

Abusing Illicit Drug: Systemic and Orofacial Health Complications**Mohamed A Bassiouny (PhD, DMD, MSc, BDS)***Professor of Restorative Dentistry, Temple University School of Dentistry, Philadelphia, PA****Corresponding author**

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Illicit drugs are everyone's problem in the US. It poses great challenge to dental health care professionals who are in the front-line contact with the public, and will inevitably encounter drug users among their patients. For their own safety and for the benefit of their patients, it is imperative that among their armamentaria should include knowledge of current drug crises, and adverse effects of these drugs on systemic and orofacial health. The objective of this communique is to provide a comprehensive review of this subject.

Keywords: Abuse and availability, Dental, Illicit drugs, Orofacial complications including nasopharynx, Oral, Periodontal manifestations, Route of administration and Systemic complications**Introduction**

Illicit drug use has plagued global societies since the dawn of the twentieth century [1]. Multiple illicit drugs, including crack/cocaine, heroin, methamphetamine, and opioids are currently found in abundant supply in the US. The non-medical use of prescription psychotherapeutics medications, including pain relievers, tranquilizers, stimulants, and sedatives can also be abused. Methamphetamine availability has swept across the US from the western and midwestern regions, while cocaine use has remained relatively stable at a high level since 2009 [2-5]. Overdose deaths from drug category that includes methamphetamine increased 7.5 times between 2007 and 2017 [6]. Meanwhile, the number of people using heroin for the first time rose from 90,000 in 2006 to 170,000 in 2016, nearly doubled [7,8].

Recently, traces of fentanyl (synthetic opioid) have been found in many other illegal drugs such as heroin. Because of the strength of fentanyl (50 to 100 times more powerful than morphine), overdosing is more likely, which presents a serious public health concern [9]. In 2018, 10.3 million people misused opioids, including prescription opioids and heroin, with two million reporting an opioid use disorder (OUD) [10]. The National Institute on Drug Abuse survey (January 2014) of the American household indicated that "one in eight Americans has used a drug other than alcohol for non-medical use" [11]. These statistics demonstrate the widespread use, and severity of illicit drug epidemic nationwide. Crack/cocaine use remains high, while methamphetamine abuse spread from Hawaii eastward, through rural and urban communities of the

US [12]. Heroin abuse has gained foundations, especially among young adults in rural communities and inner-city populations [13].

Routes of Administration

Cocaine is a schedule II drug, a powerful addictive stimulant that has high potential for abuse. It is supplied as cocaine hydrochloride salt, a fine, white crystalline powder known on the street as "Coke", "C", "Snow", "Powder", or "Blow". It may be adulterated or "cut" with cornstarch, lactose, talcum powder, plaster of Paris, flour, borax, or baking soda to increase the volume and seller profits. It may also be combined with procaine, amphetamine, or heroin (known as a "Speedball") to presumably double the "rush" [13-15]. "Crack" is refers to crackling sound heard when it is smoked and is the street name given to freebase cocaine (mixture of cocaine and baking soda). The term "crack" was first recognized by the street research unit of NY in December 1983. This drug is commonly used alone but may also be combined with PCP (Phencyclidine Hydrochloride), formaldehyde, or LSD and smoked [15]. This mixture is referred to as "cooking up spoons" or "space basing" [16].

Cocaine users smoke, inject (intravenously), or snort the drug by sniffing a line of powder, and may, alternatively, rub it on their gingival mucosa (trans-mucosal route). The route of intake governs the rate of absorption into the blood stream and subsequently the speed of onset of the effect on the brain's pleasure center. Euphoria is created by inhibition of dopamine reuptake into the neurons.

Methamphetamine is a powerful, highly addictive schedule II CNS stimulant. It takes the form of a white, odorless, bitter-tasting crystalline powder easily dissolved in water or alcohol and is known on the street as "meth", "blue", "ice", or "crystal" [17,18]. Methamphetamine is legally prescribed in very low doses, for the treatment of ADHD and as a short-term component of weight-loss treatment [18]. Methamphetamine comes in several forms and can be smoked, injected, snorted, or orally ingested. The former two routes put the drug into the bloodstream and the brain very quickly, causing an immediate intense "rush" or "flash" that lasts a few minutes. Snorting produces euphoria or a high within 3 to 5 minutes, while oral ingestion 15 to 20 minutes [19].

Heroin is an illegal, highly addictive drug processed from morphine, a naturally occurring substance extracted from the seed pod of certain varieties of poppy plants. It originated in South America and Southeast Asia and is typically sold as a pure white or brownish powder that is "cut" with sugar, starch, powdered milk, or quinine, and can be snorted or smoked [20]. Another common form of heroin, predominantly produced in Mexico, is known as "black tar" which is sticky like roofing tar or hard like coal [20]. This impure form is usually dissolved, diluted, and injected into veins, muscles, or under the skin.

Prescription medications are often used by drug abusers, whether for legitimate purposes or not. The most frequently used prescription drugs are analgesics, and psychiatric drugs used to treat depression, bipolar disorders, hyperirritability, anxiety, psychosis, convulsions, and seizures. Bronchodilators and anti-hypertensive medications are widely used by the public in general, but with a considerably higher frequency among illicit drug users. Detoxification medications are almost exclusively used by the latter group.

Exploring Health History

Many illicit drug users present to dental offices seeking emergency care. The patient's systemic health history, prescription medications, use of multiple drugs, vital signs, weight loss or suppressed appetite, and food and beverage intake including alcohol consumption should be identified and documented. A high priority should be given to cardiovascular or pulmonary events, emergency room visits, or hospitalizations. Time and reason for the last dental visit, recent extractions, and abnormal post-operative bleeding should be explored. History of gingival bleeding, mobile teeth, remaining roots and associated pathologies should also be investigated.

Systemic Complications

The occasional use of illicit drugs may not produce obvious signs or symptoms, although, acute manifestations of allergic reactions to local anesthetics or anaphylactic reactions to adulterants can be fatal. Excessive post-operative bleeding and cellulitis, and loss of sense of smell, nosebleed, difficulty swallowing and hoarseness can develop due to "Snorting" of cocaine [21]. Chronic abuse may be associated with systemic as well as local side effects [22]. Prolonged smoking of crack/cocaine can damage the lungs and worsen asthma, while irritation of nasal septum may lead to chronic

inflammation and runny nose [14]. Significant impairment, including health problems, disability and/or failure to meet responsibilities at work, school, or home, as a result of drug abuse might be manifested [5]. Intravenous injection users frequently display puncture marks called "tracks", most commonly in the forearms. These individuals are often at risk of contracting HIV and hepatitis C [23]. Ingestion of cocaine may block parasympathetic action, as a result, the body prepares for "fight or flight", evidenced by dilation of the pupils, increased respiration rate, increased blood pressure, increased heart rate and increased blood flow to the skeletal muscles, while slowing of visceral functions [24,25]. The effect of cocaine appears almost immediately after a single dose and disappears within a few minutes to an hour, while the effect of methamphetamine lasts a few minutes. Small amounts of cocaine usually make the user feel euphoric, energetic, talkative, mentally alert, and hypersensitive to light, sound, and touch. The drug can also temporarily decrease the need for food and sleep, depending upon the route of administration [14]. The faster the drug is absorbed, the more intense the high, and the shorter the duration of effect.

Multiple cocaine users also regularly consume alcohol, a potentially harmful combination producing coca-ethylene, which can potentiate the toxic effects of cocaine and alcohol on the heart [26]. The combination of cocaine and heroin is extremely dangerous because the stimulating effects of cocaine are offset by the sedating effects of heroin. This can lead to the user taking a high dose of heroin without initially realizing it, which subsequently slows down or stops respirations. Long-term cocaine abuse has also been associated with increased risk for stroke, seizures, and other neurological problems such as intracerebral hemorrhage due to its sympathomimetic effect [27].

Methamphetamine can cause immediate increased activity and talkativeness, decreased appetite, and a pleasurable sense of well-being or euphoria [28]. Methamphetamine-containing products are popular among students as study drugs used to boost energy and promote alertness. Abuse of this drug can have many negative effects, including difficulty feeling any pleasure other than that provided by the drug which can potentially fuel further abuse and addiction. Long term users may exhibit symptoms including significant anxiety, confusion, insomnia, mood disturbances, and violent behavior [29]. They may also display a number of psychotic features, including paranoia, visual and auditory hallucinations, and delusions (e.g. sensation of insects creeping under the skin) [30].

Chronic heroin users may develop a variety of medical complications, including insomnia, constipation, lung complications (e.g. pneumonia, tuberculosis, and depressed respiration), and may experience mental disorders, such as depression and antisocial personality. Men often struggle with sexual dysfunction, while women may suffer irregularity of menstrual cycles. Chronic injection of heroin causes scarred and/or collapsed veins, bacterial infections of the blood vessels and heart valves, boils, and abscesses. Infections with hepatitis B, C, and HIV, and a host of other blood-borne

viruses that can be passed on to sexual partners and children are possible. The non-soluble additives in street heroin may result in immune reactions, obstruction of blood vessels, leading to damage of the lungs, liver, kidneys, and brain.

Oro-facial and Dental Complications

A thorough head and neck examination, including general observation of the head and neck including skin, eyes, eye lids, nose, lips, angle of the mouth, TMJ, salivary glands, thyroid gland, and lymph nodes, should be conducted.

Nasopharynx

Individuals may experience mild stuffiness, nasal discharge, sore throat, earache, or difficulty swallowing due to inflammation of the nasopharynx. In advanced cases, nasal insufflation of cocaine powder may also produce ischemic-induced necrosis of the nasal mucous membrane leading to multiple complications, including rhinitis, crusting, sinusitis, epistaxis, and even ossification and necrosis. Perforation of the nasal septum is rare (seventeen cases reported throughout the last century), and necrosis of the palate, orbital and nasal bones have also been documented [22,31]. These events can occur within three weeks from start of snorting [32].

In a recent study, almost half of cocaine users reported temporomandibular disorders, more than double that of the non-users (46% vs. 21%) [33]. These findings concur with those of Winocur et al. (2001) who concluded that long-term illicit drug addiction can have detrimental effects on the stomatognathic system [34]. It was also indicated in a report by Friedlander et al. (1988) that persons who were frequently intoxicated with cocaine tended to display signs of severe bruxism such as flat cusps and abnormal wear facets on cusp slopes of the premolar-molar region [35]. Cocaine users also frequently complained of myofascial pain dysfunction [35]. The significant number of teeth lost and/or severely damaged dentition often found in drug dependents can alter chewing efficiency and create imbalance of occlusion, adding more etiologies to existing myofascial pain symptoms. Bilateral masseter muscle hypertrophy can also develop either alone, or in combination with alcohol-induced parotid gland enlargement producing a “chipmunk-like” appearance [36].

Dry Mouth

Illicit drugs are sympathomimetic-producing pharmaceuticals that can have adverse effects on salivary glands, either by direct sympathomimetic central effect or indirect actions of drug intoxication on central nervous system that leads to depression. This phenomenon can take place due to cocaine decreases blood flow to the salivary glands leaving these patients to suffer from severe xerostomia and psychiatric disorders [36]. Significantly higher frequency of dry mouth incidence among cocaine-dependent group (90%) was reported compared with control group (5%) [33].

Furthermore, the predominantly used medications by illicit drug users are analgesics, psychiatric medications, antihypertensives,

antiacids, and bronchodilators. The former four as well as corticosteroids, antihistamines, and anti-Parkinson medications that are commonly used by illicit drug users can also cause xerostomia. The high frequency of dry mouth among illicit drug user explains, among other etiologies, the bad taste and odor (halitosis) as well as the periodontal and dental complications frequently associated with this population [33].

Periodontal Health

Negligence of systemic health and oral hygiene, unhealthy nutritional habits, consumption of high caloric snacks and acidic beverages, disturbance in electrolyte balance among drug addicts could complicate systemic and oral manifestations. High scores of plaques, calculus, and gingival indices, deep pockets, alveolar bone loss, furcation involvement, periodontal pathosis and higher number of loose teeth were found associated more with illicit drug abusers (Figure 1) [35]. The incidence of abscess formation was ten times higher for cocaine users compared with non-users. The risk of hyperkeratosis among illicit drug user was found elevated, suggesting the possibility of tobacco chewing, smoking, or rubbing the drug powder against the gingival mucosa [33].

Hard Tissue

Comparing the cocaine users with the non-user group, the average number of missing teeth were found more than twice, the number of carious lesions (three times) and number of retained roots (33 times), and frequency of occurrence of pulpal involvement per person (six times) (see Figures 2 and 3) [33]. Finally, the average number of apical rarifying-osteitis per person among cocaine users was seven times that of the non-users, while the average number of restored teeth for the latter group was one and half times that of the user group [33].

Helpful Remarks

Considering the epidemic nature of crack/cocaine, methamphetamine, and heroin abuse at the national and global levels, cohesive information available on the systemic and oral manifestations of illicit drug abuse are relatively dispersed, scarce and incomprehensive, hence, the objective of this report. Illicit drug users are often reluctant to disclose their recreational drug activities due to the associated social stigma, thus a formal self-response questionnaire becomes unreliable. The dental visits of illicit drug users are often limited to emergency need only for relieving pain or extraction (Figures 1, 2 and 3). This stemmed from deep-seated belief of “no hope”, shortage of funds, and dependence on analgesics and antibiotics to maintain the status quo. Toothache is a common complaint among drug abusers, often used as a legitimate cause to obtain legal prescription medications from unsuspecting dentists. Many of the drug users display lack of compliance, exhibits hyperirritability during routine dental visit, and erratic attendance. Therefore, it is important to consider simplifying treatment plan that should basically be limited to alleviating pain, eradicating infection, and restoring function. Referral to appropriate specialist, subject to the patient’s consent, should be considered.



Figure 1: Oral pantograph of a 60 years old African American Male addicted to Cocaine



Figure 2: Oral pantograph of a 67 years old African American Male addicted to Heroin and Cocaine



Figure 3: Lateral view of dentition of 54 years old Hispanic Female addicted to Methamphetamine

The occasional use of illicit drugs may pass undetected without obvious signs or symptoms. However, an acute reaction that may occur in the dental office could prove to be fatal, placing a high responsibility on dental professional alertness. Chronic abuse of these illicit drugs can result in a spectrum of systemic and orofacial complications that were reviewed in detail. The foremost of these are the pharmacological side effects on the CNS, cardiovascular and respiratory systems. Addiction to illicit drugs often leads to loss of appetite and subsequent loss of weight, despite consumption of carbohydrate-rich, highly caloric foods, which are often less costly, nutritionally deficient and some are highly acidic that contribute further to the damage of the dentitions. The little money available, make for a difficult choice to buy food or purchase illicit drug, could also fuel criminal activity.

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