Drugs of abuse screening in urine : a five-year experience

Dvornik, Štefica; Bilić-Zulle, Lidija; Fišić, Elizabeta

Source / Izvornik: **Periodicum biologorum, 2001, 103, 357 - 360**

Journal article, Published version
Rad u časopisu, Objavljena verzija rada (izdavačev PDF)

Permanent link / Trajna poveznica: https://urn.nsk.hr/urn:nbn:hr:184:871098

Rights / Prava: In copyright / Zaštićeno autorskim pravom.

Download date / Datum preuzimanja: **2025-01-10**

Repository / Repozitorij:

Repository of the University of Rijeka, Faculty of Medicine - FMRI Repository

UNIRI DIGITALNA KNJIŽNICA

dabar
DIGITALNI AKADEMSKI ARHIVI I REPOZITORIJI

PERIODICUM BIOLOGORUM
VOL. 103, No 4, 357–360, 2001

UDC 57:61
CODEN PDBIAD
ISSN 0031-5362

Original scientific paper

Drugs of abuse screening in urine: A five-year experience

ŠTEFICA DVORNIK
LIDIJA BILIĆ-ZULLE
ELIZABETA FIŠIĆ

Department of Laboratory Diagnostics
Clinical Hospital Centre Rijeka
T. Strižića 3
51 000 Rijeka
Croatia

Correspondence:
Štefica Dvornik
Department of laboratory diagnostics
Clinical Hospital Centre Rijeka
T. Strižića 3
51 000 Rijeka
Croatia

Key words: drugs of abuse, screening, fluorescence polarisation immunoassay, urine

Abstract

Background and Purpose: *There are strong suggestions that consumption of drugs of abuse has significantly increased in Croatia during the past decade and especially a few years ago. Widespread abuse of drugs has become a great medical and social problem manifested by an increasing incidence of death secondary to overdose, particularly involving youth, and by increase in crime. A large selection of procedures is available for the analysis of drugs of abuse and a combination of procedures should be selected to meet the necessary requirements of both detection and confirmation.*

Material and Methods: *In a five-year period, we ran in our laboratory a total of 2068 tests on 516 urine samples, (average 4 tests per sample) using fluorescence polarization immunoassay (FPIA) method on TDX autoanalyzer (Abbott, USA).*

Results: *Total number of performed tests in our laboratory is increasing each year, but it was almost duplicated during last year compared to 1999 (729 vs 383), especially for opiates (185 vs 83) and cannabinoids (148 vs 55). There were total of 365 positive results (17.6%) with an average of 18.0% positive results for each year. The most commonly positive drugs were benzodiazepine (39.8%) cannabinoids (32.6%) and opiates (18.1%) during all five years.*

Conclusions: *Increasing number of requests for drugs of abuse screening in our laboratory suggests that in the near future we will have to develop high quality emergency toxicology program with confirmation tests and implement it in routine clinical laboratory.*

INTRODUCTION

There are strong indications that consumption of drugs of abuse has significantly increased in Croatia during past decade and especially a few years ago. Widespread abuse of drugs has become a great medical and social problem manifested by an increasing incidence of death secondary to o verdose, particularly involving youth, and by increase in crime.

A large selection of procedures is available for the analysis of drugs of abuse: thin-layer chromatography, gas-liquid chromatography, spectrofluorometry and immunologic methods. The optimal choice of procedures depends on many factors that include cost, workload, program needs, and how the data is used. Generally a combination of procedures should be selected to meet the necessary requirements of both detection and confirmation *(1)*.

Received November 6, 2001.

In July 1996 we introduced in our laboratory first screening tests for drugs of abuse to satisfy the needs of urgent medical care in the hospital.

We present analytical results of five year period of drugs of abuse screening in our hospital.

MATERIAL AND METHODS

During five years, we ran a total of 2068 tests on 516 urine samples, (on average 4 tests per sample).

Patients were both male and female, from 0 to 45 years old, admitted to clinical hospital Rijeka.

Specimens were screened for the following drugs of abuse:
amphetamine/methamphetamine, barbiturates, benzodiazepine, cannabinoids, cocaine, methadone and opiates.

Rapid selection of positive results was performed by fluorescence polarization immunoassay (FPIA) on automatic analyzer TDX (Abbott, USA).

RESULTS

Total number of performed tests in our laboratory is increasing each year (Figure 1), but during last year total number of tests was almost duplicated in relation to 1999. (729 vs 383), especially for opiates (185 vs 83) and cannabinoids (148 vs 55).

From July 1996 to July 2001 there were total of 365 positive results (17.6%) with an average of 18.0% of positive results for each year (Figure 2).

The most commonly positive drugs were cannabinoids and benzodiazepine (33.3%) in 1996, and cannabinoids (39.2%), benzodiazepine (31%) and opiates (15.7%) in 2001. (Figures 3, 4).

Overall, one drug was detected in 40.1% of specimens, two in 10.7%, and three drugs in 3.1% specimens, but the number of specimens with more than one positive drug increased during last two years (Figure 5).

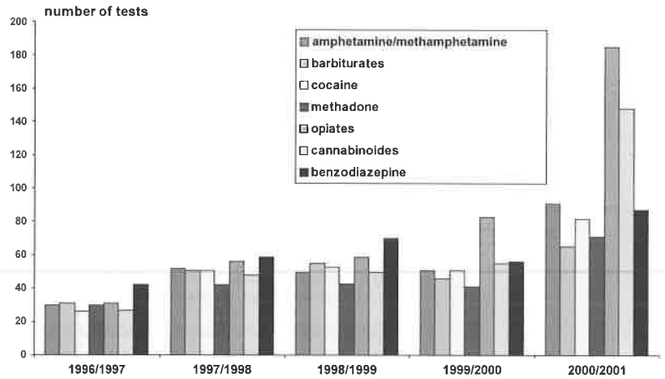

FIGURE 1. *Total number of drugs of abuse screening tests performed during five years.*

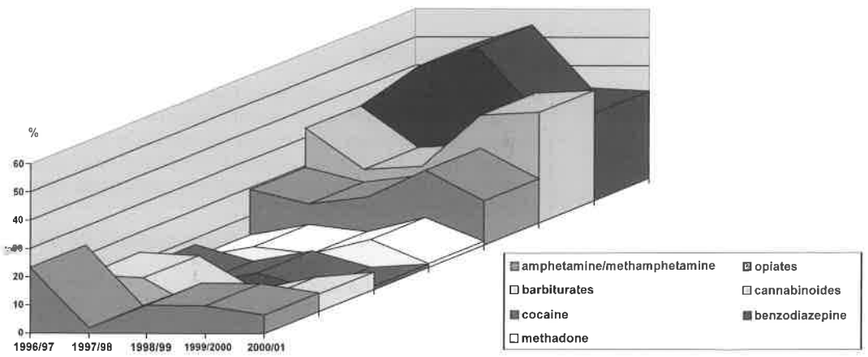

FIGURE 2. *Positive tests results (%) in drug abuse screening during five years.*

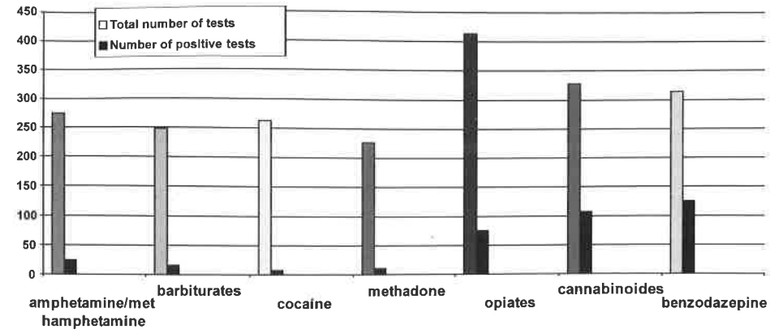

FIGURE 3. *Total number of tests and number of positive tests during five years.*

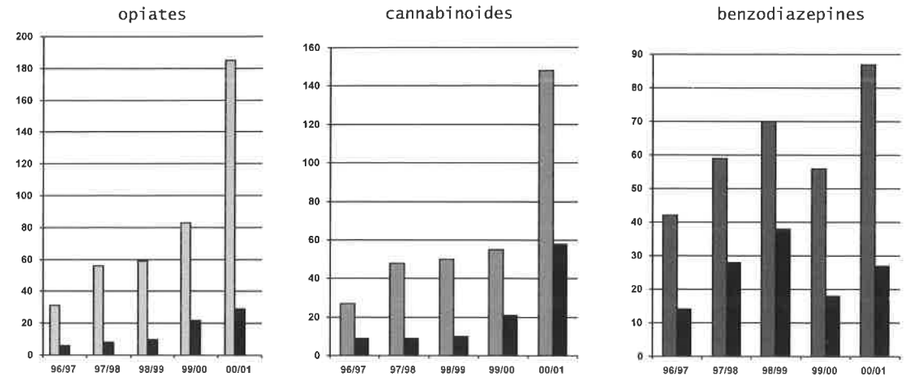

FIGURE 4. *Total number of tests and number of positive tests for determination of opiates, cannabinoides and benzodiazepines during five years.*

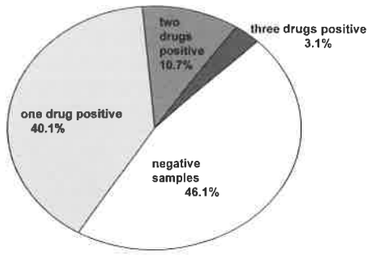

FIGURE 5. *Percentage of negative samples and samples with one, two, or three positive drugs of total number of analyzed samples during five years.*

DISCUSSION

Drugs of abuse screening tests were introduced in our laboratory due to the needs of emergency medical care five years ago. Mostly, results must be available within minutes, eventually hours, (like in emergency toxicology), but also they can serve any other purposes a physician may need, so they must be sufficiently sensitive to determine whether drugs of abuse have been used recently, within past 1, 2, or 3 days.

A large selection of procedures is available for the analysis of drugs of abuse and optimal choice depends on many factors that include cost, work load, program needs, and how the data is used. Generally a combination of procedures should be selected to meet the necessary requirements of both detection and confirmation *(1)*. Some suggested combinations are to screen all specimens using thin-layer chromatographic procedure and then immunologic or fluorometric procedure, or screen all specimens by an immunologic procedure and confirm positive results with thin-layer chromatography, gas-liquid chromatography, or spectrofluorometry. Special procedures must be used if morphine is found. If only selected and not all drugs are of interest, immunologic procedures are more suitable than thin-layer chromatography. Lately, ELISAs are becoming increasingly popular among forensic toxicologists in USA because of their relative ease of use, growing potential for automation (very important in centres with many samples per day), and their adaptability for use with blood and urine samples *(2)*.

We perform in our laboratory rapid selection of positive results of drugs of abuse in urine by fluorescence polarization immunoassay (FPIA) on automatic analyzer TDX (Abbott, USA) which allows both quick and sensitive results. We use the same method for therapeutic drug monitoring, which is also very convenient. At present state, we have no possibility to confirm positive test results, although it is strongly recommended, but our results are satisfactory for the purpose of urgent medical care.

The total number of tests we performed during the past five years (2068) is not as large as in some other centres *(2)*, but it is increasing every year (Figure 1), specially during last year, when it was almost duplicated compared to 1999. Automation is not necessary in our laboratory, but we will have to introduce confirmation tests as soon as possible.

Benzodiazepine was the most commonly positive drug during all five years (38.9% of positive results of total number of tests), Presumably because it is in widespread use and easy to get. Cannabinoids (32.6%) and opiates (18.1%) are also among most commonly positive drugs (Figure 3, 4).

In addition, the number of specimens with more than one positive drug increased during the last two years.

CONCLUSIONS

Analysis for drugs of abuse has become commonplace in the clinical laboratory setting.

The total number of tests of drugs of abuse increases rapidly over years, as well as the number of positive results.

Increasing number of requests for drugs of abuse screening in our laboratory suggests that in the near future we will have to develop high quality emergency toxicology program with confirmation tests and implement it in routine clinical laboratory.

REFERENCES

1. JATLOW P I, BAILEY D N 1956 Analytical toxicology. *In:* Gradwohl's Clinical Laboratory Methods and Diagnosis. Henry Kimpton, London, p 387–434
2. KERRIGAN S, PHILLIPS W H 2001 Comparison of ELISAs for opiates, methamphetamine, cocaine metabolite, benzodiazepines, phencyclidine, and cannabinoids in whole blood and urine. *Clin Chem 47:* 3, 540–547