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Natural Substances with a Psychoactive Effect: Analyses of Biological Samples, Toxicological Aspects and Therapeutic Properties

Nasiadek Gou*

Department of Environmental and Occupational Health, University of Pittsburgh, Pennsylvania, USA

Introduction

There has been an increase in the use of new psychoactive substances (NPSs) and this issue affects a number of nations around the world. There is a class of NPSs of regular beginning, comprising of plants and growths, which have many alkaloids, liable for causing unwinding, invigorating or psychedelic impacts. Religious beliefs and cultural norms drive the consumption of some of these substances, making the law highly variable or even ambiguous. However, due to the incomplete understanding of their metabolism and effects, abusive use of these substances may pose a significant health threat. Additionally, the rapid spread of NPSs via the internet necessitates the development of sophisticated analytical techniques that are capable of detecting these compounds. As a result, the purpose of this study is to examine the analytical methods developed in biological matrices, traditional use/therapeutic potential and toxicological aspects of twelve plant specimens.

Description

Over the years, there has been a growing concern about drug abuse. In the European Union, approximately 96 million people have used drugs of abuse. Cannabis is the most commonly used drug (27.4%), followed by cocaine (5.4%), ecstasy (4.1%) and amphetamines (3.7%).New psychoactive substance (NPS) consumption is on the rise, according to reports. These substances are referred to as a new narcotic or psychotropic drug, in pure form or in preparation, that is not controlled by the United Nations Drug Conventions, but which may pose a public health threat comparable to that posed by substances listed in these conventions by the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA).NPSs are popular all over the world because they are sold online in dark web forums under various names like bath salts, legal highs and research chemicals. Because they mimic the effects of more conventional drugs of abuse and are not detected by standard screening methods, these substances are typically consumed. The literature, on the other hand, outlines the various dangers and health issues that can result from using NPSs [1].

Although the term new refers to a recent appearance, some of these compounds have been around for decades but only recently became available for purchase, so their commercialization is not yet regulated. Controlling their marketing is a concern due to the constant appearance of these drugs about 50 new ones each year. The United Nations Office on Drugs and Crime (UNODC) and the EMCDDA have also set up early warning systems to find these compounds because of the risk they pose to health. The most well-known synthetic NPSs are synthetic cannabinoids, cathinones, opioids, piperazines, phenethylamines, designer benzodiazepines, indoalkylamines and arylcyclohexylamines. Natural NPSs can also exist. The majority of NPSs of natural origin are alkaloids found naturally in plants. When consumed, these alkaloids enable users to experience novel sensations and various mental states. *Areca catechu* (*A. catechu*) and *Mitragyna speciosa* (*M. speciosa*) are two examples of these plants, which originate primarily from South America and Asia but also from Africa and Russia. Depending on the constituents of these plants, they can either produce effects that are sedative or relaxing, such as those of *Areca catechu* (*A. catechu*) or *Mitragyna speciosa* (*M. speciosa*), hallucinogenic effects, such as it is difficult to estimate the global consumption of preparations containing natural alkaloids because religious or cultural beliefs frequently motivate their consumption. The laws that govern these substances are, as a result, highly variable and possibly even ambiguous [2].

As a result of the lack of comprehensive research into these substances metabolism, the resulting metabolites and their potential concentrations are unknown. The acute toxicity of many of these substances, which is also not completely understood, is another gap that requires additional research. In point of fact, the symptoms that are described when one is intoxicated by an NPS are often mistaken for those that occur when one consumes other substances, like medicines. As a result, developing analytical methods is crucial for identifying and quantifying the potentially harmful compounds in these natural products. The majority of developed analytical techniques, on the other hand, have focused on the detection of alkaloids that are naturally occurring in plant materials. We wanted to discuss the toxicological aspects of several psychoactive substances found in various plants, as well as some of their therapeutic properties and traditional uses, in this review. Analytical techniques developed for the detection of psychoactive substances from the same plants in biological samples were also discussed. Despite having its primary origins in Asia (Sri Lanka and Malaysia), *A. catechu* is currently found in Africa, Europe and the United States [3].

This plant's fruit, the areca nut, has been used as a traditional remedy or in rituals for centuries. This fruit, which is typically chewed, can be consumed in the form of a "Betel quid" with other substances. Areca nut is the fourth medication with the most noteworthy utilization rate around the world, perhaps because of its animating, unwinding or Spanish fly impacts .The primary psychoactive substance in the fruit of *A. catechu* is arecoline. This alkaloid serves as both a non-selective nicotinic and muscarinic agonist and a competitive inhibitor of gamma-amino butyric acid (GABA). Arecoline rapidly crosses the blood-brain barrier once it enters the body, affecting the parasympathetic nervous system. However; this fruit is addictive and can have a number of negative effects, including digestive issues and abstinence syndrome (anxiety, irritability, insomnia and mood swings). Consuming this fruit has also been linked to severe extrapyramidal syndrome, asthma and myocardial infarction, among other adverse effects. However, Hindu and Buddhist cultures have also described the use of this fruit for medicinal purposes since antiquity. The consumption of areca nuts has been linked to a variety of general properties, including feelings of contentment, well-being and psycho stimulant effects, lessening stress, strengthening gums and sweetening breath. In addition, this fruit is used to treat malaria, fever, hernia, hypertension, urinary stones and to make formulations for indigestion, diarrhoea and other digestive disorders.

***Address for Correspondence:** Nasiadek Gou, Department of Environmental and Occupational Health, University of Pittsburgh, Pennsylvania, USA; E-mail: nasaiadek45@gmail.com*

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Studies have additionally demonstrated that the utilization of areca nut is related with antimicrobial, cardiovascular and stomach related impacts .Roots and leaves of *A. catechu* were traditionally used in medicine as well as the fruit [4].

This review covered a number of plants and fungi with psychoactive substances that can have calming, stimulating, or hallucinogenic effects. Some of the analytical techniques developed in biological matrices with the intention of detecting these substances, as well as some of their traditional uses, therapeutic properties and toxicological aspects, were highlighted. The development of new analytical methods is crucial due to the rapid emergence of these psychoactive substances in the market for abused drugs and the absence of legislation to control them. An enormous challenge, on the other hand, is the lack of analytical standards necessary to move forward with the development of chromatographic methods or the difficulty in finding plant specimens that permit compounds to be scanned [5].

Conclusion

It is even more challenging to develop and validate new methods due to the compounds typically low concentrations, necessitating the use of more advanced instruments like mass spectrometry detectors. Last but not least, since the sample must undergo a pre-treatment step, the fact that the matrices of plant origin contain multiple interferes also presents a problem. Organic solvents are required for this procedure, which increases the cost of method development. Miniaturized extraction methods should be prioritized in the future in order to develop more cost-effective methods that aim to use fewer organic solvents and, as a result, are better for the environment.

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