cases involved an agricultural site and the results in Table 1, which indicate that 34 cases were found in urban residential areas. This discrepancy should be clarified.

Finally, no further autopsy findings were reported [1]. Therefore, it should be known in how many of the 51 cases autopsies revealed myocardial infarction, pulmonary embolism, ischemic stroke, cerebral hemorrhage, or other causes of death. Only cases in which the autopsy revealed no other causes of death should be included in the analysis. It should also be stated how many of the included cases underwent forensic and how many underwent conventional autopsy.

Before pesticides can be held responsible for fatal poisonings, their toxic concentrations in bodily fluids or tissues must be proven. If volatile pesticides were the cause of death, their breakdown products should be analyzed.

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