

## Prevalence of Oral and Dental Diseases and Oral Hygiene Practices among Illicit Drug Abusers

Hossain KMS\*, Kakoli AS, Mesbah FB and Mian AH

Department of Community Dentistry, Faculty of Public Health, Bangladesh University of Health Sciences (BUHS) Mirpur-1, Dhaka-1216, Bangladesh

\*Corresponding author: Kazi Md. Sakib Hossain, Department of Community Dentistry, Faculty of Public Health, Bangladesh University of Health Sciences (BUHS) Mirpur-1, Dhaka-1216, Bangladesh, Tel: +8801855181180; E-mail: [kms\\_doc@buhs.ac.bd](mailto:kms_doc@buhs.ac.bd)

Received date: December 15, 2017; Accepted date: February 10, 2018; Published date: February 14, 2018

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### Abstract

**Background:** There has been increasing incidence of addiction to certain illicit drugs amongst people belonging to various strata of society, particularly among young people in Bangladesh, as well as in western countries. Drug abuse results in several direct consequences including multiple physical and mental problems such as cardiac crisis, respiratory depression, liver cirrhosis, nephropathy, infectious diseases such as hepatitis, AIDS, and tuberculosis, injury-associated disability, mental disorders such as depression, and oral health problems. Illicit drugs abusers' health related published data available worldwide but considering the geographical disparity, such as types of drugs, pattern of use, and duration of use, environment and physiology (race) and so on, no study has been performed in Bangladesh. The present study was conducted to evaluate the prevalence of oro-dental diseases and explore attitudes towards oral hygiene practices among a group of illicit drug abusers so that required interventions can be planned for the good health of those who are in addicts with illicit drugs in this region.

**Materials and methods:** This study was comprised of 120 drug addicts admitted in a drug rehabilitation centre in Dhaka, Bangladesh. Data so obtained was subjected to analysis using SPSS version 20.0. Percentage and mean  $\pm$  standard deviation was calculated and Chi-square test was used for statistical analysis.

**Result:** Most of the participants were involved in more than one drug abuse and the most abused drugs were heroin (55.1%), cannabis (ganja) (43.2%) and methamphetamine (yaba) (30.5%). Oral hygiene practices of the drug users were alarming where 76.7% of the participants reported brushing their teeth on an incorrect schedule (Before breakfast/after every meal) and incorrect frequency of time of brushing while only 22.6% of the participant brushed in correct schedule of brushing (After breakfast and before sleep at night). Ignorance about oral health (48%), money-fear (32%) and money-bad experience (25%) are the obstacles for the respondents to visiting a dentist among them. More than two-thirds of drug users were affected by dental caries, with a mean DMFT score of 5.0 (sd 2.29), Bleeding, shallow pockets and deep pockets were found as the highest CPI finding in 68%, 57% and 12% of drug users respectively. Oral mucosal examination revealed gingivitis, xerostomia (dry mouth syndrome) and meth mouth (bruxism, excessive tooth wear, xerostomia, and rampant caries) were 35.8%, 18.3% and 8.3% respectively. Significant relationship was found in case duration of drugs abused with oral health condition.

**Conclusion:** Drug abuse is detrimental to oral health, so abusers need to be more aware of the dangerous effects of drugs.

**Keywords:** Heroin; Yaba; Cannabis; Oral hygiene practices; Periodontitis; Gingivitis; Xerostomia; Meth-mouth

### Introduction

#### Background information

Substance abuse is a disorder characterized by repetitive drug use that results in social or economic distress and is often associated with medical problems. 'Drug addiction' is a chronic, relapsing disorder characterized by compulsion to take a drug and loss of self-control in limiting drug intake [1]. The substances or drugs may be natural or synthetic, but is something that has a psychoactive effect and alters or modifies the functions of a living organism. Globally, the number of drug abusers in 2007 was 200 million, i.e., 4.8% of the global population [2].

Drugs commonly abused are narcotics (including poppy, opium, morphine, codeine, heroin, opioids, meperidine, pethidine, and methadone), cannabis (marijuana, hashish, and dried parts of cannabis plant), stimulants (amphetamines, cocaine), hallucinogens (LSD, phencyclidine, mescaline, and psilocybin), depressants (barbiturates and benzodiazepines), and miscellaneous (antihistaminics, solvents in aerosols, glue, and whitening fluid) [3].

Medical complications of drug use that are relevant to dentistry include abscesses at injection sites, viral hepatitis, Human Immunodeficiency Virus, endocarditis and anaesthesia complications [4]. Studies have shown that the dental health and oral health are affected by drug abuse [5,6]. Drugs abused adversely affect the oral soft and hard tissues (dental caries, periodontitis) or may lead to potentially malignant states (leukoplakia, oral submucous fibrosis) or may predispose to oral infections (candidiasis, gingivitis) by compromising local immunity [7].

The oral health of drugs abusers has received less attention. There are case reports of specific oral changes although epidemiological research shows these changes to be uncommon [8]. High caries experience is seen in heroin users, perhaps caused by a combination of xerostomia caused by opiates and the high sugar content of oral methadone solutions used to manage withdrawal from the drug [9]. Oral cleanliness may also be reduced in opiate users [10]. Oral effects of cocaine are related to administration of the drug via nasal inhalation, smoking and direct smearing on the oral mucosa, especially the gingivae [11]. Cocaine has a vasoconstrictive effect that causes ulceration and atrophy of the tissues. There may also be stimulant effects on the facial and masticatory muscles.

Drug users may also have special needs in relation to receiving dental care. Anecdotally, they may be dentally anxious and have low pain tolerance requiring careful pain relief and a good rapport with the dentist [12]. They are unable to assess their dental need and therefore reluctant to go for a dental treatment [13]. Similar difficulties have been noted in other areas of healthcare. Drug users experience marginalization and avoidance by service providers and perceive services to be unavailable [14].

### Drug abuse: Bangladesh context

Drug abuse is a direct threat to the economy and social aspects of a country. In Bangladesh, it is a national crisis growing every day. People of different age groups, although especially ranging from 18 to 30 years of age, of different professions and of different social status are abusing drugs. There are millions of drug-addicted people in Bangladesh. The rapid increase rate of drug addicts reported in recent epidemiological surveys carried on the three divisions of Bangladesh reflected that this country would very soon turn to a potential venue of drug abuse. Increased criminal activities like hijacking, extortion etc. to collect money for purchasing drugs destroys social security and peace. Immediate stoppage of illicit drug transportation into and within this country is essential to save our population and country from this deadly game [15].

Bangladesh is situated in the central point between the 'golden triangle' (Myanmar, Thailand and Laos) and the 'golden crescent' (Pakistan, Afghanistan and Iran) in terms of geographical location. Bangladesh with its easy land, sea and air access is becoming a major transit point. Traffickers who supply drugs in the markets of Northern America, Africa, and Europe are routing their shipments through Dhaka, Chittagong, Comilla, Khulna, and other routes in Bangladesh. It is believed that with the increasing quantity of the wares more and more people are likely to get involved in drug business. In this way it ultimately contributes to the number of drug abusers as well. To procure money for buying drugs, addict makes himself associated with different criminal groups and commit crimes [16]. In a statistics it is shown that among 253 drug abusers in Bangladesh, 31% were addicted to cannabis, 26% to alcohol, 24% to phensidyl, 10% to heroin and 9% to diazepam, antihistamine etc. The male: female ratio is 20:1. The predominant age groups are: 5% between 10-15 years, 58% between 18-35 years, 20% between 35-50 years and rest were above 50 years of age [17].

However, there has been sufficient published data available in related to the prevalence of oral health of drug abusers in worldwide but considering the geographical disparity, such as types of drugs, pattern of used, duration of used, environment and physiology (race) and so on, no study has been performed in Bangladesh.

Evaluation of the prevalence of oral health of drug abusers is important on many fronts: Bangladesh is a developing country where disease burden is enormous and availability of curative treatment is quite inadequate compared to what is needed. Prevention is better than cure. But data related to overall oral health status of drug abusers is insufficient in our country, clinician's awareness level about oral health is very low, thus the present study was conducted to (1) examine the prevalence of oral health status; and (2) estimate common oral health practices among drug abusers in selected rehabilitation centers in Bangladesh. It may provide information on the underlying pathological processes, signs and symptoms of oral diseases associated with drug abuse, thus may help to clinicians to identify such drug abuser from patient reported symptoms and thus facilitate more comprehensive and multidisciplinary prevention approach to the management of addictions.

## Material and Methods

### Study design

Identifying drug abusers in the population can be difficult with co-operation and compliance being additional problems. This is overcome by recruiting subjects from drug rehabilitation centers purposively. This study was conducted using cross-sectional study design.

### Study areas

In Bangladesh there are no precise figures of the drug dependent people, but it is estimated that around 4.0 million people are dependent on some form of drugs, and increased trend among all kinds of people are alarming. Comparing to this situation there are still very few treatment and rehabilitation facilities in the country. However, the study populations of illicit drug abusers were enrolled from drug treatment and rehabilitation center admitted for treatment of drug dependence.

### Study population

The population of the study is comprised of drug abusers who are attending for treatment of drug dependence in rehabilitation centre. Persons who are/were using any illicit drugs and are presently undergoing treatment for drug dependence at rehabilitation center were included in the study.

### Size of sample

The sample size was calculated using following formula

$$N = \frac{Z^2 [P(1-P)]}{E^2} = \frac{(1.96)^2 [0.91(1-0.91)]}{(0.05)^2} = \frac{3.84 \times 0.91 \times 0.09}{(0.05)^2} = 126 (\text{Calculated sample size})$$

Where N= Sample size

Z= Two sided normal variate value at 95% confidence level (1.96)

P= Estimated prevalence of oral diseases=91% based on the prevalence of oral diseases in illicit drug users reported in a previous study in Delhi [18];

E= Permissible error=5%.

Feasible sample size is around 120. (Based on availability of drugs abusers).

### Data collection instrument, tools and technique

For the clinical examination, a modified WHO assessment form (1997) [19] was used. A semi-structured questionnaire translated into Bengali language was administered. The questionnaire consisted of (1) socio-demographic factors (age, education, and occupation/profession); (2) history of drugs abused assessed were types of drug; (3) oral health habits (tooth brushing, other oral hygiene aids, and dental visits); (4) Open question- to assess their attitudes towards oral hygiene, dental treatment and overall health and (5) assessed prevalence of oro-dental diseases by WHO ORAL HEALTH ASSESSMENT FORM (1997) MODIFIED. Data was collected in two ways using:

- A semi-structured questionnaire: The participants were interviewed about their age, level of education, occupation, history of drug uses, oral habits etc. (SECTION-A TO SECTION-D).
- A data capture sheet for a Clinical oral examination using modified WHO Oral Health Assessment 1997 Guidelines (SECTION-E). DMFT, periodontal disease and oral mucosal lesions were recorded.

### Scoring of oral health conditions

For the researcher's convenience the oral health status was classified in 2 categories healthy (score less than 1) and Unhealthy (score more than 1). The criteria which were evaluated in the proposed scoring were based on the status of the oral tissues in disease and health. The investigator rated the oral status of the subjects as follows: Score 0=If healthy dentition, no decayed, no missing and restored teeth, healthy periodontium and healthy oral mucosa. Score 1=If less than 25% decayed, missing and abrasion teeth, mild gingivitis mild periodontitis are present. Score 2=If more than 25% and less than 50% decayed, missing and abrasion teeth, moderate gingivitis and moderate periodontitis, xerostomia are present. Score 3=if more than 50% decayed, missing and abrasion teeth, severe gingivitis, severe periodontitis and oromucosal lesion are present.

### Results

Figure 1 shows among the respondents 12.5 % were below 20 years, 43.3 % were of 20 to 29 years, 18.3 were of 30 to 39 years and 25.8% were of above 40 years old.

Figure 2 shows that most (39.9) respondents had completed graduation or above, 33.4% had intermediate (12th class) and 26.7% had no formal education.

Figure 3 shows the distribution of the respondents by abuse of drugs. Almost all were poly-drug abusers, abusing more than one drug. However, the most commonly used category of drugs was heroin were 55.1%. Second most abused drug was cannabis (ganja) were 43.2%.

Methamphetamines (yaba) were 30.5%. Alcohol and phensydid were 10.4% and 11.9% responses among the respondents.

Table 1 shows the oral hygiene practices among the respondents.

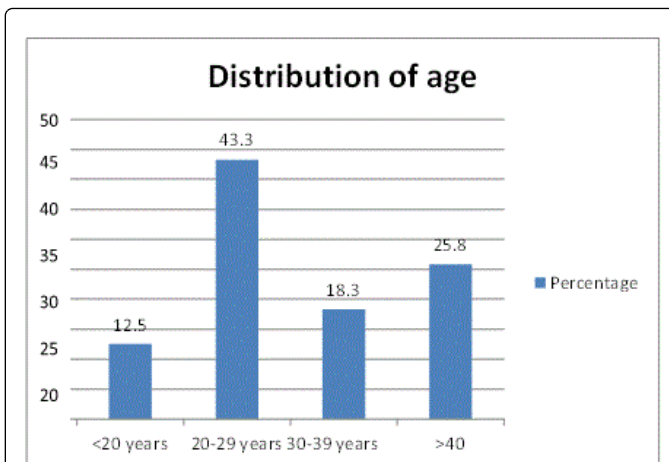


Figure 1: Distribution of respondents according to their age.

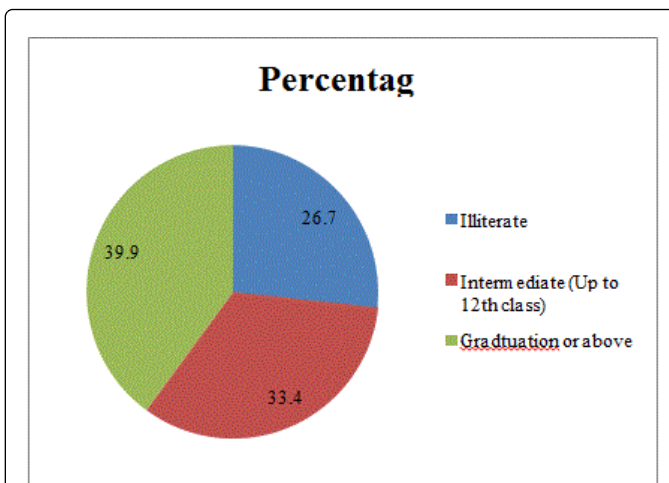


Figure 2: Distribution of respondents according to their level of education.

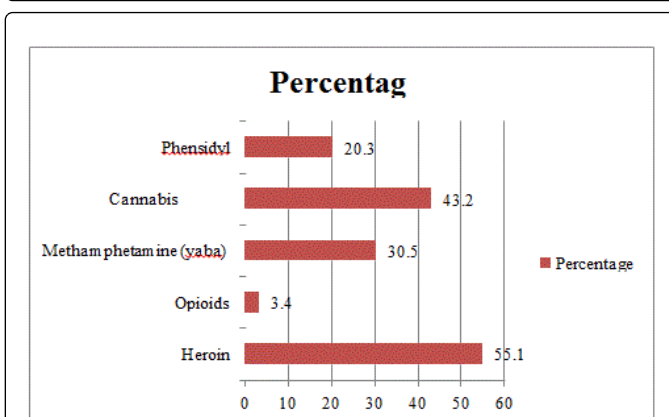


Figure 3: Distribution of the respondents by the types of drugs abused (Multidrug abusers).

Third-fourth (76.7%) of the participants reported brushing their teeth on an incorrect schedule (Before breakfast/after every meal) and incorrect frequency of time of brushing while only 22.6% of the participant brushed in correct schedule of brushing (After breakfast

and before sleep at night). Ignorance about oral health (48%), money-fear (32%) and money-bad experience (25%) are the obstacles for the respondents to visiting a dentist among them.

		Frequency (Percentage)
Schedule of cleaning teeth	Before breakfast/After every meal (Incorrect schedule)	92 (76.7)
	After breakfast and before sleep at night (Correct schedule)	28 (22.6)
Material used for cleaning teeth, n (%)	Toothpaste	98 (81.7)
	Toothpowder and others*	22 (18.2)
Frequency of cleaning teeth, n (%)	Once/three/more than three times a day (Incorrect frequency)	92 (76.7)
	Twice a day (Correct frequency)	28 (22.5)
Factor determine the frequency of visiting dentist	Money and Bad Experience	30 (25)
	Money and fear	39 (32)
	Ignorance	58 (48)

**Table 1:** Oral hygiene measures among illicit drug abusers. \*Other=Coal powder, tobacco powder, salt, oil, neem leaves.

The oral health statuses of drug abusers are presented in Table 2. More than two-thirds of drug users were affected by dental caries, with a mean DMFT score of 5.0 (sd 2.29). Bleeding, shallow pockets and deep pockets were found as the highest CPI finding in 68%, 57% and 12% of drug users respectively. Oral mucosal examination revealed gingivitis, xerostomia (dry mouth syndrome) and meth mouth (bruxism, excessive tooth wear, xerostomia, and rampant caries) were 35.8%, 18.3 and 8.3 respectively.

Table 3 shows that Xerostomia or dry mouth was observed mostly in heroin (10.7%) and yaba (15.5%) abusers and methmouth in (8.3%) yaba and heroin abusers. Leukoplakia or pre-cancerous lesion mostly observed in cannabis (8.3%) and heroin abusers (8.3%). Table 4 shows significant relationship was found in case duration of drugs abused with oral health condition (Table 4).

## Discussion

The sample size of this study was determined using prevalence of dental diseases in drug users reported in a previous study [18] and consecutive sampling was used. This method of sampling, though a non-probability sampling technique, allows every available subject to be included. The sample in this study represents a young and predominantly male population which reflects the demography of those in drug rehabilitation programs. The fact that on average the participants of this study began abusing drugs at 19 years of age confirms that drug abuse is a problem which begins in teenage years (United Nations Office on Drugs and Crime [2]).

The sample in this study represents a young (teenager) with 43.3% of 20 to 29 years, 18.3% of 30 to 39 years old, and predominantly a male population which reflects the demographic of those in drug rehabilitation programs [20].

The major drugs used were heroin (opioids), cannabis (ganja) and amphetamine-type stimulants rather than cocaine or other in

Bangladesh. The most commonly used category of drugs was heroin were 55.1% and second most abused drug was cannabis (ganja) were 43.2% and methamphetamines (yaba) were 30.5% among the respondents. Ray R (2004) [21] found alcohol, cannabis, heroin and opium were the common drugs of abuse for target communities in various parts of India which is almost a similar pattern of drug abuse in our study.

The present study found poor oral health status and negligence for oral hygiene practices among drug addicts. Oral hygiene practices of the drug users were alarming with more than three-quarter of the respondents (76.7%) cleaning their teeth in a wrong schedule. Poor oral hygiene practices may be due to the lack of concern for overall personal hygiene, resulting from drug dependents, consumption and withdrawal [22]. Ignorance (48%), money-fear (32%) and money-bad experience (25%) are the main obstacle for the respondents to visit a dentist. Use of dental services was inhibited by low priority for oral health, low self-esteem, addiction state, needle phobia, ability to self-medicate and organizational factors in their lifestyles. Most of the participants told, reason for dental visit was their broken tooth. Similarly, Robinson PG et al., reported that a number of participants said that they frequently ended up in hospital casualty departments because of accidents.

Analysis of the individual components of mean DMFT value showed that the mean number of decayed teeth (3.4, sd 2.5 and range 0-7) constituted the major part of the index, indicating high caries prevalence among the drug users. Significantly lower numbers of filled teeth (mean 0.3) was recorded amongst drug users, suggesting that drug abusers rarely received comprehensive dental care.

This indicates that in addition to poor oral health and corresponding needs, they have difficulty in accessing dental services.

Oral health status		Frequency (Percentage)
Dentition status	DMFT Mean (SD)	5 (2.29)
	Median (Range)	5 (1-10)
	Decayed teeth, Mean (SD)	3.4 (1.8)
	Median (Range)	3 (0-7)
	Missing teeth (due to caries) (M) Mean (SD)	1.29 (1.7)
	Median (Range)	1 (0-6)
	Filled teeth (F), Mean (SD)	0.3 (0.7)
Periodontal status	Median (Range)	0.0 (0-4)
	Presence of calculus	55 (46)
	Bleeding on probing	82 (68)
	Presence of shallow pockets	68 (57)
Oral health condition	Presence of deep pockets	15 (12)
	Healthy	23 (19.20)
Status of oral mucosa	Unhealthy	97 (80.8)
	Healthy	35 (29.2)
	Gingivitis and preiodontitis	43 (35.8)
	Xerostomia*	22 (18.3)
	Leukoplakia*	10 (8.3)
	Meth mouth*	10 (8.3)

**Table 2:** Oral health status of drug users. \*xerostomia= dry mouth (loss of salivation), Leukoplakia= a white patches on oral mucosa called pre-cancerous lesion, methmouth= bruxism, excessive tooth wear, xerostomia, and rampant caries.

Status of the Oral Mucosa	Heroin	Injectable opioids	Yaba	Ganja	Phensydil
Xerostomia	9(10.7%)	-	13(15.5%)	4(4.8%)	2(2.4%)
Leukoplakia	7(8.3%)	2(2.4%)	-	7(8.3%)	3(3.6%)
Methmouth	7(8.3%)	-	7(8.3%)	-	-
Total	65	4	41	72	24

**Table 3:** Status of oral mucosa among the respondents.

The periodontal status of the drug users was found poor. Analysis of community periodontal index (CPI) of treatment needs indicates that majority of the drug users have bleeding pocket (68%) and 57% of the respondents had shallow pocket (4-5 mm) and they needs professional plaque control (scaling and polishing). 12% drug users needs deep scaling, root planning and surgical procedure. This may be attributed to their poor oral hygiene and concomitant heavy use of tobacco. Further, addictive drugs, particularly opiates have been found to impair cell division, thereby tilting the balance towards breakdown of tissue and failure to achieve repair and regeneration [23]. The results also showed that only 19.20% had healthy oral health other 80.8% had unhealthy oral health condition. Significant relationship (at the level of

significance at  $p < 0.05$ ) was found duration of drug abused with oral health condition.

### Conclusion

Drug abuse is a major cause of multiple physical and mental problems such as cardiac crisis, respiratory depression, liver cirrhosis, nephropathy, infectious diseases such as hepatitis, AIDS, and tuberculosis, injury-associated disability, mental disorders such as depression, and oral health problems. The number of drug abusers in Asia is sharply rising. The incidence of addiction to certain drugs in

Bangladesh is alarming particularly amongst young people in our country.

In this study most of the participants could not complete their education. Most of the participants were in the low income group. Study showed that majority of the respondents was addicted to heroin, cannabis (ganja) and/or yaba for a long time. I have also noticed that the majority of the respondents did not maintain their oral health practice properly.

Types of drugs	Healthy	Unhealthy	Chi value	p-value
<b>Heroin</b>				
User (n=122)	13 (12.46%)	52 (52.54%)	0.636	0.8
Non-user (n=33)	10 (10.45%)	45 (44.46%)		
<b>Methamphetamine (Yaba)</b>				
User (n=36)	10 (6.9%)	26 (29.1%)	2.461	0.116
Non-user (n=84)	13 (16.10%)	71 (67.90%)		
<b>Cannabis</b>				
User (n=52)	6 (11.70%)	46 (40.30%)	6.323	0.011
Non-user (n=68)	21 (15.30%)	47 (52.70%)		
<b>Duration of abused of drugs</b>				
Up to 5 years(n=68)	17 (13.03%)	51 (54.97%)	3.446	0.0633
More than 5 year(n=52)	6 (9.97%)	46 (42.03%)		

**Table 4:** Associated determinants among subjects types of drugs with Oral Health Condition. \*2-test was used. The level of significance at  $p < 0.05$ .

Teeth cleaning practice showed that all respondents cleaned their teeth once in a day, which is not a healthy practice. For getting maximum benefit by oral hygiene practice one should brush his teeth twice daily with a tooth brush and tooth paste. Regular use of mouth wash and dental floss will give extra protection for oral health. However, this study described that drug abusers oral condition was not healthy.

Based on findings from this study we can conclude that drug abusers had inferior oral hygiene practices and as a consequence poorer oral hygiene and worse gingival, periodontal and mucosal health; higher caries experience; and higher prevalence of xerostomia, meth mouth and leukoplakia. A large proportion of oral diseases may be preventable among drug abusers through proper prevention and rehabilitation of oral health and also cessation of drugs among them. The changing attitude can be occurred by giving adequate information and motivation to the respondents. So dental health education is needed focusing on special needs of population to improve their quality of life expectancy.

## References

- Braunwald E, Fauci AS, Kasper DL, Hauser SL, Longo DL, et al. (2003) editors. *Harrisons Principle of Internal Medicine*. Alcoholism and drug dependency, Messing RO. 15th ed. McGraw-Hill. pp: 2557.

- World Drug Report (2007) United Nations Office on Drugs and Crime publication. Geneva pp: 30.
- World Drug Report (1997) United Nations Office on Drugs and Crime publication. Geneva pp: 34-38.
- Meechan JG (1999) Drug abuse and dentistry. *Dental Update* 26: 182-187.
- Parrott AC, Sisk E, Turner JJ (2000) Psychobiological problems in heavy 'ecstasy' (MDMA) polydrug users. *Drug Alcohol Depend* 60: 105-110.
- Robinson PG, Acquah S, Gibson B (2005) Drug users: oral health-related attitudes and behaviours. *British Dental J* 198: 219-224.
- Thavarajah R, Rao A, Raman U, Rajasekaran ST, Joshua E, et al. (2006) Oral lesions of 500 habitual psychoactive substance users in Chennai, India. *Epub* 51: 512-519.
- Du M, Bedi R, Guo L, Champion J, Fan M, et al. (2001) Oral health status of heroin users in a rehabilitation centre in Hubei province, China. *Commun Dent Health* 18: 94-98.
- Angelillo IF, Grasso GM, Saggiocco G, Villari P, D'Errico MM (1991) Dental health in a group of drug addicts in Italy. *Commun Dent Oral Epidemiol* 19: 36-37.
- Molendijk B, Ter Horst G, Kasbergen M, Truin GJ, Mulder J (1996) Dental health in Dutch drug addicts. *Community Dentistry and Oral Epidemiology* 24: 117-119.
- Parry J, Porter S, Scully C, Flint S, Parry MG (1996) Mucosal lesions due to oral cocaine use. *Br Dent J* 180: 462-464.
- Sainsbury D (1999) Drug addiction and dental care. *N Z Dent J* 95: 58-61.
- Sheridan J, Aggleton M, Carson T (2001) Dental health and access to dental treatment: a comparison of drug users and non-drug users attending community pharmacies. *Br Dent J* 191: 453-457.
- Ortiz A, Soriano A, Galvan J, Rodriguez E, Gonzalez L, et al. (1997) Characteristics of cocaine users their perception and their attitude towards treatment services. *Salud Ment* pp: 8-14.
- Shazzad MN, Abdal SJ, Majumder MSM, Sohail JUA, Ali SMM, et al. (2013) Review Article: Drug Addiction in Bangladesh and its Effect. *Medicine Today* 25: 84-89.
- Simpson DD, Joe GW, Dansereau DE, Flynn PM (2010) Addiction treatment outcomes, process and change. *Addiction* 10: 1360-1369.
- Shamim SB (2005) A study on drug abuser in mohakhali slum. *J BIDS* 13: 13-18.
- Rooban T, Rao A, Joshua E, Ranganathan K (2008) Dental and oral health status in drug abusers in Chennai, India: A cross-sectional study. *Journal of Oral and Maxillofacial Pathology* 12: 16-21.
- World Health Organization (1997) *Oral health surveys-Basic methods*. 4th edn. Geneva: World Health Organization.
- Cheung YW, Ch'ien JM (1999) Previous participation in outpatient methadone program and residential treatment outcome: a research note from Hong Kong. *Subst Use Misuse* 34: 103-118.
- Ray R (2004) *The Extent, Pattern and Trends of Drug Abuse in India-National Survey*. New Delhi: Ministry of Social Justice and Empowerment, Government of India and United Nations Office on Drugs and Crime. [www.unodc.org/india/national\\_survey.html](http://www.unodc.org/india/national_survey.html)
- Jaffe JH (2000) *Substance-Related Disorders*. In: Sadock, B.J. and Sadock, V.A.: *Kaplan and Sadock's Comprehensive Textbook of Psychiatry*. Volume 1. 7th edn. Philadelphia: Lippincott Williams and Wilkins.
- Reece AS (2007) Dentition of addiction in Queensland: poor dental status and major contributing drugs. *Aust Dent J* 52: 144-149.