

## Crack Use Disorder and Pulmonary Tuberculosis: How Does it Overlap? A Case Report

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DOI: [10.36347/sjmcr.2023.v11i09.012](https://doi.org/10.36347/sjmcr.2023.v11i09.012)

| Received: 29.07.2023 | Accepted: 02.09.2023 | Published: 08.09.2023

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### Abstract

### Case Report

Crack is an illicit drug, a crystallized form of cocaine, a powerful and addictive stimulant. Crack is often associated with public health concerns due to its detrimental effects on individuals and communities. Crack users may present many physical and mental health issues, including pulmonary problems like tuberculosis. Tuberculosis is an infectious disease and a significant public health problem, being a major cause of morbidity and mortality worldwide. Morocco is one of the countries where tuberculosis incidence is elevated. Using a clinical case, we will highlight the links between pulmonary tuberculosis and crack use disorder.

**Keywords:** Tuberculosis, Cocaine, drugs, crack, pulmonary Tuberculosis.

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## INTRODUCTION

Tuberculosis is an infectious and contagious disease caused by a bacterium called *Mycobacterium tuberculosis*. Throughout known human civilizations, tuberculosis has always been responsible for numerous casualties. Even today, it remains a major global public health issue.

The diagnosis of tuberculosis is generally based on clinical symptoms and radiological images, but confirmation requires bacteriological and/or histological tests [1]. Despite improved living conditions and the existence of effective treatment, tuberculosis remains one of the deadliest infectious and contagious diseases, ranking among the top ten causes of death worldwide. Every day, nearly 4,000 people succumb to this disease, accounting for approximately 1.5 million deaths annually, while nearly 28,000 people contract tuberculosis, a preventable and curable disease, resulting in almost 9 million new cases each year. Global tuberculosis control efforts have saved around 63 million lives since the year 2000 [2]. Morocco has not been immune to this disease, with an estimated 35,000 new cases and approximately 2,900 tuberculosis-related deaths in 2019, representing a specific mortality rate of 8.1 per 100,000 population. In 2020, the recorded number of cases was 29,018, encompassing all forms. During the same year, 240 cases of tuberculosis-human

immunodeficiency virus (HIV) co-infection were recorded [3].

Cocaine and heroin are two psychoactive substances considered the most dangerous for users' health and society. However, there is an overestimation of risk perception among the general population compared to users of these substances and experts [4-6].

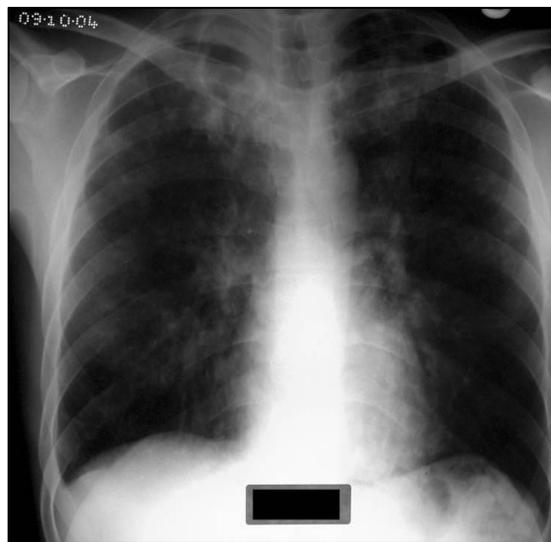
Cocaine can also be transformed into "freebase" or "crack." Crack is obtained by heating a mixture of cocaine hydrochloride with an alkaline substance, producing crystals. The term "crack" refers to the sound emitted by cocaine when heated [7, 8]. It can be consumed through intravenous injection, nasal inhalation (snorted), or smoking. When consumed nasally, cocaine powder is inhaled through the nose. After absorption through the nasal mucosa, cocaine rapidly enters the bloodstream. The desired effects typically manifest in 2 to 3 minutes, providing a sense of physical and mental well-being for about 30 to 60 minutes.

Increasingly, cocaine (in the form of freebase or crack) is smoked in a glass pipe, a water pipe (known as a "bang"), or even in a makeshift pipe made from beer cans or plastic bottles. It can also be smoked in the form of cigarettes or joints by mixing cocaine with tobacco and/or cannabis [9, 10]. Smoked cocaine has a potent addictive potential, causing a very rapid rise in blood

concentrations within seconds. This method of administration achieves effects as quickly as an intravenous injection while avoiding its undesirable effects. However, the effects of smoked cocaine are short-lived (1 to 2 minutes), and the comedown phase is often experienced as unpleasant.

Direct evidence linking the risk of tuberculosis to crack consumption is lacking, although an association with tuberculosis has been demonstrated. The increased risk of exposure is widely attributed to social factors and lifestyle, including homelessness, imprisonment, and drug and alcohol abuse [11]. Drug users are generally immunocompromised, leading to an increased risk of tuberculosis infection and rapid progression to active disease.

Regular crack smoking leads to lung damage (crack lung) (Figure 1). Consequently, the function of alveolar macrophages and cytokine production is impaired, potentially increasing susceptibility to infectious diseases [12]. *Mycobacterium tuberculosis* is an intracellular pathogen that initiates the disease process after a person inhales bacilli into the terminal bronchi and pulmonary alveoli [13]. Alveolar epithelial cells likely resist invasion by *M. tuberculosis* bacilli, allowing resident alveolar macrophages and dendritic cells sufficient time to traverse the epithelium and phagocytize potential invading microbes [14]. Several pulmonary complications are associated with crack inhalation (e.g., severe cough, hemoptysis, shortness of breath, chest pain, acute bilateral pulmonary infiltrates, thermal airway injury, pneumothorax, non-cardiogenic pulmonary edema, production of carbon-laden sputum, and exacerbation of asthma) [15].



**Figure 1: Chest X-ray of a tuberculous patient with a crack use disorder**

## AIMS AND METHODS:

Using a clinical case, our study aims to provide insight into the links between pulmonary tuberculosis and crack use disorder.

Here, we present a case of a patient diagnosed with pulmonary tuberculosis, who is being treated at the Addiction Medicine Department of Ar-Razi Hospital in Salé, Morocco, for crack use disorder.

## CLINICAL CASE

We present the case of a 36-year-old single male patient, working as a police officer, with a history of addictive behaviors including tobacco, alcohol, and crack use disorder.

Mr. N. reportedly sought consultation at the Addiction Medicine Department of Ar-Razi Psychiatric Hospital in Salé in January 2023 for a detoxification program involving tobacco, crack, and alcohol.

During the interview, the patient reported that he had been using tobacco since the age of 20, smoking a pack a day. At the age of 33, during a trip in a festive context, he initiated crack use by consuming half a gram along with three bottles of whisky shared among six people. He described feeling excited, euphoric, and full of energy. This pleasurable experience led him to start using crack regularly, consuming one gram of crack twice a week with a group of friends.

The interview also revealed an anxious syndrome consistent with generalized anxiety disorder, leading to his prescription of escitalopram, quetiapine, tapering benzodiazepines, and vitamin therapy. As part of his therapeutic approach, the patient also received motivational therapy and psychoeducation sessions.

During the course of his follow-up, he developed progressively worsening symptoms including chronic cough, fever, weight loss exceeding ten percent of his body weight, and night sweats. In response to these

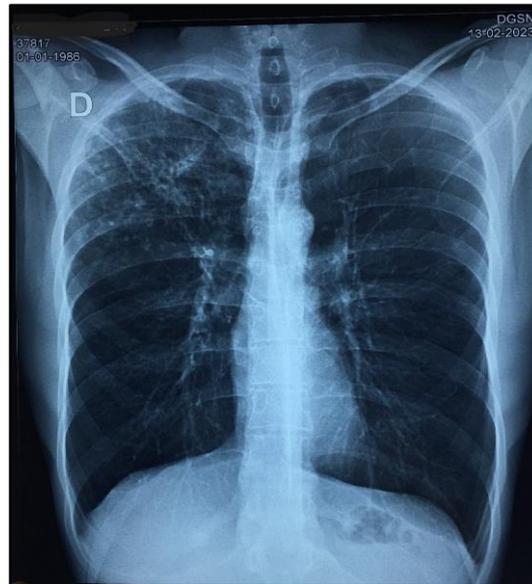
symptoms, he was referred to Moulay Youssef Hospital for a pneumology consultation.

A chest X-ray was performed, showing a right apical lesion with alveolar micro-nodules and peribronchial thickening suggestive of pulmonary tuberculosis. A thoracic computed tomography (CT) scan was also requested, revealing lesions predominantly in the upper right lobe with cavitory changes, strongly

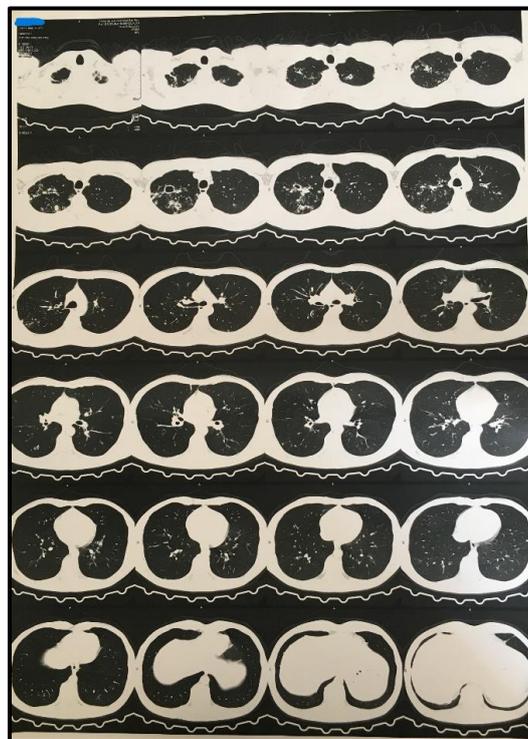
suggesting a specific infectious origin, possibly due to *Mycobacterium tuberculosis*.

A cytobacteriological examination of sputum was requested to confirm the diagnosis, which came back positive for *Mycobacterium tuberculosis*.

An antitubercular treatment regimen (2 months of rifampicin, isoniazid, pyrazinamide, and ethambutol, followed by 4 months of rifampicin and isoniazid) was initiated.



**Figure 2: Chest X-ray showing a right apical lesion with alveolar micro-nodules, along with peribronchial thickening**



**Figure 3: Thoracic CT scan image revealing lesions of pneumonia predominantly in the upper right lobe with cavitory changes, suggesting initially a specific infectious origin consistent with pulmonary Tuberculosis**

## DISCUSSION

We present a clinical case of a patient with problematic use of psychoactive substances, mainly inhaled cocaine (crack). The patient engaged in crack consumption always in the company of friends. Subsequently, he developed symptoms of pulmonary tuberculosis confirmed through radiological and bacteriological examinations.

There was a connection between crack consumption and tuberculosis. This consumption seemed to have become a risk factor for tuberculosis due to overlapping epidemiological and social factors associated with both drug use and tuberculosis.

An investigation conducted in California [16] demonstrated that crack consumption was a risk factor for latent tuberculosis infection (LTBI) and active tuberculosis. The index case, who was HIV positive, presented with bacillary pulmonary tuberculosis accompanied by severe cough. He frequently visited two "crack houses," locations where crack smokers gathered. The investigation around this case revealed that 32% of contact subjects had LTBI and 15% had active tuberculosis.

Similarly, a study carried out in Puerto Rico [17] found a higher prevalence of latent tuberculosis infection among intravenous drug users and crack smokers.

Furthermore, a case-control study conducted in London [18] involving 970 subjects under antituberculosis treatment categorized cases into two groups: non-crack smokers and crack smokers among substance users. The controls did not consume any substances. In multivariate analysis, compared to control subjects, the risk of having bacillary tuberculosis was significantly higher among non-crack substance users (RR = 1.9; 95% CI: 1.2–3.0;  $p = 0.007$ ), and even higher among those using substances including crack (RR = 6.6; 95% CI: 1.8–24.3;  $p = 0.005$ ). Cocaine users, especially those frequenting "crack houses" in disadvantaged urban areas, are at risk of developing tuberculosis, including multidrug-resistant forms, as well as HIV infection and sexually transmitted diseases [19]. Cocaine, especially when smoked, might reduce immune defenses by decreasing alveolar macrophage antimicrobial activity through reduced inducible NO synthase activity or via a direct toxic effect on the lung. The accumulation of iron in alveolar macrophages in case of HIV-associated anemia further reduces their antimicrobial activity [20-22].

In previous global drug reports, the issue of tuberculosis has been inadequately addressed, despite being a potential consequence of drug use. Ending the global tuberculosis epidemic is a target of Sustainable Development Goal 3.3 and constitutes the goal of the WHO's strategy to end tuberculosis. However, concrete

data are necessary to understand how drug control policies can be an integral part of efforts to achieve this objective.

Tuberculosis is a potentially fatal infectious disease transmitted from person to person when someone inhales air exhaled by an individual with active tuberculosis, especially during coughing, sneezing, or spitting. Although preventable and curable in most cases, tuberculosis is one of the leading causes of death worldwide, having caused more deaths than HIV/AIDS in 2015. Tuberculosis ranks among the top causes of mortality among drug users living with HIV [23]. Drug users are a high-risk group for tuberculosis transmission. Limited data from studies in Europe, Asia, and America [24] estimate the prevalence of tuberculosis among intravenous drug users to be approximately 8% (median prevalence calculated from 23 studies), with values ranging from 0.2% to 66%. This prevalence is less than 0.2% in the global general population [25]. Drug users are disproportionately affected by tuberculosis risk factors such as social difficulties, HIV infection, and periods of incarceration. They often face socioeconomic disadvantages, poverty, lack of housing, and malnutrition. HIV infection is particularly critical, as the virus dramatically increases the risk of latent tuberculosis transitioning into active tuberculosis [26]. It is a leading cause of the high prevalence of tuberculosis among intravenous drug users [27]. In the absence of treatment, between 5% and 15% of individuals with latent tuberculosis develop active tuberculosis during their lifetime [28]. In contrast, individuals living with HIV have 20 to 30 times the risk of developing the disease compared to others [29]. Furthermore, prisons pose a high-risk environment for drug users concerning tuberculosis transmission.

The number of newly confirmed cases of drug-resistant tuberculosis rose from 19,500 in 2006 to 132,500 in 2015 [30]. In certain countries, drug consumption was identified as an independent risk factor for the spread of multidrug-resistant tuberculosis [31-36].

## CONCLUSION

Tuberculosis is a potentially fatal infectious disease that spreads from person to person when someone breathes the same air as an individual with active tuberculosis.

Drug users constitute a high-risk group for tuberculosis transmission. These individuals who are dependent on crack or other substances may present several risk factors for tuberculosis, such as malnutrition, chronic stress, poverty, and lack of access to healthcare. All these factors can contribute to the higher prevalence of tuberculosis among populations affected by substance abuse.

It can be stated that there is a dangerous synergy between tuberculosis and crack use. Therefore, it is crucial to establish comprehensive prevention and treatment programs that take into account the risk factors associated with drug consumption, including crack, to reduce the spread of tuberculosis and other infectious diseases.

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