



Original Article

Drug screening for psychoactive substance abuse during pre-enrolment medical evaluation

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ABSTRACT

Objectives: Concerns about illicit drug use in the workplace have prompted an increased interest in urinalysis for detecting and preventing drug use. This has led to widespread adoption, driven by technical advancements in testing methods and a growing demand for drug testing. In numerous countries, including the United States (U.S.), pre-enrolment and ongoing drug testing are common practices including in the Armed Forces. The U.S. Navy, in particular, has a rigorous and successful drug testing program for various substances. Contrastingly, the Indian Armed Forces currently do not conduct pre-entry screening for psychoactive drug abuse, and there is a lack of data on the extent of the issue among serving personnel. This study aims to address this gap by screening candidates for pre-enrolment and applying for aviation duties during medical evaluation.

Material and Methods: Employing a urinalysis-based multidrug kit, the study screened 960 candidates in total for multiple drugs of abuse which including amphetamines, barbiturates, benzodiazepines, cocaine, opiates, and cannabis in an anonymous manner.

Results: This study analyzed 960 samples, with 68% from candidates applying for pre-enrolment and 32% from in service candidates seeking aviation roles. Our study result showed a single positive case involved, who was a male candidate applying for pre-enrolment and tested positive for barbiturates, resulting in a 0.1% overall prevalence, with 0.15% in pre-enrolment and none in the in-service group.

Conclusion: Given the extremely low prevalence (0.1%) of drug use identified, and considering the limitations of the methodology, including possible behavioral adaptation and lack of confirmatory testing, routine screening may not be justified at present. However, unannounced or alternative testing approaches may yield more reliable insights into actual prevalence.

Keywords: Drug evaluation, Illicit drugs, Prevalence, Substance abuse detection, Urinalysis

INTRODUCTION

In recent years, the use of illicit drugs in the workplace has shown a marked increase, prompted global concern, and led to widespread adoption of urinalysis for drug detection.^[1,2] Drug testing using urine samples has been implemented across various sectors, including industry and the armed forces, owing to the development of technically simpler methods and growing safety demands.^[3]

The Indian Armed Forces currently do not carry out any pre-entry screening for drug abuse. There is no data on the extent of the problem even in serving personnel. It is not known whether pre-enrolment screening is needed or not. Similarly, whether post-employment routine screening is needed or not. Hence, in this study to determine the prevalence of psychoactive

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substance abuse, we have screened candidates applying for commissioning and as well as in-service candidates applying for aviation duties.

MATERIAL AND METHODS

This study was conducted at a medical evaluation center in North India which conducts pre-enrolment medical evaluations as well as evaluation of in-service candidates. Candidates during medical evaluation for enrolment after clearing pre-requisite examinations and in-service candidates applying for aviation duties in different arms of the Indian Armed Forces were screened.

Candidates' personal particulars like applying for pre-enrolment or in-service candidates along with age and gender were documented. They were informed about the drug testing procedure during their initial medical examination briefing. They were assured about the privacy of the test results and informed consent was taken for the urine drug test. Candidates were instructed to provide a mid-stream urine sample in a private, clean, and well-ventilated sample collection area to avoid contamination. Candidate's identity number was provided and labeled with each urine collection container.

A urinalysis-based multidrug kit [Figure 1] was used for screening of multiple drugs of abuse which including Amphetamines, Barbiturates, Benzodiazepines, Cocaine,

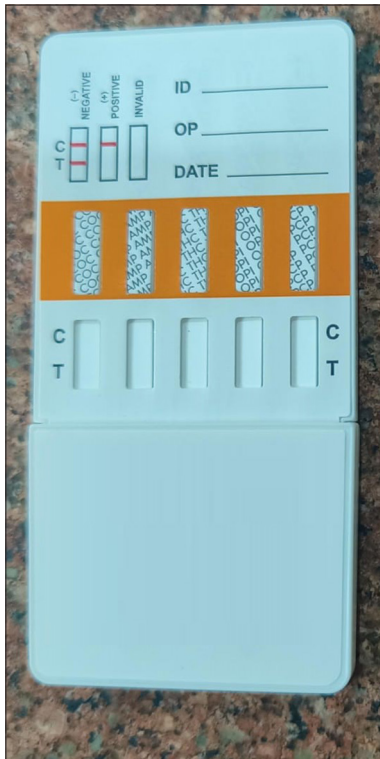


Figure 1: Urine-based multidrug test kit used for the said study.

Opiates, and Cannabis in an anonymous manner. Multidrug test cassettes demonstrate high accuracy, with sensitivity $\geq 95\%$ and specificity ranging from 90% to 99%, depending on the drug class, as per manufacturer data. Immediately after the collection of urine, it was handed over to the laboratory assistant. The test kits were kept at room temperature. Expiration date and integrity of the test kit packaging were checked. Then, test kit was opened and using a dropper, the required amount of urine was applied onto the test device as per the manufacturer's instructions. The timer was started and it was kept for the recommended time for the results to develop.

The results were interpreted as per standard guidelines. Positive result indicated the presence of specific substances and negative result indicated that no substances were detected. If no control line appeared, the test was invalid which implied test did not run correctly. The test results were recorded and documented for further interpretation. The urine sample and test kit components were disposed of according to biohazard waste disposal regulations.

RESULTS

A total of 960 samples were screened over the study period. Out of 960 samples, 650 samples (68%) were from candidates applying for pre-employment commissioning, and 310 (32%) samples were from in-service candidates applying for aviation duties [Figure 2].

The male and female ratio in this study was found to be 3.14. The total number of females in this study was 232 and males was 728. Out of 232 females, in-service candidates were 36 whereas pre-commissioning candidates were 196. Males in pre pre-commissioning group were 454 and in-service group were 274 [Figure 3]. Mean age of the total screened candidates was 22.93 ± 1.44 years in which candidates for commissioning mean age were 22.38 ± 1.17 years and in-service candidates mean age was 24.09 ± 1.27 years

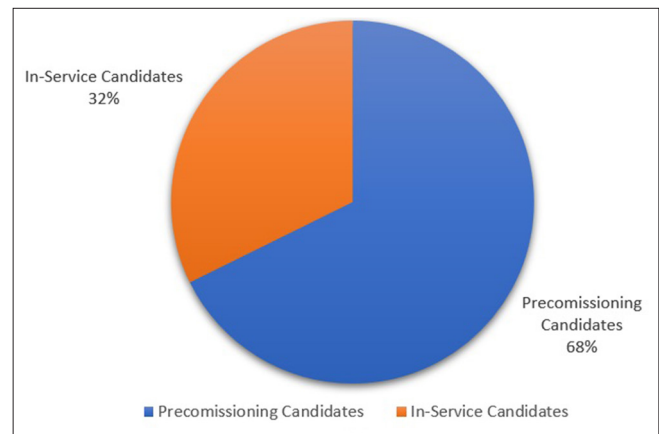


Figure 2: Comparison of pre-enrolment and in-service candidates.

[Figure 4]. Only one candidate during pre-enrolment was found to be positive for barbiturates which showed a prevalence of 1 out of 960 that is 0.1% in total. However, if compared between two arms that is pre pre-commissioning and in-service candidates, it turns out to be 0.15% and nil, respectively [Figure 5]. Prevalence among males is 0.14% whereas in females, it is nil. The individual was a 23-year-old male. No confirmatory testing (e.g., Gas Chromatography-Mass Spectrometry) was conducted for the positive result due to a lack of consent and logistical constraints, which represents a limitation in the study design and interpretation.

DISCUSSION

Pre-enrolment and new entrant drug testing have been widely implemented in the Armed Forces of many countries, including the United States (U.S.). The U.S. Armed

Forces conducts extensive drug testing programs, both for pre-employment screening and random testing of service personnel.^[1] Among these, the U.S. Navy operates one of the most rigorous and effective programs. It manages five drug testing laboratories, processing approximately 1.8 million urine samples annually. At present, these tests screen for cannabinoids, cocaine metabolites, phencyclidine, amphetamines, opiates, and barbiturates.^[1] Alternative assessment tools such as hair analysis, oral fluid testing, or anonymous surveys using validated substance use questionnaires may offer more robust prevalence data, especially in settings where the Hawthorne effect may be significant.

Accurate epidemiological data on drug abuse in India remain limited. Most studies reference a United Nations estimate indicating approximately one million registered heroin users in the country.^[2] More recent research suggests that, following alcohol and tobacco, cannabis, heroin, opium, and hashish are the most commonly used substances. A national survey conducted in 2004 on the extent, patterns, and trends of drug abuse in India identified opiates as the predominant substances of abuse, with users primarily being young males.^[3] In addition, a review article on substance abuse in India highlighted that previous epidemiological studies have largely been regional in scope, making it challenging to derive comprehensive national prevalence estimates.^[4]

Our data suggest that there is a prevalence of around 0.1% of psychoactive drug use among candidates applying for commissioning in the Indian Air Force and commissioned officers selected as aircrew. If we compare it with national prevalence of psychoactive drug use, about 2.8% of the population use any cannabis product, 2.1% of the country's population use opioids, about 1.08% of the population use sedatives, 0.7% use inhalants and other categories of drugs such as, cocaine (0.10%) amphetamine type stimulants (0.18%), and hallucinogens (0.12%) are used by a small proportion of country's population.^[5] Our study group is confined to a smaller age range 22–28 years whereas in the national prevalence data age group is much broader between 10 and 75 years of age. Hence, our study's prevalence is much lesser than national prevalence data.

To ensure a safe and productive work environment, employers may implement pre-employment and post-employment drug screening protocols. In the context of military recruitment, pre-commissioning drug testing is typically conducted as part of the pre-commissioning medical evaluation to assess candidates before their induction. This screening serves to identify substance use among prospective candidates, thereby safeguarding the organization from the potential risks associated with hiring individuals who use illicit drugs.

Post-commissioning drug testing, on the other hand, is conducted among serving personnel and may be implemented for various reasons, including as part of a

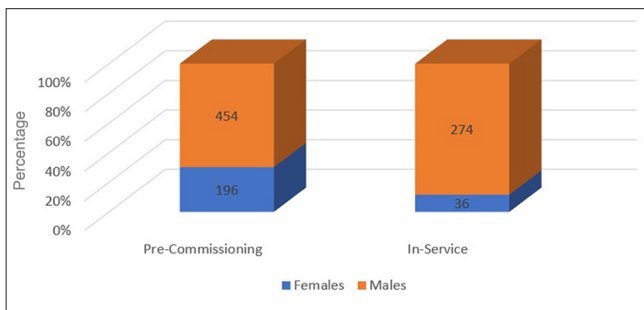


Figure 3: Comparison of gender distribution of the entire study population.

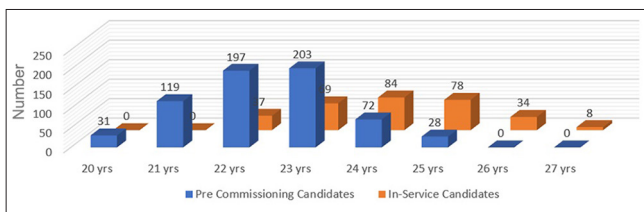


Figure 4: Comparison of age distribution of the entire study population.

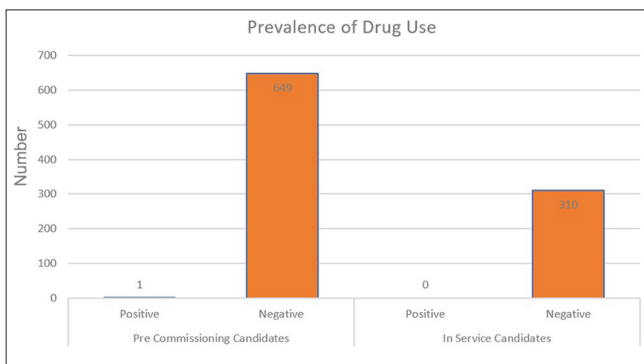


Figure 5: Test results of the study.

random drug testing program, following an accident or incident, or when there is reasonable suspicion of substance use. While both pre- and post-commissioning drug testing play a crucial role in detecting substance use disorders, pre-commissioning testing may be more effective in prevention. By acting as a deterrent, it can discourage individuals who use drugs from applying in the first place, thereby reducing the likelihood of substance use disorders within the workforce.

Medical examination of in-service individuals is being carried out every year, and to clear it, is already a stressful experience where individuals try to change many routine activities before it. Similarly, candidates for pre-employment medical screening are also under a lot of pressure to clear the medical examinations. Hence, screening with infructuous investigations at the time of annual medical examination or during any pre-employment medical examination will only further complicate the medical examination process and not yield true prevalence of psychoactive drug use in the desired population. This awareness may have led to temporary abstinence, thus lowering the detection rate in this study.

CONCLUSION

In recent years, increasing concerns regarding illicit drug use in the workplace have led to a heightened interest in urinalysis as a method for detection and deterrence. Consequently, a study was conducted at a medical evaluation center of the Armed Forces to assess the prevalence of psychoactive substance use among candidates applying for commissioning in the Indian Air Force, as well as in-service personnel selected for aircrew roles across various branches. Urinalysis was performed using a multidrug screening kit to detect psychoactive substances.

Given the extremely low prevalence (0.1%) of drug use identified, and considering the limitations of the methodology including possible behavioral adaptation and lack of confirmatory testing, routine screening may not be justified at present. However, unannounced or alternative testing approaches may yield more reliable insights into actual prevalence.

Ethical approval: The research/study was approved by the Institutional Review Board at AFCME, New Delhi, number as per Appx C of DGAFMS/DG3B Letter no 15985/56/9/2018, dated 5th May 2017.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent.

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Conflicts of interest: There are no conflicts of interest.

Use of artificial intelligence (AI)-assisted technology for manuscript preparation: The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

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