Chapter

Cocaine and Its Variations in Forms of Presentation and Addiction

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Abstract

This chapter intends to show cocaine variations in its forms of presentation, chemical forms, pharmacology, use forms, and contexts of use to understand how these factors can influence drug addiction. Furthermore, a discussion on the most expected psychoactive effects will take place during this chapter, based on different forms of use, treatment possibilities, and possible harm reduction strategies. Above all, the discussion considers the recursive movement of people who abuse the drug or became dependent. Therefore, the authors will discourse about these aspects using some singular and illustrative cases, from the biographical trajectory of people in their contexts related to the substance use, aborting the recursive movement of the drug user.

Keywords: cocaine, molecular forms, forms of presentation, addiction, treatment

1. Introduction

Cocaine is one of the most consumed illicit drugs in the world. It is estimated that 17.1 million people in the world use this substance [1]. The drug is a tropane alkaloid found in leaves of coca plant (*Erythroxylum coca* L.), which only grows in Andean countries [2]. From dry leaves of coca plant is produced the cocaine paste. This product has a high cocaine concentration and can be consumed as a drug or used for the production of many cocaine derivatives [3, 4].

There are many cocaine forms of presentation. Variations in these forms are due to changes in chemical form of the cocaine molecule and also in the way how the drug is consumed. Cocaine molecule can be in molecular or salt form. Both chemical forms have different physical-chemistry properties, which influence the way how the drug will be self-administrated and consequently metabolized by the organism [5].

The drug has a stimulating action in the organism with potential to cause addiction [6]. Cocaine is one of the main substances that can cause more physical damage

and chemical dependence on someone [7]. Intensity of effects, dependence, and craving are strongly influenced by the way in which the drug is self-administered.

Compulsive use, besides chemical dependence, can make people susceptible to health problems and affect interpersonal relationships. Not rare many drug users end up engaging in risk and illicit activities, as prostitution and robbery, in an attempt to obtain resources to continue to use the drug [8–10].

Due to this cocaine consume aspects, as well as addiction and other problems from this condition, the cocaine dependence should be studied in a multicenter and multidisciplinary way involving diverse knowledge on areas such as chemistry, pharmacology, psychology, and social sciences. Cocaine chemical dependence is one of the most difficult pathologies to treat, and the discussion about this theme should be constantly emphasized.

2. Cocaine forms of presentation

Cocaine's purified form has a pearly white color. Being a weak alkaline compound, it can combine with acids forming many types of salts. Cocaine hydrochloride (COC) is the main common salt; besides, other types of salts can be found such as sulfate, nitrate, borate, and salicylate. Different salts dissolve in a high or low extension in different solvents. The COC salt is polar and highly soluble in water. However, molecular form of cocaine, popularly called free base, is the opposite of salt forms and is practically insoluble in water (**Figure 1**) [11, 12].

The terms "coca paste" or "crude coca paste" and "coca base" are similar in relation to the active principle presence; however, they differ in chemical waste products used in the extraction from coca leaves. While "coca paste" still has many waste products, "coca base" comes from withdrawal of such waste products. Nevertheless, these terms are used indistinctly by own coca farms and drug producers [3, 13, 14].

The coca base is smoked by the drug user and such use form began in Peru in the beginning of the 1970s and spread to other producers' countries, such as Colombia and Bolivia, during the same decade. After that, the drug use reached the other countries of South America, including border regions of Brazil with producer's countries. In the Andean countries, Coca base, when smoked isolatedly is called "basuco", and in Argentina, the drug is called "paco". When the drug is smoked with tobacco or marijuana, it is called "grimmie" [3, 15].

Merla is made by coca paste or coca base mixed with sodium carbonate (Na_2CO_3) and sulfuric acid (H_2SO_4), dissolved in a heated aqueous solution with kerosene. Merla is smoked usually mixed with tobacco or marijuana [16, 17].

Cocaine is more usually found as a crystalline powder, COC, obtained through coca base treatment with hydrochloric acid (HCl). In this form, it can be smoked, because it cannot be vaporized and decomposes with temperature increasing. Usually, cocaine is self-administrated by nasal aspiration or orally or intravenously [17]. The COC receives many popular denominations such as "powder," "snow,"

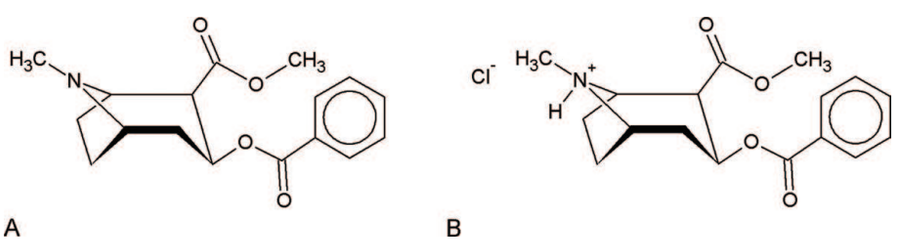

Figure 1.
Cocaine chemical structures in its molecular form (A) and its main salt form, cocaine hydrochloride (B).

"coke," "flour," etc. Besides, all these terms refer to the drug as a white powder, paved, and bright, which, after powdered with the help of a barber blade or a plastic card, can be snorted or diluted in water and injected intravenously with a syringe and needle [18]. The practice of injecting cocaine is commonly known as "peak" in Latin America countries [19].

Freebasing is a cocaine derivate product, which consists of COC converted to molecular form of cocaine. For this, COC is treated with an alkaline solution such as ammonia hydroxide (NH_4OH) or sodium bicarbonate ($NaHCO_3$) to remove HCl. This process needs a mixture of diethyl ether with water under heating. The material originated is crushed and smoked in improvised pipes. This cocaine form of presentation is usually made in a low scale for own use. Due to the use of diethyl ether in the process of heating, explosion accidents occurred, causing risk of life of the person who manufactured the drug, leading to disuse of this form of presentation [20].

Crack cocaine can be obtained from the freebasing with the removal of diethyl ether and adding NH_4OH or $NaHCO_3$ and water under moderate heating. Under these conditions, cocaine precipitates in an almost pure product after solvent evaporation. Crack cocaine obtainment process can be also from COC, coca paste, or coca base. From COC, the drug is diluted in hot water or in NH_4OH or $NaHCO_3$ solutions with posterior removal of diluent layer at the end of the process. From coca paste or coca base, the drug is heated with $NaHCO_3$ solution without removal of final diluents, resulting in low concentrated and more "dirt" drug [16, 21, 22]. The name "crack" comes from the crackling noise that the drug produces during heating. The drug is smoked in improvised pipes, tin cans, or plastic tubes. Crack cocaine also can be smoked mixed with marijuana (merged or "mesclado") or tobacco ("pitilho") [23, 24].

Oxi is a cocaine form of presentation obtained by coca paste treatment with lime (CaO) or cement, H_2SO_4, kerosene, gasoline, and other substances. The drug is smoked in improvised pipes or mixed with tobacco. The term "oxi" or "oxidized" originated due to the suspected use of oxidant agents as a way to remove impurities during initial process of drug fabrication. There seems to be a superposition between oxi and crack cocaine related to its use patterns; however, unfolding remains unknown [25].

"Virado" or "turned powder" consists in transforming crack cocaine rock into a powder adding boric acid (H_3BO_3). This mixture is heated to assist the process and subsequently cooled and made into powder, which is snorted similar to COC. The "virado" is cocaine in borate salt form, which is absorbed by the nasal mucosa [26].

Table 1 presents main cocaine forms of presentation related to its chemical forms and use forms, and **Figure 2** shows main consumed forms of presentation.

3. Pharmacological mechanisms

Absorption velocity and maximum plasma concentration are dependent on administration routes in which cocaine self-administration occurs. These routes can be oral, intravenous, intranasal (snorted), and respiratory (smoked), being the latter two most common [27, 28].

Cocaine smoked in its molecular form promotes faster absorption of the drug, through pulmonary absorption. This results in faster appearance and high intensity effects in the drug user, when compared with intravenous route. Kinetic patterns of both routes are similar. Usually, smoked route effects occur in 3–5 seconds, with maximum plasma concentration of 300–900 $ng \cdot mL^{-1}$. Maximum intensity of effects occurs in almost 3 minutes, lasting approximately 5–10 minutes. Observations of these phenomena are extremely important, since cocaine use in this route can lead to dependence in a very short period of drug use [29–31].

Popular name	Chemical form	Use form
Coca paste	Molecular	Smoked
Coca base	Molecular	Smoked
Basuco	Molecular	Smoked
Paco	Molecular	Smoked
Merla	Molecular	Smoked
Powder	Salt	Snorted or injected
Freebasing	Molecular	Smoked
Crack cocaine	Molecular	Smoked
Oxi	Molecular	Smoked
"Virado"	Salt	Snorted

Table 1.
Main cocaine forms of presentation and its chemical forms and use forms.

The efficiency of smoking act in relation to drug chemical availability in the body and in relation to the speed and quantity of cocaine in the bloodstream in conditions to produce the desired effect depends on a number of factors, such as amount of drug burned, temperature used for burning, the container used for heating, and condensing of the drug in containers used for smoking. Absorption rate is high because extensive superficial area of the lungs is highly vascularized. When cocaine is smoked, the formation of the anhydroecgonine methyl ester (AEME) occurs, a cocaine thermal degradation by-product, which is eliminated in the urine and can be used as a chemical marker of this form of use [32, 33].

Intranasal administration also called "snort" or "cafungar" consists in arranging cocaine salt lined up on smooth surface, each row with approximately 10–30 mg, which is aspirated in such a way that absorption occurs through the nasal mucosa. Cocaine use by this route or by the oral mucosa propitiates absorption through the nasopharyngeal membranes, with low absorption rate due to the vasoconstrictor drug properties. The administration by this route produces smaller plasma levels for a longer time due to slow absorption rate. Approximately 20–30% of the administered drug is absorbed. Maximum plasma concentration occurs, on average, 30 minutes after drug administration and is conditioned by differences in technical effectiveness of aspiration and partial dose swallowing; besides individual characteristics of each user, this produces different levels of mucosal vasoconstriction and possibility of biotransformation in the mucosa itself [17]. Although effects appear slowly, the magnitude is comparable to the intravenous route. Doses of approximately 0.4 $mg \cdot kg^{-1}$ of body weight (30–40 mg) are associated with a maximum plasma concentration of 50 $ng \cdot mL^{-1}$, while those corresponding to 1–2 $mg \cdot kg^{-1}$ are associated to 100–200 $ng \cdot mL^{-1}$ [29, 30].

The oral route is also effective in terms of drug chemical stability and bioavailability. After approximately 30 minutes, when there is no plasma detection, gastrointestinal absorption quickly occurs and maximum plasma concentration usually occurs between 45 and 90 minutes. Delay in oral absorption, in relation to what occurs in intranasal route, is due to ionization of cocaine in the stomach acidic environment, and the delay in reaching the small intestine basic medium, region where the molecular form prevails, leads to a higher absorption rate [34–36].

Injectable cocaine has its beginning of action about 30–45 seconds after administration. The "peak," as this form of use is known, produces an effect called rush

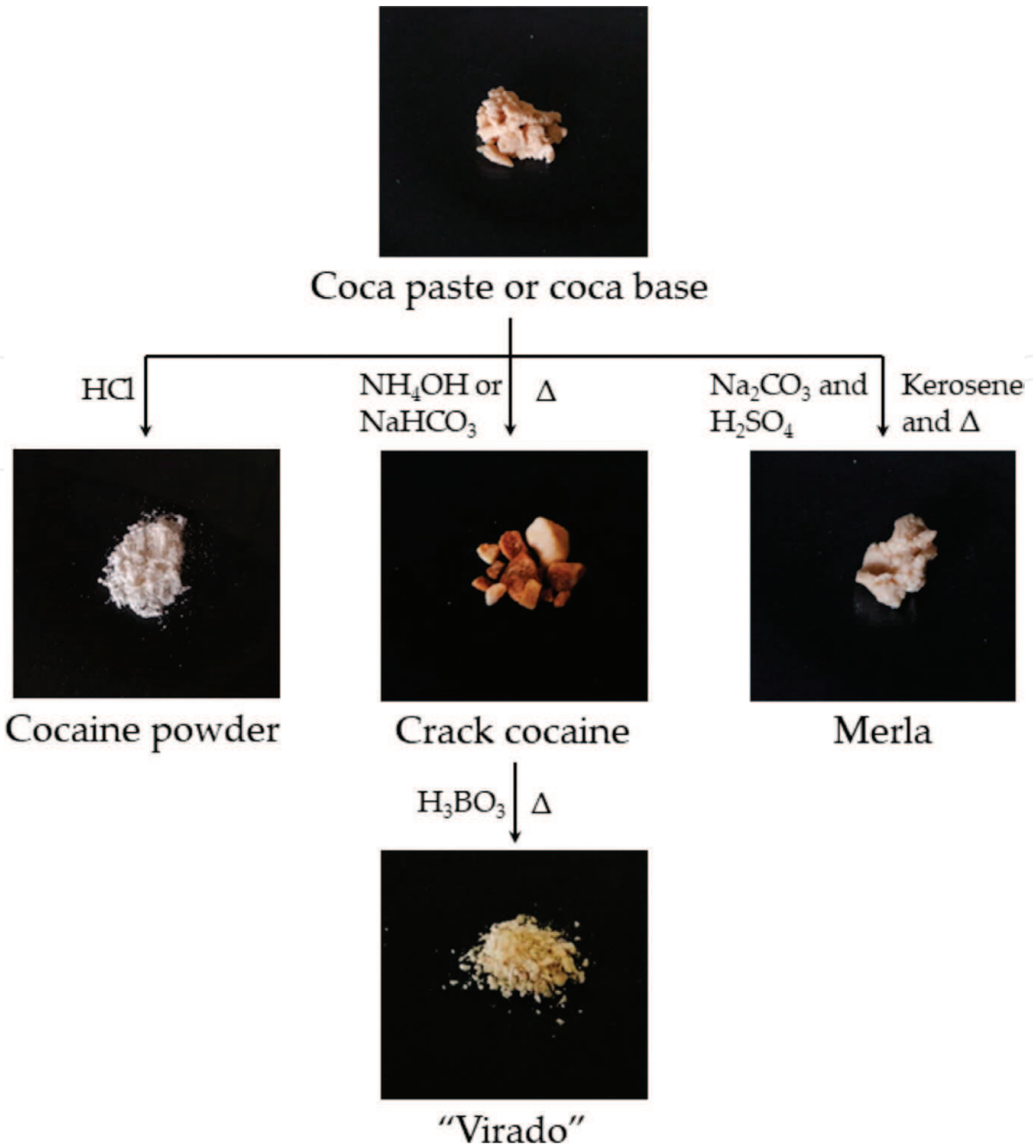

Figure 2.
Cocaine most consumed forms of presentation. HCl = hydrochloric acid; NH_4OH = ammonium hydroxide; $NaHCO_3$ = sodium bicarbonate; Na_2CO_3 = sodium carbonate; H_2SO_4 = sulfuric acid; H_3BO_3 = boric acid; Δ = heating.

or "baque" [12]. To be injected cocaine is usually diluted in water and heated to facilitate dissolution or filtered on cotton to avoid impurities. This route does not pass through the absorption stage and through the hepatic first pass effect. Thus, the cocaine available in bloodstream is almost 100%, requiring a dose 20% lower than that ingested or snorted. Duration of effects is about 20 minutes [37, 38].

Bioavailability of smoked cocaine is approximately 70% due to losses of 30% of thermal decomposition or condensation in the utensil used for this purpose [15]. Intranasal bioavailability is reported to be in the range of 60–80%. Although there is a delay in absorption by this route, the loss is relatively lower [37].

Because cocaine is a lipophilic substance, it can easily cross the blood-brain barrier (BBB), and experimental data suggest that the drug is caught by adipocytes and consequently accumulates in the central nervous system (CNS) [39]. There are placental transfer and milk secretion. Placental transfer has passive transport characteristics due to drug lipophilic properties [40]. Cocaine presence may also occur in the drug user's semen regardless of administration route used [41].

Kinetic parameters and plasma half-life of elimination (T½) for cocaine vary according to the administration route. For the snorted route, T½ is around

50–78 minutes; for the smoked route, it is around 38–58 minutes, and for intravenous route, it is around 40–67 minutes [20, 34, 37].

Cocaine recreational doses lead to temporary elevations in noradrenaline (NA) and dopamine (DA) concentrations with subsequent reduction to below normal values. These variations in these neurotransmitter concentrations are related, respectively, to states of euphoria and depression experienced by the drug users [28, 30].

The main mechanism of action of cocaine in the CNS is blocking the reuptake of DA in synaptic clefts, due to cocaine binding to dopamine transporter sites. Dopamine accumulation at D1 and D2 postsynaptic receptors seems to be the pathophysiological mechanism through which euphoria occurs. The consequence of neurotransmitter accumulation is the induction of presynaptic receptors, resulting from the mechanism of self-regulation and subsequent depletion of the neurotransmitter. Similarly, adrenergic stimulation seems to occur by the same mechanism, and as a result of chronic use of cocaine, both NA and DA become significantly reduced in the brain. Decreased DA in the brain may result in abnormalities of dopaminergic pathways, leading to psychiatric complications such as depression and bipolar disorder [42–44]. The D2 receptor is present in higher concentration in the striatum and nucleus accumbens, and its stimulation has been associated with psychotic behavior [45–47].

4. Cocaine effects

There are several expected effects for the person who is using cocaine. Most common effects are loss of appetite, increased blood pressure, nausea, anxiety, and/or paranoia. It is important to remember that such effects are in accordance with the singularity of the person.

Cocaine psychoactive effects arise from increased neuronal activity of DA and NA, stimulating brain reward pathway. Blocking of dopamine reuptake increases concentration of this neurotransmitter in the synaptic cleft, producing a more intense pleasure sensation [48, 49]. The intensity of pleasure is so high that the sensations are difficult to describe [50].

Psychic effects caused by cocaine use occur in two distinct ways and always manifest in the same sequence. Initially, cocaine positive effects, in other words, pleasure sensations, occur due to concentration increase of DA and NA. Such sensations are replaced by negative effects or unpleasant sensations, like paranoia, due to DA and NA depletion. Positive effects emerge more quickly, decreasing their intensity until the appearance of negative effects [49–51].

Paranoia is a constant sensation due to cocaine use, especially in its smoked form, crack cocaine. Paranoia is responsible for most of conflicts witnessed among crack cocaine users. This paranoia is a consequence of the intense use in which the inhalation of large amounts induces irritability feelings, tremors, and bizarre attitudes [52]. It manifests as a constant restlessness, usually accompanied by a sense of fear in drug users, who start to watch the place where they are using the drug, showing great distrust of each other and in relation to the people who are nearby [53].

In an ethnographic study, held in the city of São Paulo—Brazil, the sense of "radiation" for the research participants was described. The "radiation" means discord, mistrust, fear, in the scene of crack cocaine use. It is the breaking of reciprocity, thief, betrayal, trust abuse, and disrespect [54].

Combination of pharmacological and sociocultural effects identified in crack cocaine use determines the risk that these drug users can undergo. Crack cocaine causes a state of ecstasy of short duration, being one of the main characteristics for its risk of addiction. Constant consumption becomes compulsive, and the

need to acquire the drug takes on a more important place than family, job, social relationship, self-care, etc. This relationship of potent and short duration effects, together with permanent need to acquire money to obtain the drug, combined with the illegality of this practice (and its consequences of further exclusion of users), articulate to the prevalence of compulsive use among crack cocaine users [55].

This ability of crack cocaine to develop an almost instantaneous addiction framework has always been pointed out as unquestionable truth. Although this information is widely disseminated, it has never been scientifically tested. It was identified that, when compared to the numbers on abusive use of COC, crack cocaine users have a higher percentage of recurrence in use. This relationship may be associated to the fact that crack cocaine is more accessible in poor communities, where COC is economically less viable [48]. **Table 2** shows main health problems that cocaine users can develop in the short and long term.

5. Forms of cocaine use

Over the years, there has been an increase in the variety of forms of presentation and consumption of cocaine. By identifying a psychoactive substance, different ways are discovered to achieve the desired effects, making it one more market product in our society. In recent decades, cocaine use in its different forms of presentation has taken on worrying dimensions, with serious consequences for the users, their families, and communities, wrecking different interfaces of daily life [56–58]. Cocaine consumption represents a constant search for novelty, main characteristic of the current society of consumption [24].

Understanding the ways of how people use cocaine, materials used, as well as different ways of using this substance are of fundamental importance to identify contexts of greater or lesser vulnerability to drug consumption.

It is difficult to find cocaine use isolated. Usually, the drug is consumed in conjunction with others. In the state of São Paulo—Southeast of Brazil, there is a greater prevalence of crack cocaine use associated with alcohol and/or marijuana. These associations appear as a strategy to minimize risks caused by crack cocaine compulsive use. This is because alcohol or marijuana alleviates crack cocaine craving symptoms [59, 60]. In the state of Pernambuco—Northeast of Brazil, this

Short-term effects	**Long-term effects**
Loss of appetite	Cognitive problems
Increase in blood pressure	Sexual dysfunction
Nausea	Renal and pulmonary damage
Anxiety and paranoia	Nasal septum destruction
Depression	Tooth wear
Dilated pupils	Disorientation and apathy
Disturbed sleep	Brain hemorrhage
Erratic behavior	Irregular heartbeat
Euphoria	
Auditory and tactile hallucinations	
Tremors	

Table 2.
Main health problems that can be developed by cocaine users.

consumption pattern was also identified; however, the use of the "shot," only crack cocaine smoked isolated, still appears as a preference for most drug users [61].

"Virado" or turned powder is a cocaine-differentiated use form in the culture of cocaine use in Brazil, especially in the state of Pernambuco. Some studies pointed this form of use as characteristic of Pernambuco [26, 62, 63], not being registered, yet, in any other state of Brazil or another country [61].

"Virado" consumption has more a social characterization, being used mainly in festive and celebration environments, not stigmatizing so much people who consume this form of presentation. "Virado" has a longer effect, similar to COC snorted, not causing so much compulsivity as crack cocaine smoked. Despite these positive aspects, "virado" causes significant nasal bleeding, and for sharing objects for aspiration, such as plastic straw, this increases infectious disease contamination probability, such as DST/AIDS [61].

Not recognizing possibility of other forms of cocaine use is denying entire social and cultural process involved in drug use issues. Adaptations of the drug users are strategies built from social exchanges that occur at the time of use. New forms of use do not arise in an isolated way, not depending only on the effects of cocaine and or on individual's collective constructions. They are fruits of social dynamics established between the groups, which can make viable different forms of use more or less harmful [24].

6. Psychosocial treatment

There are several types of therapeutic approaches that can be used to treat people with cocaine use problems. Complex conditions of drug use contexts, social and personal implications associated with the use, and users' biopsychosocial conditions have required tools and care strategies. This allows a varied therapeutic offer, which aims to reach people with this problem in an integrated way. Thus, treatment must be prepared to offer a myriad of interventions to the multiple needs showed, through personalized and singular indications. Application of associated and multidisciplinary approaches presents better therapeutic results [64, 65].
We will focus on psychosocial treatments, and the following will present some approaches of psychosocial treatments indicated for cocaine addiction.

6.1 Cognitive behavioral therapy

Cognitive behavioral therapy (CBT) has been shown to be an effective approach in chemical dependence treatment. CBT is defined as a set of semistructured interventions, objective and goal-oriented. It is based on the assumption that cognitions, emotions, and thoughts are among the factors considered as precipitators or maintainers of behavior. Thus, several techniques and protocols are used, addressing central themes that involve relation of the person with the drug and specific themes to each person. It is fundamental that the professional is well trained for the model application, planning activities according to needs of each person [64]. CBT supports dependent people to become abstinent or reducing drug use, allowing them to recognize risk situations, to avoid them, and to deal with problems associated with cocaine use [66]. From this approach, other variations that explore motivational and behavioral aspects were derived.

6.1.1 Motivational interview

Motivational interview (MI) consists of a counseling approach used to promote behavior change, according to individual interests of lifestyle enhancement. This

approach adds value at every stage of treatment and can be associated with other techniques. It is based on concepts of motivation, ambivalence, and readiness for change. Such concepts imply in the presence of three professional attitudes: collaboration, evocation and respect for the autonomy [64]. MI interventions are more persuasive than coercive; more empathetic and welcoming than confrontational. In this perspective, relapse is perceived as a key event for motivational process, generating self-efficacy increase [67].

6.1.2 Relapse prevention

In relapse prevention (RP) model, addictive behaviors are bad habits that can be changed. These people are considered to have learned these behaviors and thoughts that are dysfunctional, and even though problems are generated for them, drugs are still used when the user has to deal with difficult situations. It is assumed that the person did not develop or learned more adaptive behaviors that generate gratification or enable them to solve problems differently. RP is based on three fundamental points: (i) awareness of the problem, (ii) facing skills training, and (iii) lifestyle modification [68, 69]. In RP, all aspects involved in the relapse process are considered. Thus, the person has the opportunity to subjects such as facing strategies aiming at training their self-efficacy to develop skills for handling similar situations in the future [64].

6.1.3 Social skills training

It is presented as a set of interventions, which aims to develop and improve cognitive and behavioral skills to change drug use behavior. Social skills are a set of behaviors expressed by a person in self-social environment, which include expressing feelings, desires, attitudes, opinions, or rights, appropriate to situation, adaptively and assertively, decreasing the probability of future difficulties arising. These skills should be understood in their social context, variations in communication pattern, specific situations, age, sex, social class, education, and purpose. Social skills training and drug use show that these people have deficits in such behaviors, which can be considered an important risk factor for drug use, highlighting the possibility of lack of assertiveness and communication strategies for drug resistance and negotiation. Thus, it is understood that the drug becomes a mean of facing external pressures, everyday events, and interpersonal situations, without need to express assertive behavior. Obtaining a good repertoire of socially skillful behaviors is related to lower risk of drug use [70].

6.1.4 Contingency management

This treatment aims to promote abstinence and other desired behaviors by organizing systematic rewards in alternative behavior occurrence incompatible with drug use. It is based on the theory of operant conditioning. Contingency management (CM) has been a key technique in solving problems by inhibiting responses. In the therapeutic relationship, the therapist has the possibility of reinforcing or punishing patient's advancement or problem behaviors. Thus, CM is a behavioral treatment aimed to change individual repertoire and decrease or extinguish undesirable behaviors. It can be used associated with other therapeutic approaches [64, 66].

6.2 Psychosocial approaches

For treatment of people who have problems in cocaine abuse, it can be seen that problems themselves are highly particular needs. Thus, the health professional must demonstrate skills and availability. There is a need for treatment spaces that

stimulate creativity, freedom, and autonomy to the team for mental health work of cocaine users, as well as practices constitution that allow the user to be the focus of therapy in detriment to substance use. Therefore, it is necessary to establish solid therapeutic links; this is recognized by establishment of a solidary and trusting relationship, so that the health professional understands host as an important strategy for care development [71]. These multiprofessional services care, with extended models called psychosocial, in addition to continued care, may increase chances of adherence and positive response in terms of behavior change. This is the expanded clinic proposes that the person should be well received and addressed their unique needs, through shared construction of the singular therapeutic project [72].

6.3 Mindfulness

Conventional treatment, when combined with different approaches such as, acupuncture and image replacement techniques, physical exercise and cooperative games, promotes decreased anxiety; craving relief; relapse prevention; integration, socialization and obtaining another form of pleasure, in case of physical exercise and cooperative games [73]. Relationship between stress and dependence is well known. Stress increases probability of using alcohol and other drugs and may precipitate relapses. It is necessary to incorporate techniques of stress control in patients in outpatient treatment [74, 75]. Mindfulness has been described as a practice of learning to focus attention on momentary experience an attitude of curiosity, openness, and acceptance. Mindfulness practices have become increasingly popular in complementary therapeutic strategies for a variety of medical and psychiatric conditions [76].

6.4 Harm reduction

Harm reduction (HR) actions constitute a set of public health measures aimed at minimizing adverse consequences of drug use. The fundamental principle guiding HR is respect for freedom of choice, as studies and experience in health services show that many drug users, sometimes, cannot or do not want to stop using drugs and, even so, they need that risks from drug use to be minimized. HR is still perceived as a strategy to guarantee the rights of people who use drugs, regardless of whether or not to stop using [77].

More than just an approach, HR is presented as an ethical policy of respect for integrality, autonomy, and human rights. In this sense, it becomes a professional stance that permeates all activities, hosting, and services organization, including through guidance and contact with families in domiciliary visits and activities carried out in primary health care. For HR, the drug is not the determining agent for care construction, so that evidences are considered that relation of the person with the drug does not necessarily always occur in a relation of dependence. Instead, various possibilities of relation of the person with the drug are thought that extend objectives of its practices. Thus, it was highlighted that even though HR is currently linked to the world of drugs, it is a way of acting and of caring present in human relations [78].

7. Drug user recursion

Even with psychosocial treatments available for cocaine addiction described above, it is observed that, although they reduce severity of psychosocial problems caused to cocaine users, these models failed to respond to the phenomenon of "relapse." The model of "prevention of relapse" is only operationalized by biomedical bias, awaiting positive and unique outcome of total abstinence of drug use. Such

model of care and attention ends up being insufficient in face of other proposals of care that do not operate in the same perspective. This is the case of models such as HR based on human rights, social constructionism, and psychosocial treatment itself that accept other possibilities of outcome of cases as, for example, controlled drug use.

Thus, the "recursion" is presented as an alternative of reflection and more consistent policy action with these other models and perspectives of care. In the case to the phenomenon of "relapse" another reflexive paradigm emerges: recursion as a principle and theoretical construct of Morin's Theory of Complexity [79–81] and reflected in a practical way by Maturana [82–84].

Consequently, "recursion" can be understood as repetition that occurs in all processes and living systems [80, 82, 83]. A permanent and endless movement, in people, occurs from their personal experiences, with their own senses and meanings to each one who lives their own recursive movement [85]. These experiments are based on explanations that each person can print to their personal movement [82, 83]. Such explanations try to "justify" or "enlight" the drug users about what they had been going through in their lives.

Therefore, the idea of "recursion" as a new challenge to understanding the phenomenon of "relapse" considers characteristic aspects of the person and circumstances of his narratives in continuing resignifications, during and after the "relapse" process.

To better understand the "recursion" as a "reupdating" motion constant in the life history of people who use drugs, which go beyond "return to a substance use pattern," we cite the work of Cruz et al. [86] that say: "Now, in relation to the principle of recursion, this is explicit among people who use drugs, in which one perceives abstinence moments interspersed with a pattern of intense consumption of the drug. So, the notion of recursion refers to movement of traversing again, having, many times, an inexhaustible back-and-forth movement of actions and implementations. The principle of recursion is a process in which effects are at same time causers and producers of the process itself".

Starting from complexity theory, besides the principle of "recursion," we find others that are important to understand the behavior of drug users. We also highlight the principle of systems theory. This is directly related to functioning of people and their families. Systems theory is widely used to understand functioning of various social systems, in particular those of family relations, for studying feedback mechanisms between self-regulating systems [87].

In systems theory, fundamental attributes of the organism are parts of the whole. And the whole will always be greater than its parts—a reflection also used by Gestalt Therapy [88]. Thus, one sees the organized assembly of parts that form a complex and dynamic whole, concluding that every system is a subsystem of a larger system. And since a system is larger than the sum of the parts, its influence is incessant with environment, so that it not only maintains its organization but also modifies it, seeking change and not just opposing it [87].

It is perceived the principle of recursion, as part of a new paradigm that acts with argument of active organization and constant reorganization [79]. For Rameh-de Albuquerque [85], the preceding "re" implies articulation of linked knowledge: "[...] repeat, reflect, revolve, rearrange, reproduce, return, recall, repeat... Relapse?! What is recurrent in think? That when the drug user relapses, he returns to the same place from which he left. However, in the light of recursion, he no longer returns to the same point. Your passage through experience represents somehow a new learning."

Hence, the difference between the "relapse" construct and the idea of "recursion" is the fact that in "recursion" we do not expect a definitive outcome due the

multiple process repetion possibilities each person experiences. When passing through a drug use experience, the person remeans what happens to him and can, on the other hand, produce new learning that will encourage him to have a new relationship with the use of drugs.

Thus, considering reflections of Maturana and Varela [89] that all coupling and interaction directly affect the nervous system due to the structural changes that arouse in it, we consider that all experience is transformative, even so, sometimes, changes are not completely visible. Such reflections make even greater sense in relation to humans, and we can transpose this idea to expand our understanding of the phenomenon of "relapse."

Every "relapse" brings learning that we cannot always see. And considering the biomedical perspective of care, which seeks abstinence as the only possibility of successful treatment outcome, the idea of considering other learning and ways of dealing with drug use is not accepted. Generally, the treatments offered are anchored in other paradigms as already mentioned above. In the abstinence paradigm, "partial" learning of the person who uses drugs is not accepted. The resignification that is given by each person is not accepted. Do not consider his experience with the drug and use contexts involved. That way, the proposal to consider "recursion" as something inherent in all living systems, regardless of drug use or abuse, strengthens and connects with the perspective of other treatment models.

HR, for example, will accept "partial" learning considering possibility of restructuring the subject from a more controlled use and less harmful to your health and to the social and family relations, facilitating adherence of many people who do not want or cannot stop using drugs [90].

8. Conclusions

Cocaine has several forms of presentation. These modifications in forms of presentation can cause changes in the molecule of cocaine, which generates different drug kinetic and dynamic patterns. Cocaine in its salt form is usually administered snorted and has less intense and longer effects. In its molecular form, usually smoked, effects are more intense and short. These variations in intensity and duration of effects end up influencing use frequency and onset of addiction.

Cocaine addiction is a rather difficult pathology to treat, and there are several approaches such as medication, religious, and psychosocial treatment. There are psychosocial approaches that derive from cognitive behavioral therapy, in addition to other approaches that consider individual rights as harm reduction. Nevertheless, these approaches do not study the phenomenon of relapse. Recursion comprises the phenomenon of relapse as something natural in the process of treatment of the drug user and as a form of learning, being these elements essential for the addiction treatment.

The phenomenon of cocaine addiction is complex and involves from chemical and pharmacological characteristics of the substance to its contexts of use. New understandings of various forms of drug presentation in the world and new treatment models need to be constantly discussed.

Conflict of interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of this chapter.

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