

The importance of pharmaceutical surveillance in forensic toxicology in the field of public health

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Abstract: Forensic Toxicology is a science of extreme importance, because through it is possible to detect toxicants harmful to the body, by which it encompasses the analyses of biological material that lead to the result of alterations and damage caused and even the cause of death of the individual, which can happen by various factors, such as poisoning, drug abuse and suicides, where a number of professionals are involved who are able to investigate and realize all the necessary requirements to reach a conclusion. Even with specialists in this area, strict quality control is required in forensic analysis laboratories that perform all processes to obtain a correct and satisfactory result. The present work aims to discuss the theme of forensic toxicology and public health as an essential instrument for the identification of harmful substances to organisms, since, often, the inappropriate use of certain chemical reagents can cause irreparable damage; presenting itself, therefore, as a theme of high relevance to public health and society in general. In this sense, the role of the expert presents itself as "*sinequa non*" for elucidating crimes and offenses in cases of poisoning; drug overdose; alterations of substances, where through analysis and collection of biological material, this professional will raise concrete subsidies in order to obtain conclusive evidence, corroborated in his technical report. In this area of knowledge, professionals from various backgrounds work and are therefore understood as multidisciplinary, for example: occupational toxicology, environmental toxicology, food toxicology, drug toxicology, social toxicology, etc. In this sense, toxicology through its scientific techniques comes to add efforts with criminal expertise and public health itself in its macro sense.

Keywords: Forensic Toxicology. Drugs. Research. Intoxication.

1. Introduction

Toxicology is a multidisciplinary science that seeks to identify and quantify the harmful effects associated with toxic

products, that is, it is the study that defines the safety limits of chemical agents, understanding as safety the probability of a substance not producing damage under specific conditions. At

first the word has its natural origin from the Greek "*Toxikon*", and can be understood as the study of toxic agents that interact with living systems through chemical processes (WATKINS III; KLAASSEN, 2012).

Since antiquity, the elucidation of deaths associated with chemical substances was a concern, however, the toxicologist Mateu Josep Bonaventura (1787-1853), was the first to relate autopsy material with chemical analysis, to reveal cases of poisoning that had a legal nature. He adopted new methods of analysis, adapting them to forensic activity (OGA; Camargo; BATISTUZZO, 2014). Modern toxicology consists of four disciplines: clinical, regulatory, research and forensics (RANGEL, 2011).

In the 20th century, forensic toxicology was restricted in identifying the toxic nature of a given crime, already today, this science acts in forensics, both in the living individual, to track drugs of abuse and characterize a state of drug addiction, as well as in the corpse to detect overdose, anaphylactic reaction to drugs (RANGEL, 2011). In recent decades, forensic toxicology has become a science that unites analytical chemistry, biochemistry and pharmacology, taking advantage of the advances of analytical technologies (BUSARDO; PICHINI; PETERS, 2017).

Forensic toxicology aims to find evidence that will allow the identification of the presence of a chemical substance (toxic agent) in the criminal investigation, whether for cause of death, damage to health or property, especially, with the main concern of obtaining and interpreting the results. There is a wide range of samples that can be used in forensic toxicology, such as: organs collected at autopsy, biological fluids (both from the living individual, and from the corpse, among others). The samples are selected and collected according to the specificity of the case and the type of analysis that is intended to be performed (FACHONE, 2008). The pharmaceutical industry plays an important role in forensic toxicology, especially in relation to drugs of abuse. The pharmaceutical professional helps to identify and quantify the drugs and their metabolites in the fluids of the victims (CSHUNDERLICK; ZAMBERLAM, 2021).

Forensic toxicology therefore uses toxicological analyses relating to with the legal procedure, being an important tool in the materialization of crime. Understanding the forms of exposure, toxicokinetic and toxicodynamic of xenobiotics (exogenous chemicals) is important for the interpretation of findings and reveals forensic toxicology as a multidisciplinary science, necessary for the interpretation of the finding and for criminal expertise (OGA; Camargo; BATISTUZZO, 2014). To obtain correct results it is necessary in addition to specialists in the field, but also a thorough quality control in forensic analysis laboratories (WATKINS III; KLAASSEN, 2012).

The present work aims to analyze the importance of pharmaceutical surveillance in forensic toxicology in the field of public health.

2. Methodology

This is a narrative bibliographic research, elaborated

from articles published in the SciELO, LILACS and VHL databases. Using descriptors: "Forensic Toxicology"; "Drugs"; "Investigation"; "Intoxication". Included in the research were: full-text articles available, published in Portuguese.

3. Results and Discussion

In forensic toxicology, analyses of biological samples can take place in living, *ante mortem*, and or deceased, post mortem individuals. In the first option there is, for example, doping control in sport that is quite common and currently necessary. It is natural for every athlete to try to get the best possible performance in their sport in order to win victories and break records. To this do so, many adhering to illicit drugs such as diuretics, anabolic and various stimulants (PEREIRA *et al.*, 2002).

The forensic toxicologist is assigned the activity of identifying, recognizing and quantifying risks inherent to human exposure to toxic agents, employing methods obtained from knowledge gained in virtually all areas of modern toxicology (DE JESUS; SILVA, 2021).

In the case of sport, urine and saliva are biologically sufficient to identify toxins because they are considered acute intoxications. But in other cases, other than athletes where intoxication is chronic, nails and hair are used because they have longer exposure and consequently contain more information for toxicological analysis (LISBOA, 2016).

When it comes to post mortem toxicology they are worked when there are victims who have died. The analysis is done when there is suspicion that some substance led to the fatality of the victim. In these cases, it is also analyzed whether the victim was a compulsive drug user and their possible overdose effects. Post mortem toxicology sometimes becomes more difficult because of the natural changes that the body undergoes. Cells self-destruct spontaneously in a process such as autolysis. It is common in *post mortem* cases to use various biological matrices. Blood mainly from the femoral part and aorta are analyzed. But they don't stay out of those in the heart cavity. The liver is also used in *post mortem* analyses as well as stomach contents. Vitreous and humor serve in these cases. Muscle tissues are used if the body is in the advanced rotting stage. With the body in this state even bones and hair help in post mortem toxicology (MARTINI, 2014).

The demand for forensic analysis has increased in recent years, gradually becoming more challenging in the face of the complexity of increasing samples of abuse substances. Faced with the demand for accelerated and accurate results required of its applications, a generic analysis method emerged, created for a large number of targets decomposed (ARAUJO, 2017).

From this, it is worth noting about this area of activity, which are part of professionals of various backgrounds and therefore is understood as a multidisciplinary area. It is important to highlight that the pharmacist in forensic toxicology, through his scientific techniques, comes to join the criminal expertise to uncover the chemical agents used

within that crime finding (RANGEL, 2011).

In the face of this, Bordin *et al.* (2015) show that forensic toxicology activities have been paramount to society as an aid in making decisions about the cause-and-effect relationship between a given compound and an observed adverse effect. Therefore, in forensic toxicology it is important to have a specific and sensitive analysis for the quantification of licit and illicit substances in biological matrices.

According to Tocchetto and Passagli (2011) today, it has been seen that these studies on forensic toxicology are increasingly broad and indispensable, ranging from postmortem and live expertise, aiming to track and/or confirm possible presence of illicit drugs to attest to a possible state of psychic and/or physical dependence of that individual. In more extreme cases, they assist in public health circumstances, such as counterfeiting or adulteration of medicines and chemical accidents.

The relevance that the field of action of toxicological expertise has in the legal area. Thus, analyzing that the better executed the body of crime, the more waste and information collected, it will enable the greater opportunity in which the expert achieves a better achievement of results, thus providing a service of extreme relevance to public health and society in general.

4. Conclusions

Toxicology is a very wide area because of its scope and applicability being divided into several specialties, each with its own particular characteristics.

The forensic toxicology materializes from the relevance with the criminal expertise, aiming to qualify and identify toxicological substances in the criminal field. Since it is an area recognized as responsible for the supplies of evidence, able to elucidate legal suspicions in cases where it may have any suspicions.

Thus, we conclude that, through toxicology and public health, affected individuals are properly linked to processes that have undergone changes in the midst of toxic risks and have had in several situations' death, among some lives and the focus is research objective contributing to analyses that the vast majority of times one sees every detail and trace leading to conclusions in general.

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