International Journal of Toxicology and Risk Assessment

ORIGINAL ARTICLE

Epidemiological Study of Illicit Drugs Consumed in Côte d'Ivoire Trends Over Recent Years

Bahi Gnogbo Alexis[1]*, Méité Souleymane[1], Kouassi Serge K[2], N'Guessan Jean Luc A[2], Konan Jules K[1], Boyvin Lydie[1], Kipré Guédé Bertin[3], M'Boh Gervais M[1], Dosso Mireille[3] and Djaman Joseph A[1,2]

[1]Department of Clinical and Fundamental Biochemistry, Institute Pasteur of Côte d'Ivoire, (IPCI), Abidjan, Côte d'Ivoire

[2]Department of Biosciences, University Félix Houphouët-Boigny (UFHB), Abidjan, Côte d'Ivoire

[3]Department of Bacteriology-Virology, Institute Pasteur of Côte d'Ivoire, (IPCI), Abidjan, Côte d'Ivoire

*Corresponding author: Bahi Gnogbo Alexis, Department of Clinical and Fundamental Biochemistry, Institute Pasteur of Côte d'Ivoire, (IPCI), Abidjan, Côte d'Ivoire, Tel: +2250101106725

Abstract

This study aims to establish an inventory of illicit drugs consumed in Côte d'Ivoire and to monitor consumption trends over recent years. Two levels of biological testing were used in this study: NaI von minden Drug-Screen® qualitative tests for screening and Roche Diagnostics THC II semi-quantitative tests for tetrahydrocannabinoid (TCH) quantification. Upon completion of the study, the total number of cases of suspected psychoactive substance use over the last six years amounted to 8,328. Aslo, the ratio of positive cases to the total number of suspected cases remained fairly constant at around 8.33% throughout the study period. The age group with the highest proportion of all suspected cases over the whole study period was the age group 20-35 years, with a proportion of about 55%, which accounted for more than half of suspected cases. This finding highlights the need for awareness-raising at a national level. It is time to draw up a programme to protect the general population, particularly schoolchildren and university students, against the use of psychoactive substances, in order to safeguard the country's young people, who represent its future.

Keywords

Psychoactive-substances; Illicit drugs; Addiction; Côte d'Ivoire

Abbreviations

THC: Tetrahydrocannabinoid; MDMA: 3,4-méthylènedioxy-N-méthylamphétamine

Introduction

In recent decades, illicit use of drug has become a major public health concern. Indeed, the global prevalence of illicit use of drug grew rapidly in recent years, reaching an estimated 5.3% [1,2]. In addition, around 275 million people were reported as consumers of psychotropic medicines by 2020. Forecasts predict that this number will rise by 11% worldwide and by 40% in Africa alone by 2030. The most commonly used illicit drugs worldwide are cannabis (with 192 million users), amphetamine-type stimulants (with 34 million users), cocaine (18 million users), and opioids (34 million users) [3]. Illicit use of drug significantly drive up the global burden of disease [4]. According to a World Health Organization report, in 2023 nearly 36 million people suffer from disorders related to the use of psychoactive substances [3]. These drug addicts are often at an increased risk of overdose, impaired physical and mental functioning, reduced quality of life and mortality due to overdose or suicidal ideation [5]. Early estimates suggest that young people, representing the most active population, are the most affected. Indeed, the latest figures showed that about 13.8 million young people aged between fifteen (15) and sixteen (16)

Alexis BG, et al. J Toxicol Risk Assess 2025, 11:063

• Page 1 of 4 •

years had already used cannabis at least once [3]. Social factors, curiosity and peer group influence have been identified as contributing to the high prevalence of the use of psychoactive substances [6]. The consequences of abusing of these psychoactive substances in schools are numerous: school drop-out, poor academic performance, violence in schools and universities, etc. In order to develop a programme to protect the general population, especially schoolchildren, from drug abuse, it is essential to establish a clear diagnosis of the risk of exposure to these substances.

This study therefore aims to establish an inventory of illicit drugs consumed in Côte d'Ivoire and to monitor consumption trends over recent years.

Materials and Methods

Study setting, type and population

The present study was conducted at the Toxicology and Phytochemistry Unit of the Department of Medical and Fundamental Biochemistry. This cross-sectional descriptive study was carried out from 2015 to 2022. The study was focused on drug users or suspected drug users admitted to the Institut Pasteur de Côte d'Ivoire (IPCI) for biological testing.

Biological samples

Urine samples were collected from subjects under the supervision of a healthcare worker. Sixty millilitres of fresh urine were collected in a sterile, clear, polystyrene urine collection bottle with a high-density polyethylene screw cap. A single sample was collected from each individual and was given a serial number. After being checked for compliance, the samples were sent to the laboratory for biological analysis.

Toxicological analysis

Two levels of biological testing were used in this study: Nal von minden Drug-Screen® qualitative tests for screening and Roche Diagnostics THC II semi-quantitative tests for tetrahydrocannabinoid (TCH) quantification. The qualitative tests are competitive immunoassays based on an antibody-antigen reaction that detect the presence or absence of a panel of twelve narcotics and their secondary metabolites in human urine. These include amphetamine, methamphetamine, cannabis, cocaine, benzodiazepines, barbiturates, MDMA, tricyclic antidepressants, morphine/opiates, methadone, tramadol and buprenorphine.

For the quantitative analysis, only cannabinoids, the main illicit drug found in patients' urine, were quantified. The test was performed using ready-to-use cannabis kits (Cannabinoids II (THCII)) on the Cobas C311 Hitachi automated system from Roche Diagnostic, France.

Statistical analysis

Mean values and standard errors (mean ± SEM) were calculated using Graph Pad Prism 8.4.2 (Microsoft, USA). Results were analysed using a t-test and analysis of variance (ANOVA), followed by a Tukey's multiple comparison test. Differences were considered significant when the p-value was less than 0.05.

Results

Upon completion of the study, the total number of cases of suspected psychoactive substance use over the last six years amounted to 8,328. This figure decreased in 2020 to 792 cases and peaked at almost 2,000 cases in 2021 (Table 1). However, the ratio of positive cases to the total number of suspected cases remained fairly constant at around 8.33% throughout the study period (Table 1 and Figure 1).

The age group with the highest proportion of all suspected cases over the whole study period was the age group 20-35 years, with a proportion of about 55%, which accounted for more than half of suspected cases (Figure 2).

The psychoactive substances sought were illicit narcotics such as cocaine, cannabis, opiates, but also psychotropic drugs considered illicit such as benzodiazepines, barbiturates, etc..... (Figure 3). The results showed that psychotropic drugs such as buprenorphine (185 positive cases) and benzodiazepine (131 positive cases) were the most commonly found in patients' urine (Figure 3). Cannabis, an illicit drug, was the third most commonly used psychoactive substances, with 107 positive cases (Figure 3).

A breakdown of positive cases by type of drug user shows that, within each age group, poly- drug users were by far the most numerous. Of the 207 users aged 12 to 19, 94 were mono-drug users compared to 113 poly drug users. In the 20-35 age group, there were 209 poly-drug users compared to 130 mono- drug users. Finally, in the 36-58 age group, there were 38 mono- drug users compared to 33 poly- drug users (Figure 4). On 107 patients tested

Table 1: Number of tests performed per annum for the six past years.

Years	Total Test	Positives Test	Negatives Test	Positive Tests/ Total Tests Ratio (%)
[2018]	1548	129	1419	8.33
[2019]	1044	87	957	8.33
[2020]	792	66	712	8.33
[2021]	1980	165	1815	8.33
[2022]	1716	144	1572	8.39
[2023]	1248	104	1105	8.33
TOTAL	8 328	695	7580	8.33

Table 2: General characteristics of cannabis-positive patients.

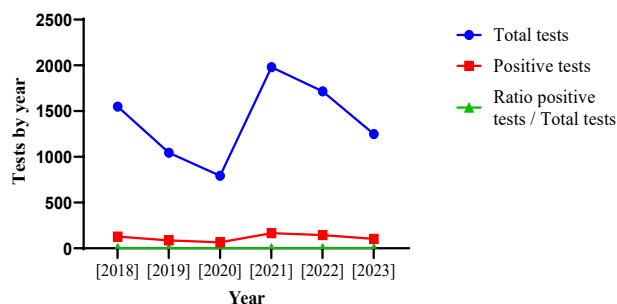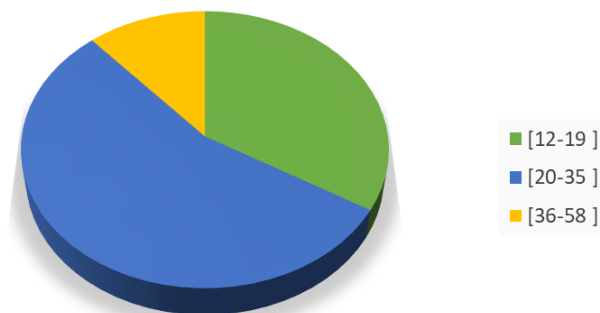|	MALE	FEMALE	P-value
Drug consumers by gender	99 (92.53 %)	8 (7.47 %)	p < 0.05
Quantitative tests (THC positive when Level > 50 ng/mL)	319.38 ± 5.62 ng/mL	133.75 ± 7.25 ng/mL	p < 0.05

Figure 1: Consumption trend.

Figure 2: Suspected case age group distribution.
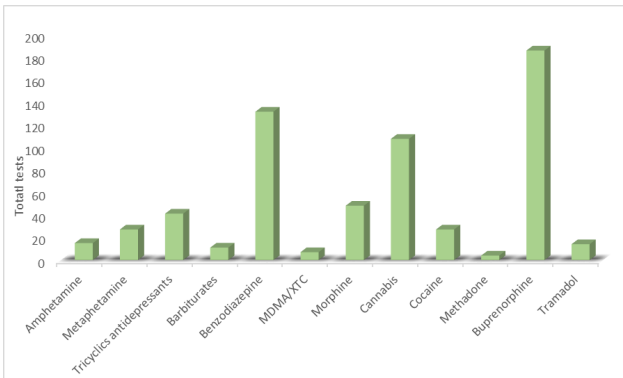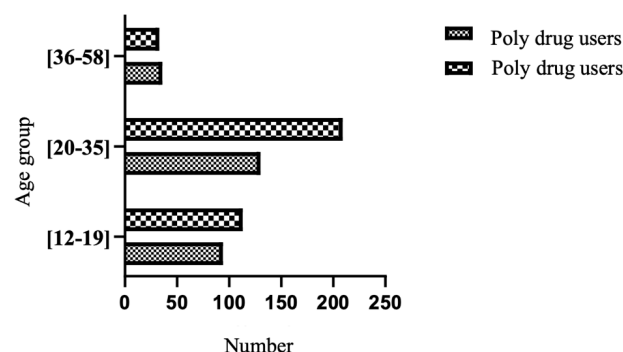

Figure 3: Psychoactive compound.

Figure 4: Types of drug users within age groups.

positive for cannabis (THC), the study showed that 92.53% of drug users were male and 7.47% were female. THC concentration was above 300 ng/mL in males compared to 133 ng/mL in females (see Table 2).

Discussion

The results of the present study showed that the number of suspected cases decreased in 2020, followed by a sharp increase in 2021. This observation could be explained by restrictive measures imposed in 2020 during the Covid-19 pandemic, in contrast to 2021, where barrier measures were reduced. Although the number of suspected cases of psychoactive substance consumption is fluctuating, the ratio of proven cases to suspected cases has remained steady over the years. The mean age of the study population was 24.29 ± 1.31 years, and the most represented age group, with 54.95% of the population, was between 20 and 35 years old. These results are similar to those of Ouattara, et al. [7] who showed that the age group most affected by drug is the 17 to 40 age group. Other studies have shown that addiction to psychoactive substances affects young people. Indeed, youth is a period of experimentation, during which young people are considered to be a particularly vulnerable and susceptible population [6,8]. The results of this study show that buprenorphine is more often used than other psychoactive substances, followed by benzodiazepine and cannabis.

These results contrast with the information provided by the United Nations (UN) report. This information indicates that cannabis and pharmaceutical opioids are the most commonly used psychoactive drugs worldwide [9]. These contrasting results could be explained by the fact that the majority of people received in this study came from a drug treatment center. Buprenorphine is indeed a safe and effective agent for detoxifying opioid dependence [10,11]. It can be used as a first-line agent in substitution therapy programmes due to its low abuse potential compared to other opioids [10]. Furthermore, benzodiazepines are often prescribed to people suffering from drug use related disorders [12]. In addition, the results showed a high percentage of poly-drug users in all other age groups. These results are in line with the United Nations Office on Drugs and Crime survey report on the use of psychoactive substances and health among secondary school pupils in Côte d'Ivoire. According to this report, there is a growing trend of poly- drug users, with a prevalence of 37.5% [13].

Of all drugs assessed qualitatively, only cannabis was quantified. The results of the quantitative evaluation of cannabis in the 107 patients who were tested positive for cannabis during the qualitative evaluation were found to be positive for cannabis, i.e. true positives. In this study population, the use of cannabis was significantly more frequent among males (60.75%) than females. These results are similar to those reported by Mabrouk, et al. [14]. In Tunis, with a figure of 61%. This finding could be justified by the fact that men are more suggestible than women. And that they wmay feel more virile under the effect of these psychoactive substances. Indeed, research has demonstrated that individuals who use drugs are able to regulate their feelings of fear while

in the grip of cannabis, and that cannabis can actually reduce fear [15].

Conclusion

This study showed that young people, who are the most active population, were the most exposed to psychoactive substances, with ages ranging from 20 to 35. This group was also characterised by a significant majority of male. Analysis drug user types revealed an increasing trend towards poly-consumption, combining cannabis with tranquillisers and antidepressants. A comparative study of qualitative and quantitative cannabis tests showed a high level of concordance in the results. The study also revealed that the rate of positive drug tests compared to suspected drug use has remained steady over the last six years. This finding highlights the need for awareness-raising at a national level. It is time to draw up a programme to protect the general population, particularly schoolchildren and university students, against the use of psychoactive substances, in order to safeguard the country's young people, who represent its future.

Acknowledgements

Funding

Competing Interests

The authors declare that they have no competing interests and I confirm that there is no conflict of interest for me and the co-authors.

Data Availability Statement

The data in this study are included in the article/supplementary materials. Contact the corresponding author(s) directly to request the underlying data.

Author's Contributions

BGA and **MS** designed and drafting the manuscript. **KKS, NAJ-L** and **KKJ** carried out urine collecting, technical aspect and statistical analysis. **BL** directed the technical aspect. **KGB** carried out the English translation. **MGM** monitored the implementation of the project. **DM** and **DAJ** conceived and managed the project.

Each author participated sufficiently in the work to take public responsibility for appropriate portions of the content. All authors read and gave a final approval of the version to be published.

References

1. United nations office on drugs and crime (UNODC) (2016) World drug report 2016. Sales No. E.16.XI.7. New Work: United Nations Publication 2016.

2. World Health Organization (WHO) (2017) Other psychoactive substances. http://www.who.int/substance_abuse/facts/psychoactives/en/

3. United nations office on drugs and crime (UNODC) (2023) World drug report 2023: 2-3.

4. Degenhardt L, Whiteford HA, Ferrari AJ, Amanda Baxter J, Fiona Charlson J, et al. (2013) Global burden of disease attributable to illicit drug use and dependence: Findings from the Global Burden of Disease Study 2010. Lancet 382: 1564-1574.

5. Bachhuber MA, Hennessy S, Cunningham CO, Starrels JL (2016) Increasing benzodiazepine prescriptions and overdose mortality in the United States, 1996-2013. Am J Public Health 106: 686-688.

6. Ahounou EI, Traore BS, Sule MA, Zikéto BS, Gonce DA, et al. (2023) Conduites Addictives des Adolescents Usagers de Drogues Consultant pour la Première Fois au Service d'Addictologie et d'Hygiène Mentale d'Abidjan en 2019. Health Sci Dis 24: 12-16.

7. Ouattara N, Yao KM, Doubran PJD, Sanogo IA, Tako NA (202) Effect of illicit drug use on human behaviors in west Africa: Cases of Grand-Bassam (Côte d'Ivoire). Int J Biol Chem Sci 15: 399-413.

8. Kuendig H, Delgrande JM, Kuntsche E (2005) Cannabis et jeunesse: Epidémiologie et idéologies. Dépendances 27: 8-10.

9. Office des Nations Unies contre la Drogue et le Crime (ONUDC) (2021) World drug report.

10. Ducharme S, Fraser R, Gill K (2012) Mise à jour sur l'utilisation clinique de la buprénorphine: Pour les troubles reliés aux opioïdes. Can Fam Physician 58: e9-e14.

11. Strahan AE, Desai S, Zhang K, Guy GP Jr (2023) Trends in out-of-pocket costs for and characteristics of pharmacy-dispensed buprenorphine medications for opioid use disorder treatment by type of payer, 2015 to 2020. JAMA Netw Open 6: e2254590.

12. Tjagvad C, Clausen T, Handal M, Skurtveit S (2016) Benzodiazepine prescription for patients in treatment for drug use disorders: A nationwide cohort study in Denmark, 2000-2010. BMC Psychiatry 16: 168.

13. Office des Nations Unies contre la Drogues et le Crime (ONUDC) (2017) Rapport de l'enquête sur la consommation de substances et la santé chez des élèves de l'école secondaire en Côte d'Ivoire. Ministère de l'éducation national 92.

14. Mabrouk H, Mechria H, Mechri A, Douki W, Gaha L, et al. (2011) Consommation de cannabis dans une région du Centre Tunisien Sante 21: 233-239.

15. Ugwu UT (2022) It makes me work strong: Cannabis and cannabis use persistency in a Nigerian city. Int J Mod Anthrop 2: 804-818.

Alexis BG, et al. J Toxicol Risk Assess 2025, 11:063

• Page 4 of 4 •