

ORIGINAL ARTICLE

Urine Drugs of Abuse Testing at Hospital Universiti Sains Malaysia: A Review of Trends from 2009 – 2019

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ABSTRACT

Introduction: Substance abuse is a major social and health bane worldwide, including Malaysia, inflicting extensive morbidity and mortality. Our study aims to review the request and results of urine drugs of abuse testing conducted at the Pharmacology Laboratory of Hospital Universiti Sains Malaysia, Health Campus, Kelantan, Malaysia, over a period of 11 years. **Methods:** Data for urine drugs of abuse testing requested and their results performed at the Pharmacology Laboratory between January 2009 and December 2019 was retrospectively extracted. Data on patient demographics, types of drugs requested, and types of drugs tested positive were analysed. Testing was performed using the enzyme multiplied immunoassay technique. **Results:** The absolute number and percentage of positive cases for amphetamine type stimulant (ATS) drugs has steadily risen over the past decade making it the current drug of abuse of most concern. Opiate abuse, although still seen, remained static. The peak age range for abusing drugs falls between 25–34 years with a male predominance; an alarming finding was of positive cases observed among neonates and children below the age of 12. Majority of requests came from the Psychiatric and Emergency Departments. **Conclusion:** Over the past eleven years, ATS abuse has superseded opiate in being the most abused drug type, detected even at young ages. Therefore, societal awareness and education on the dangers of ATS abuse, and intensive detection of ATS use must be implemented.

Keywords: Amphetamine type stimulant, Drug abuse, Opiates, Malaysia

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INTRODUCTION

Abuse of drugs is a major social and health bane in Malaysia, inflicting extensive morbidity and mortality. The adverse effects of abusing drugs can be demonstrated directly via psychiatric manifestations, neurological and cardiovascular complications, and indirectly via physical trauma from motor vehicle accidents and drug-induced violence. Abuse of drugs contribute significantly to the loss of employment and productivity, with grievous impacts on families and care givers.

The term ‘drugs of abuse’ refer to drugs that are used for non-medical reasons. These are usually used for their mind-altering effects and can be broadly classified as depressants (such as opioids, benzodiazepines, barbiturates, mitragynine), stimulants (may include amphetamine-type stimulants (ATS) and cocaine) and

hallucinogens (1). Hallucinogens include psychedelics (such as lysergic acid diethylamide (LSD)) and dissociatives (such as phencyclidine and ketamine). Other drugs that are abused include cannabinoids, salvia and inhalants. Abuse of drugs can lead to significant physical and psychological adverse effect; over the long term often leads to physical dependence and addiction.

In terms of global prevalence, in 2017, an estimated 271 million people or 5.5% of the global population aged between 15–64 years, had abused drugs in the previous year (2). This is a substantial increase of 30% relative to the year 2009. It is an alarming sign, as this indicates the growth of illicit drug use had outstripped the rate of population growth (1.1% annually). Of this number, a further estimated 35 - 50 million people suffer from drug use disorders, while 585,000 died in 2017 (2). Loss of health in terms of disability-adjusted life years estimate in 2017; there were 42 million years of “healthy” life lost as a result of abused drugs. This staggering amount is attributed to premature death (approximately 50%) and to years lived with disability (approximately 50%) (3).

Previously in Malaysia, opioids were the predominant drugs being abused. However, amphetamine type stimulants drugs (ATS) gradually gained in popularity (4,5,6). ATS abuse spiked dramatically towards the end the decade (7). Kelantan, a northern east coast state in close proximity to the Thailand border, has been reported to have a greater drug abuse burden compared to the Malaysian average (8). However, the information obtained from this study lacks details as the study was carried out as a survey among secondary school students; the details on the types of drugs abused were not included, thus the study may not reflect the true number of cases.

Hospital Universiti Sains Malaysia (HUSM) is an 829-bedded hospital in Kelantan, a state located at the northeast region of West Malaysia. It is a tertiary hospital affiliated to Universiti Sains Malaysia. The Pharmacology Laboratory is an ISO15189 accredited laboratory tasked with conducting drugs of abuse testing for HUSM. It was previously shown that the national data from the Malaysian Anti-Drug Agency showed a concerning spike in ATS abuse, exceeding opiate figures, over the last decade, especially towards the latter half (7). However, these reports were from drug enforcement agency and not from hospital setting. Therefore, our study aims to report on the regional trend of positive results for illegal drugs of abuse testing from urine samples conducted at Hospital Universiti Sains Malaysia (HUSM) over a period of 11 years. To the best of our knowledge there were no previous published reports on the trends of drug of abuse detection in a hospital setting in Malaysia. The outcome of this study may be useful in creating awareness, and the planning of preventive and management strategies for the problem of drug abuse in Malaysia.

MATERIALS AND METHODS

This was a retrospective study involving extraction of data from the Pharmacology Laboratory of HUSM, on records for urine drugs of abuse requests. Patients’ medical records were referred to for any missing data. The collection of data for this study has been approved by the Ethical (Human) Committee of Universiti Sains Malaysia (USM/JEPeM/19070436). All requests from 1st January 2009 to 31st December 2019 were included. Data extracted include patients’ demographics (age, race, gender) requesting department, types of drugs requested (opiates, tetrahydrocannabinol (THC), amphetamine type stimulants (ATS), benzodiazepine type drugs and barbiturates), reason for request and types of drugs tested positive for each patient. All requests for drugs of abuse testing were made by medical doctors attending the patients.

Generally, at least 10 mls of urine was collected in a plain container and sent to the Pharmacology Laboratory. Fresh urine was immediately processed on arrival at the laboratory. Urine samples were first pre-tested to

ensure their pH (normal range: 4.5-8.5) and specific gravity values (normal range: 1.003-1.030) were within the normal range. Urine samples were then assayed for the presence of drugs namely opiates, THC, ATS, benzodiazepine type drugs and barbiturate type drugs via enzyme multiplied immunoassay technique (EMIT) using the Viva-E Drug Analyser (Siemens Healthcare Diagnostics Products GmbH, Eschborn, Germany). The cut off values for a urine sample to be considered positive for opiates, THC, ATS, benzodiazepines, are 300 µg/L, 50 µg/L, 1000 µg/L and 300 µg/L respectively in accordance with the updated Malaysian Ministry of Health (MOH) Guideline for Drug of Abuse Testing in Urine (version 2.0, updated 2021) (9). For barbiturates, we employ a 300 µg/L cut off value in accordance with the ‘full definition’ (SAMHSA) guidelines (10).

Data was analysed using the IBM SPSS (Statistical Package for Social Sciences) version 24.0 for Windows (Inc., Chicago, IL). Descriptive statistics were used to describe the number of drugs requested and positive cases, patient age ranges, and departmental distribution.

RESULTS

A total of 7083 requests for urine drugs of abuse testing from HUSM were sent to the Pharmacology Laboratory over the 11-year period (Table 1). Reasons for request include aggressive behaviour to exclude drug-induced psychosis, newborn born to mothers with history of drug abuse, motor vehicle accidents, unexplained seizure or chest pain and others. Majority of the samples were from male subjects (92.0%) and of Malay race (97.8%). Age of subjects ranged from newborn to 65 years. The total number of samples requested and positive results over the 11 years were illustrated in Table I ATS is the main drug type requested for testing over the ten-year period, followed by opiates and THC.

There was a steady increase in the overall number of tests requested over the period of 11 years; requests in 2009, 2012, 2015, 2019 were 370, 502, 659 and 1131 respectively. Department of Psychiatry requested

Table 1. Number of drug tests requested, and percentage of positive results for each drug type

Drug type	Total number of requests	Number of positive results (N)	Percent of positive samples (%)
ATS	1808	290	16.0
Opiate	1694	137	8.1
THC	1642	22	1.3
Benzodiazepines	1214	238	19.6
Barbiturates	725	6	0.8
Total	7083	693	9.8

Abbreviations: ATS = amphetamine type stimulants, THC = Tetrahydrocannabinol

the highest number of tests (53.1%) followed by the Emergency Department (24.7%), from the total tests requested over the 11-year period. From 2009 – 2019, the Psychiatry Department consistently requested the highest number of tests each year. Since 2013, there was a consistent increasing trend in the number of tests requested by the Emergency Department of HUSM (Fig. 1).

The number of positive cases detected was also consistently increasing. Starting from the year 2014, there were marked increases in ATS positive cases with concurrent increases in benzodiazepine drug group as shown in Fig. 2.

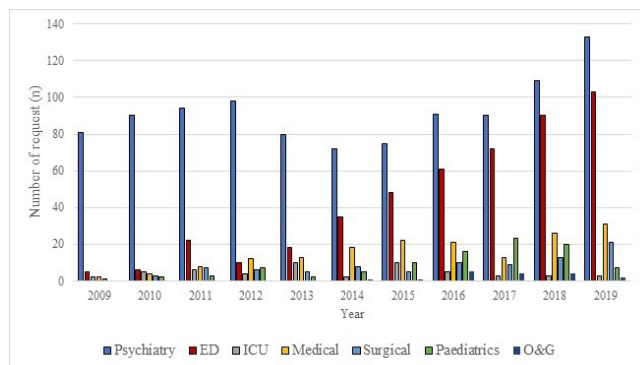


Figure 1: Department request for drugs of abuse testing on a yearly basis from 2009-2019

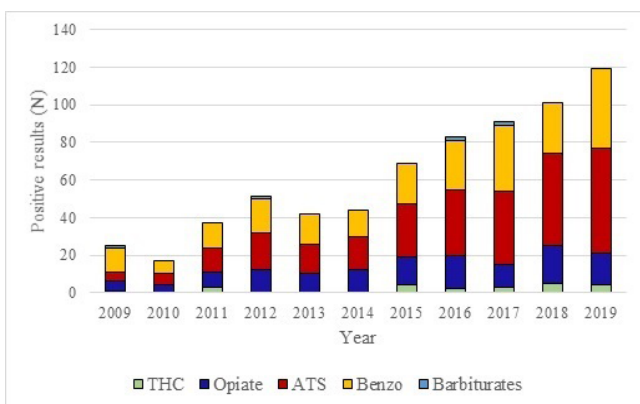


Figure 2: Number of positive cases for each drug type from 2009 to 2019

In 2009, benzodiazepine was the drug type with the highest percentage of positive results (52.0%); however, the percentage reduced over the subsequent years (Fig. 3). In contrast, the positive percentage results for the ATS drug type steadily increased from 20% in 2009 to 47.1% in 2019. Out of the overall 7083 samples requested, 9.8 % were positive. Out of these positive samples, ATS accounts for 41.8 %, followed by benzodiazepines (34.3%), opiates (19.6%), THC 3.2% and barbiturate 0.9%.

Among the samples tested, concurrent abuse of more than one drug type was noted. The predominant two

drug concurrent abuse were ATS and benzodiazepines (63 samples, or 34.6% of total 2 drug concurrent abuse) followed by combination of opiate and ATS (56 samples, or 30.8%) and lastly, the combined use of opiates and benzodiazepine drug group (40 samples or 22.0%). Some samples were tested positive for three drug types, mainly the combination of opiates, ATS and benzodiazepines (17 samples, or 77.3% from the total 3 drug combination).

Fig. 4 showed number of positive urine drugs of abuse results for different age ranges. Most positive cases occurred between the ages of 18 to 44 years old. ATS drug type was the main drug tested positive between the ages of 25 to 44 years old, and newborn. Positive cases were also detected in children of school going ages, including those younger than 12 years old.

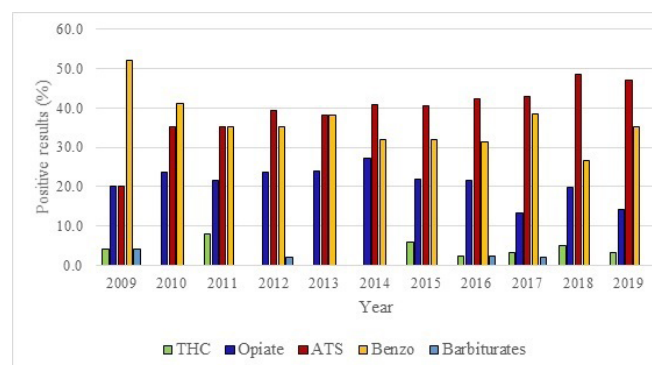


Figure 3: Percentage of positive cases (from requested samples) for each drug type from year 2009 to 2019

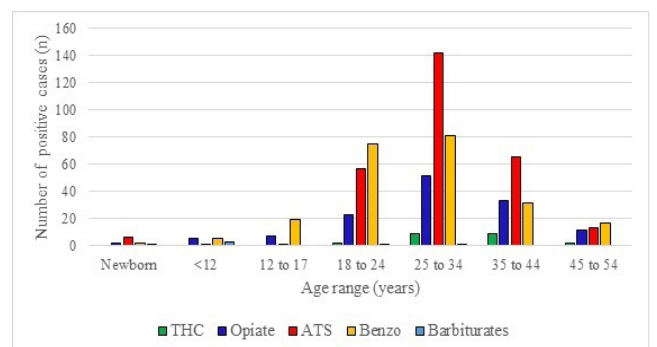


Figure 4: Type of drugs found positive at different age range

DISCUSSION

Our data showed that, the majority of requests came from the Psychiatric ward of HUSM, followed by the Emergency Department, Medical, Paediatrics, Surgical wards and others. Psychiatric ward made the most requests over the past 11 years. The major reason for the high number of requests made by the Psychiatric ward was to exclude drug induced psychosis or aggression before concluding the diagnosis of psychiatric illnesses. It was noted that, the number of tests requested by the Emergency Department progressively increased over the past five years. The majority of cases came with

the diagnosis of motor vehicle accident (MVA). This is in line with a previous study that had associated the occurrence of fatal MVA with drug and alcohol abuse (11).

Other major causes or diagnosis for requests include physical trauma, patients brought in unconscious with unknown reasons, patients with history of seizure, abnormal behaviour and aggressiveness and young patients presenting with acute myocardial infarction. Paediatric cases formed only a small proportion of the requests; however, it is worth noting that the requests made by the Paediatric wards were mainly due to the history of or suspected drug abuse in their mothers. Other reasons include babies that appeared lethargic, and mothers in delirium state during delivery, and preterm babies.

From our study, there was a steady increase in positive cases for ATS from 2010 onwards. In addition, the number of overall positive cases was highest for ATS which accounts for 42.0% of all positive cases. Our result is in line with a report by Chemi et al. (2014) that also concluded ATS to be the most prevalent drug type, replacing opioids in Malaysia (4). Historically, there has been major shifts in the type of drugs abused over the years in Malaysia. In the early nineteenth century, drugs were mainly abused by Chinese labourers who had smoked opium, however, this changed in the 1960s where youths of all ethnic groups started abusing drugs (12). In 1993, heroin abuse occurs in 85% of illegal drug abuse. The local trends seen in Malaysian Anti-Drug Agency reports showed opiate cases totalling 14, 502 in 2014 being reduced by approximately 50% to 7938 in 2019. Whereas there was an approximately three- fold increase in ATS cases, being 6571 cases in 2014, to 19,026 in 2019. These appears to support our findings. This was also indirectly reflected by a wastewater based-epidemiology study carried out in Kuala Lumpur in 2017 (13). In this study, wastewater samples from two wastewater treatment plants were analysed for commonly used drugs of abuse to estimate drug consumption.

Among the monitored illicit drugs, the consumption and dose of ATS was reported to be higher than those of opioids (13). Globally, ATS is still the second most commonly used illicit drug type, behind cannabis. In terms of global production, East and South-East Asia constitute a substantial 61 tons out of a global 211 tons of average annual quantity of ATS seized, by subregion, from 2013–2017 (14,15). Contrary to the global data, which showed cannabis to be the most widely used psychotropic drug worldwide (188 million people in 2017) (16), cannabis is the least reported in our study. Even though the number of requests for cannabis had increased, the number of positive cases remained low over the past 11 years. This discrepancy may be due to its status in Malaysia, where it is illegal to cultivate

cannabis (17), whereas the use of cannabis is legal in some other countries (18). Thus, cannabis is not widely available and not popular among Malaysian abusers.

Our study showed that the concurrent use of ATS and benzodiazepine being the highest combination drug type which accounts for 34.6% of total 2 drug combination. This finding is in accordance with a study in Australia showing a concurrent abuse of benzodiazepine (37%) among ATS abuser (19). A disturbing finding in our study is, ATS was the main drug tested positive among newborn. This was closely linked with the type of drug abused by their mothers, and among the pregnant women tested, majority were positive for ATS. Apart from adverse effects such as intrauterine growth retardation and premature delivery, babies born to this cohort have a greater incidence of developing ADHD and aggression (20). Therefore, educating mothers during antenatal follow up regarding dangers of drug of abuse is crucial as suggested by UNODC/WHO's International Standards (2nd edition) of evidence-based strategies in Drug Use Prevention (21).

Even though ATS generally incur less dependence relative to opioids, its abuse is associated with high physical/mental harm such as accidents, trauma, myocardial infarction, epilepsy and psychiatric disorders (drug induced psychosis), as well as high social harm from excessive aggression, domestic violence and committing crimes. However, unlike opioids where methadone maintenance therapy is a cornerstone of long-term treatment, there is still no treatment for ATS abuse and dependence till this day, as highlighted by Mazlan et al (2006) (22).

It has been estimated that opioids were responsible for two thirds of the 585,000 people who died as a result of drug use in 2017 (23). However, from our study, the number of positive opiate cases has generally shown a reducing trend. This is consistent with the statistics provided by the Malaysian National Anti-drugs Agency, where in 2014, 14, 502 cases of positive opiate abuse had been reported, while in 2019, only 7,938 cases were reported (5).

The number of positive cases based on age appears to follow the normal distribution, where ages between 25 -34 is the age group with the highest positive cases detected. Malaysian Anti-Drug Agency reported that youth (19-39-year) abusers dominate other age groups (adult, adolescent) consisting of 72-74% for the past several years (5). Our data showed similar findings with the most common age group being 25-34 years for all commonly abused drugs, with opiates at 38.3% and ATS at 49.8% of total positives for the 25-34 age. The 25-34 age group also has the highest percentage of positive tests for ATS and opiates (20.7%).

A report by Substance Abuse and Mental Health

Services Administration (SAMHSA) found that initiation of substance abuse was commonest at the age of 15-17 years (24) and another 2019 report showed highest illicit drug use over past month and past year in the 21-25 age bracket (25). Our data showed positive cases as early as 12 years of age. A focus group study among 27 drug abusers conducted in 2014 in rural Kelantan reported a trend of starting drug use at younger ages and increasing drug use among females (26). As both local (26) and international data cases (24) support the overall scenario of an early peak of cases in youth and initiation during adolescence, efforts to curb substance abuse should heavily involve schools, beginning at less than 12 years of age.

Majority of the subjects in our study were of Malay race (97.8%) which correlate closely to the general population demographics of Kelantan (95.9% Malay) (27). Our result also showed that the majority (92.2%) of subjects tested were males. This finding is mirrored in Malaysian Anti-Drug Agency data in that 96.18% of drug addict cases recorded were male. Similarly, European data also reported that more males were involved in abusing drugs compared to females (28).

To our knowledge, this is the first published report on detection of drugs of abuse in a hospital setting in Malaysia. This report differs from that by Malaysia Anti-Drug Agency which is based on police-related offences and local raids by authorities.

One limitation of this report is that it is based on a single centre study in Kelantan, therefore it may not necessarily represent pattern of drug abuse for the whole country. We encourage a multicentre study to confirm similar findings in other parts of Malaysia.

CONCLUSION

Over the past eleven years, the number of requests for drug of abuse testing showed an increasing trend. Similarly, the number of positive cases has also increased. The type of drugs abused in Kelantan appears to be changing over the past eleven years. ATS abuse has sharply risen and superseded opiate in being the most abused drug. A disturbing observation of this report is positive results being seen in newborn and children below the age of twelve years old. Societal awareness on the dangers of ATS abuse, and intensive screenings in local hospitals, amongst students entering institutions of higher learning and staff recruitment need to be implemented.

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