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ORIGINAL ARTICLE

Analysis of Hospital Based Urine Drug Screening Tests over 2 Years. Does it Mirror the Actual Prevalence of Drug Abuse!

Bhutada T,[1] Ray A,[2] Behera BK,[3] Dash BK,[4] Otta S.[5]

Assistant Professor,[1] Professor and HOD,[2,3] Additional DMET,[4] Associate professor.[5]

1,2,3. KIMS medical college and PMBH , Patia, Bhubaneswar.

4. DMET office, Odisha.

5. IMS and SUM Hospital, Kalinga Nagar, Bhubaneswar

Abstract :

Effect of drugs often interplays with the diagnosis and treatment of patients presenting to Emergency and critical care services of the hospital. Urine drug screen (UDS) is a qualitative toxicological screening tool which is simple, fast and has a relatively low cost providing a clue in acute care settings. The present study aims to determine the prevalence of drugs of abuse determined by UDS in suspected patients in a hospital set up and compare it to national prevalence study. It is a retrospective study conducted in the Toxicology lab in KIMS Medical College and Hospital, in Odisha over a period of 30 months where urine samples received from the hospital were included. Commonly abused substances were detected by urine drug screen by the help of a commercially available lateral flow assay kit. We received 232 samples in this study period of which 108 (46.5%) tested positive by urine drug screen.The highest positivity among the samples was noted in the age group of 21-30 (33.3%) closely followed by 11-20 (30.6%) with a male preponderance.(32.3%) cases where single drug was found in urine drug screen while 33 (14.2%) of cases had multiple drugs detected in the UDS. Most common substance of abuse was benzodiazepines in 43.2% cases. THC (29.05%) and OPI (14.2%) were the other commonly abused drugs. In poly drug abusers, commonest drug combination consisted of OPI and THC with or without BZO in 36.36 % (12 /33) cases. Thus, in spite of having many limitation of urine drug screen will help in the acute patient care set up particularly for diagnosis of poly drug abuse.

Keywords : Urine drug screen; Benzodiazepines abuse; Cannabis abuse.

Introduction :

Psychoactive substance use is a growing problem in both developing and developed countries. Illicit drug use is rampant in the young population and has become one of the great conundrums for policy makers and health professionals.[1] The report of Ministry of Social Justice and Empowerment, Government of India, 2018 indicates that substance abuse is a huge burden in India also and there is a wide variation in the prevalence of abused drugs across different states.[2] Cannabis and opioids are the commonly used substances in India.[2] Effect of drugs often interplays with the diagnosis and treatment of patients presenting to Emergency and critical care services of the hospital. Urine drug screen (UDS) is a qualitative toxicological screening tool which is simple, fast and has a relatively low cost in this regard. In spite of researchers debating the utility of UDS in detecting the substance of abuse with certainty, there is a good agreement that it is an important tool in hospitalized patients set up particularly those with altered sensorium, unexplained agitation,[3] trauma[4] and cases of child abuse.[5] UDS also adds diagnostic value in psychiatric patients presenting to an ED, as it is superior to history taking in the rates of drug detection.[6,7] About 20%-40% of trauma patients have test positive for illicit drug, most commonly cannabinoids, amphetamines, or cocaine, and it is a risk factor for a violent injury.[8-14] The present study aims to determine the prevalence of drugs of abuse determined by urine drug screening in suspected patients in our hospital located in Odisha, India.

Corresponding Author
Sarita Otta
Email : saritaotta@gmail.com
Mobile No. : 9438529628

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Materials and Methods :

Study setting- The present study is a retrospective study was conducted in the departmental Toxicology lab in KIMS Medical College and Hospital, a tertiary care teaching hospital in Odisha over a period of 30 months. Urine samples received from the various departments like the Emergency department, intensive care units, psychiatry ward were included.

Methodology-All the samples accompanied with proper requisition form containing coded lab identification, age, sex, department of collection, date and time of sampling and clinical indication for performing Urine Drug Screening (UDS) were considered. The said test was performed using commercially available ABONTM One Step Multi-Line Screen Test Device, which works as a lateral flow chromatographic immunoassay for the qualitative detection of following drugs or their metabolites in urine namely Cocaine(COC), Amphetamine (AMP), Methamphetamine (MET), Cannabis (THC), Opiates (OPI), Benzodiazepine (BZO), Tricyclic antidepressants (TCA), Barbiturates (BAR), Phencyclidine (PCP) and Methadone (MTD). Urine samples (20 ml) were received in bar-coded sterile

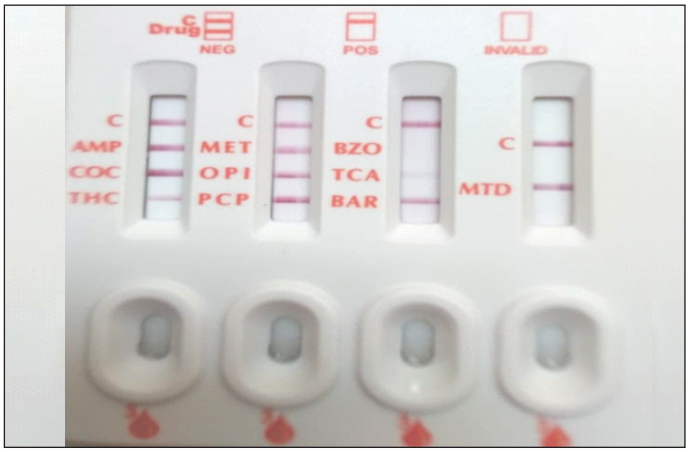

Fig. 1 : A urine drug screen kit used in the study which is positive for benzodiazepine

containers after entry in hospital information software, maintaining a proper chain of custody from the point of collection to the point of testing. In conscious patients clean catch freshly voided sample was received while in catheterized patients samples were received through foley's catheter.

The consent for the test was taken by the treating physicians and the particulars of the patients were not disclosed in any way. Three Drops of urine were put in different wells for the sample following which result reading was done after a gap of 5 minutes. A negative test was indicated by the presence of bands in both Control (C) and test (T) region where as the presence of a single Control line indicates a positive result. No line in the C region with or without a line in T was denoted an invalid test requiring a repeat of the test with a fresh kit (Fig. 1).

Inclusion criteria - Samples of urine received along with a requisition form, received in laboratory within 12 hours of collection in the proper cold chain were only considered

Exclusion criteria- Repeated samples from same patients were excluded. Any other sample of urine not meeting the inclusion criteria were also not included in analysis.

Ethical statement- The tests were requested by the treating physicians when clinically indicated. Informed consent was undertaken by the clinician for performing the tests. However, permission for access to the data was obtained from the head of the department. No information regarding the identity of any of the patients was revealed or divulged in any form during the entire study period. No ethical concerns were thought to be involved.

Statistical analysis- Results were entered in an excel sheet and computed for standard statistics using Graph Pad Prism. The p-value was determined by Fisher's Exact Test and $p < 0.005$ was considered as statistically significant.

Results :

During the study period we received 232 samples of suspected substance abuse from both in patient and out patient facilities of our hospital of which 108 (46.5%) tested positive by urine drug screen. Male constituted 97.4% of the study population with a very few females suspects. The most common age group of study population was 21-30 consisting of 36.2% of total population closely followed by 11-20 age groups (32.3%). The highest positivity among the samples was similarly noted in the age group of 21-30 (33.3%) closely followed by 11-20 (30.6%). Among the male population the highest positivity (34.04%) was in the age group of 21-30 while among the females population the highest positivity was in the age group of 21-40 (57.2%). There is no statistically significant difference in positivity to substance abuse

Table 1- Distribution of samples by different age groups.

Age group	Total sample No. (% total)	Total positive No. (% total)	Males		Females		P value
			Total sample	Positive (% of total)	Total sample	Positive (% of total)	
0-10	00 (0)	00 (0)	00	00	00	00	NA
11-20	75 (32.3)	33(30.6)	66	30 (31.9)	9	3 (21.4)	0.72
21-30	84 (36.2)	36(33.3)	78	32 (34.04)	6	4(28.6)	0.39
31-40	35 (15.1)	18(16.7)	28	14 (14.9)	7	4 (28.6)	>0.99
41-50	19 (8.2)	11(10.2)	19	11 (11.7)	0	0(0)	>0.99
51-60	13(5.6)	7 (6.5)	10	5 (5.3)	3	2(14.3)	>0.99
61-70	3 (1.3)	2 (1.9)	2	1 (1.1)	1	1(7.1)	>0.99
>70	3 (1.3)	1 (0.9)	3	1 (1.1)	0	0(0)	>0.99
Total	232	108	206	94	26	14	

Table 2- Mean and Standard deviation of age of the patients.

	Total positives	Males (mean ± SD)	Females (mean ± SD)
All samples	28.66±12.9	28.37± 12.7	31.35± 14.4
All positives	29.9± 13.4	29.84± 12.9	35.07±16.12
Benzodiazepines	33.88±15.03	33.29±14.36	37.44±19.2
Cannabis	24±8.48	24±8.48	NA
Opiates	27.23±8.38	26.2±8.08	37.7±0.71

Table 3- Sample received from different areas of the hospital and their rate of positivity on urine drug screen .

Area of collection	Samples received (% total)	Samples tested Positive (% total in the area)
Emergency department	153 (65.9%)	72 (47.05%)
Intensive care units	68 (29.3%)	31 (45.6%)
Psychiatry ward and OPDs	11(4.7%)	05 (45.5%)
Total	232	108

Table 4- Different types of drugs tested positive on urine drug screen.

	Total	Male	Female
No of drugs tested positive			
0	124	112	12
1	75	64	11
2	24	21	03
3	09	09	00
Percentage of various drugs			
BZO	64 (43.2%)	55	09
TCA	3 (2.02%)	00	03
OPI	21(14.2%)	19	02
MET	02 (1.35%)	01	01
COC	00 (0 %)	00	00
THC	43 (29.05%)	43	00
AMP	02 (1.35%)	01	01
BAR	05 (3.4%)	05	00
PCP	08 (5.4%)	07	01

Cocaine(COC), Amphetamine (AMP), Methamphetamine (MET), Cannabis (THC), Opiates (OPI), Benzodiazepine (BZO), Tricyclic antidepressants (TCA), Barbiturates (BAR),Phencyclidine(PCP) and Methadone(MTD).

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Table 5 - Types of drug combination detected in poly drug abuse cases detected in the study

Combination of drugs detected	Number (% poly drug abusers)	Combinations of drugs detected	Number (% poly drug abuse)
OPI+THC	8 (24.24%)	BZO+OPI+ THC	4 (12.12%)
BZO+THC	5 (15.15%)	BZO+THC+PCP	2 (6.06%)
BZO+ OPI	3 (9.09%)	BZO+OPI+PCP	1 (3.03%)
BZO+TCA	2 (6.06%)	OPI+THC+BAR	1 (3.03%)
BZO+BARB	2 (6.06%)	OPI+MET+AMP	1 (3.03%)
BZO+PCP	1 (3.03%)		
OPI+PCP	1 (3.03%)		
OPI+BARB	1 (3.03%)		
OPI+MET	1 (3.03%)		
OPI+PCP	1 (3.03%)		

Cocaine(COC), Amphetamine (AMP), Methamphetamine (MET), Cannabis (THC), Opiates (OPI), Benzodiazepine (BZO), Tricyclic antidepressants (TCA), Barbiturates (BAR),Phencyclidine(PCP) and Methadone(MTD).

between males and females in any age group (Table-1). Mean age of positive cases in females (35.07±16.12) was higher than males (29.84± 12.9) (Table-2). There were 75 (32.3%) cases where single drug was found in urine drug screen. On the other hand 33 (14.2%) of cases had multiple drugs detected in the UDS, the most probable population of subjects needing hospitalized care i.e. quantum of work for public health workers. Of these 33, 24 (10.34%) patients had two drugs while 09 (3.8%) had three drugs detected in UDS (Table 4). Most of the multiple drug screened patients were males (31/34, 91.2%) while females (3/34; 8.8%) accounted for very small population.

Most common substance of abuse in our study subset was benzodiazepines in 43.2% cases. THC (29.05%) and OPI (14.2%) were the other commonly abused drugs. Other drugs found in our study were TCA, MET, AMP, BAR and PCP. (Table 4) Mean and Standard Deviation of age of BZO abusers was 33.88±15.03 with females having higher mean age than males. THC and OPI users had a much lower mean age of 24 ± 8.48 and 27.23 ± 8.38 respectively than BZO users with a male preponderance. For OPI users females tended to be of a much higher age group than males (Table 2). Among the combination of abused drugs found in urine screen the commonest drug combination consisted of OPI and THC with or without BZO in 36.36 % (12 /33) cases (Table 5).

Discussion :

Substance abuse including both prescription as well as non prescription drugs is a growing menace in developing as well as developed nations. In India although the drugs like cannabis have been known since centuries but the exact extent of the problem is still unknown and further more the proportion of these abusers needing medical care is highly underestimated. Although drug overdose-related deaths attract much public attention, there are substantial number of nonfatal overdoses like cardiac and musculoskeletal problems, aspiration pneumonia, cognitive impairment and hypoxic brain injury, renal dysfunction, and physical injuries sustained during the intoxication event which go unreported.[15]

Screening for drug of abuse is an essential requirement in acute settings to rule out the effect of drugs as a cause of the patients' condition. UDS is a qualitative, low cost, rapid assay but lacks good specificity and/or sensitivity, and can only detect drugs that concentrate in the urine.[16] Furthermore different substances stay in urine for different length of time thus having varying degree of assay specificity for different drugs.[16,17] Thus ideally any positives need to be confirmed by mass spectrometry and gas chromatography.[16,17] But high cost, limited availability of these tests reduces their use in high throughput clinical settings.

In the present study population, males outnumbered females. In other similar studies assessing substance abuse males formed the major part of drug consuming cohort in hospital setting.[18-21] The rate of positivity in the present study was 46.5%. Comparable rate of positivity was also noted by Carrigan et al.[4] i.e 51% in trauma patients in a hospital set up.

Most common drug detected by UDS in our study subset was BZO in 43.2% cases followed by THC and OPI in 29.05% and 14.2% cases respectively. In other studies by Lager et al.[3] and Loiselle J M et al.[22] in emergency and adolescent trauma cases respectively also found the presence of Benzodiazepines in significant numbers. Akosile et al.[23] also found BZO followed by THC commonest drugs detected by UDS in their study on patients attending psychiatric emergency services. However as noted by Radovanovic et al.[24] in a hospital setting presence of BZO in UDS may be much less informative considering its widespread use in patient care due to a large safety margin. In the general population, only about 0.11% (almost 11.8 lakh individuals) is using sedatives in dependent pattern in India.[2] Thus, the number of cases where BZO was found along with other drugs of abuse may be considered as a significant finding, which in our study was 20.4% (22/108).

Many studies like Solan et al.,[25] Akosileet al.,[23] Lager et al.,[3] and Chaoualiet at al.[26] conducted across different continents found Cannibis as a significant proportion of cases i.e. 37%, 40.5%, 34% and 95% cases respectively. Previous hospital based studies in North and South India have highlighted prevalence of cannabis as a drug of abuse in study populations.[27,28] As per the survey conducted in India in 2019 the total number of persons consuming cannabis is 2.8% of population. The use of illicit cannabis derivative in the form of Charas and Ganja is 1.2 % across India which is astonishingly very high in the part of India where the study was conducted (4.5% in Odisha).[2] Further, Odisha, where the present study was undertaken, ranks third in list of states and it has a large population of cannabis users needing health care services.[2]

When prevalence of illicit opium use is compared between global, asian and indian set up the estimates are 0.7%, 0.46%, 2.06% respectively.[2] But Odisha has a much lesser load of opium users than other states of India.[2] In our study also opioid detected by UDS is the as the third commonest substance (14.2%).

Poly drug use is defined as the use of 2 or more psychoactive substances at the same time or sequentially to achieve particular effects.[29] Use of multiple drug cocktails in very difficult for detection using traditional questionnaire method by the clinician. UDS plays a role in rapid detection of multiple substance of abuse

in hospital setting to solve this dilemma. In the present study cannabinoids and opium were the commonest combination used in poly drug abuse. There is a dearth of literature reporting the combination of various drugs of abuse in our country thus requiring further research.

The methodology of screening of drugs in urine carries its own drawbacks as described earlier. Due to the retrospective nature as well as dearth of resources, the confirmation by Gas chromatography/Mass spectrometry and quantitative analysis could not be carried out which may be considered as a limitation of the study.

Conclusion :

As described in the national survey, it is important to find the 'quantum of work' as far as dealing with drug of abuse for which regular UDS in hospitals will aid. UDS is a rapid and low cost, point of care drug screening method and is very valuable tool in resource limited settings. In spite of limitation of this methodology this will help in the acute patient care set up particularly for diagnosis of poly drug abuse. Apart from a high prevalence of BZO the UDS as shown in our study does correlate well with national statistics. The rampant use of BZOs in hospital setting in patient care explains the higher statistics of this drug. We further propose to prospectively use UDS in our set up, follow up the positive patients by WHO-ASSIST tool and find the population needing urgent medical support.

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