

## Perspectives et expériences

# Coca leaf chewing as therapy for cocaine maintenance

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**SUMMARY: Coca leaf chewing as therapy for cocaine maintenance.**

Major ethnic groups in Bolivia (Aymaras and Quechuas) have chewed the coca leaf for generations upon generations without health problems. The effects of coca leaf chewing produce a level of social and economic adaptation that is beyond what is normally possible. This was a major factor during the Spanish colonization of Bolivia, when forced native labor was used extensively.

The cocaine base, or "pasta", may be seen as a type of South American crack. Its obligatory method of administration is smoking. A primary condition of the "pasta" smoker is compulsive drug-search behavior and addiction to cocaine base destroys emotional and mental balance. Socio-economic maladjustment is the norm amongst "pasta" addicts.

Since 1984 I have recommended the chewing of the coca leaf, between 100 to 200 grams of coca leaf per week for the treatment of cocaine dependence. Since this treatment was dispensed on an ad hoc basis, it was not possible to measure the relapses. However, an assessment was conducted on the basis of mental condition and level of social and economic adaptation before and after treatment.

The patient's level of social acceptance, before treatment, only reached 60% at most, and after treatment, 26% improved their level of adaptation. Four patients among 50 reached an adaptation level of 100%. Upon final assessment, the level of social adaptation prior to treatment was only 28%, after treatment as many as 48.8% of the patients were socially adapted.

*Key-words:* Addiction, Cocaine, Coca leaf, Substitution therapy.

Bolivia is a country with less than 7 million inhabitants within a million square kilometers. It is the third largest producer of coca leaves in the world. Thousands of local factories, which harvest and process the coca leaf are spread all around the jungle. In these factories, thousands of young people work in daily contact with the product they produce, cocaine "pasta". "Pasta", which means paste in Spanish, is the most dangerous of all the forms of cocaine that is extracted from the coca leaves. We could call it a South American crack.

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**RÉSUMÉ : La feuille de coca comme traitement de substitution chez les patients cocaïnomanes.**

Les plus importants groupes ethniques de Bolivie (Aymara et Quechua) ont mâché la feuille de coca pendant des générations sans retentissement médical. La mastication des feuilles de coca, par son effet, avait pour but de faciliter une meilleure insertion sociale et économique. Cet effet était également très recherché lors de la colonisation espagnole de la Bolivie, période pendant laquelle la force de travail des autochtones était intensivement exploitée.

La cocaïne base, ou « pasta », peut être assimilée au crack d'Amérique du Sud. Elle est obligatoirement fumée. Le fumeur de « pasta » a un comportement compulsif à la recherche de produit, et l'addiction à la cocaïne base finit par détruire son équilibre émotionnel et mental. La désinsertion socio-économique est la règle chez les personnes dépendantes de la « pasta ». Depuis 1984, j'ai recommandé la mastication de la feuille de coca (entre 100 et 200 g par semaine) dans le traitement et la prise en charge des patients dépendant à la cocaïne. Depuis que ce traitement a été dispensé, de façon informelle, il n'a pas été possible de mesurer le taux de rechute. Cependant, une évaluation avant et après traitement, basée sur des critères psychiatriques et d'intégration socio-économique, a été réalisée sur 50 patients. À l'évaluation finale, 48,8 % des patients étaient bien adaptés socialement, alors que ce taux n'était que de 28 % avant traitement.

*Mots-clés :* Addiction, Cocaïne, Feuille de coca, Traitement de substitution.

In fact, the only difference between crack that we know of and "pasta" is the where it is found. Both can be smoked and both create a very strong, fast and destructive psychological dependence. On the opposite side of the scale is cocaine clorhydrate, a more sophisticated and safe drug, sniffed by higher classes and almost unknown for most of the population in Bolivia. Bolivia produces and exports cocaine base, the second stage of the production or in other words a clean "pasta". The cheapest product that is refined outside of Bolivia produces the famous Crystal or cocaine clorhydrate, this form of cocaine is also smoked.

The different characteristics between smoke or sniffing cocaine is highly determinant with regard to the user. It is impossible for the user to control the smoking of Pasta or

crack, once it is initiated the consumption goes it is own way. The user then becomes only an astonished observer watching his or her own destruction. Controlling the affect can only be done by controlling the quantity of drug. On the other hand, it is possible to have a certain amount of control when sniffing cocaine if this is done by a mentally balanced person. But it is not uncommon for problems of dependency or health risk to arise since cocaine is such a very strong stimulant that excites the user and creates euphoria, often all the way to death.

### Coca chewing

But the most popular and commonly used method for consumption of coca stimulants in Bolivia is the ancient aymara technique: the chewing of coca leaves. Coca leaves have been chewed by the Aymaras and Quechuas of Bolivia, Peru and other Andean countries for 5000 years. The leaves are not chewed but sucked. The term chewing is not an appropriate one, but as it is commonly used, we will use this term throughout this article. The technique has been developed over centuries.

The user takes a mouthful of coca leaves without swallowing them. These are previously stripped of the veins, the hard parts of the leaf, to avoid any traumatic injury to the mouth lining. Chewing is done softly, trying not to crush them totally, only enough to break the cell membranes and then let them dissolve slowly in the saliva. When the half-crushed leaves are sufficiently dampened (10-15 min), he adds the "Ilijta" or any other alkaline agent (such as sodium bicarbonate) to the pulp in his mouth. The "Ilijta" is a preparation made of several types of vegetable ash, such as the quinoa and plantain. The purpose for the "Ilijta" is to provide an alkaline medium to maximize the absorption of alkaloids from the leaves. The bulb or ball (about 8-10g) of mixture formed in the mouth, is left to lie on the gums and the mouth lining, just below the outlet of the excreting duct of the parotid salivary gland.

After a few minutes, the symptoms begin to appear, there is an intense anesthetic effect on the mucous around the bulb which also affects the cheeks, throat and tongue. It is certain that the ingestion of the juice exerts an anesthetic effect in the lower intestinal tract and at the systemic level. This would explain the custom in Andean countries to chew coca leaves or take coca infusion to alleviate pain for a wide range of ailments, headaches, toothaches, intestinal cramps, etc. It is frequently used as a dressing, applied to painful areas, such as in the area of a broken bone or arthritis.

According to my own observations I noted that the absorption of alkaloids was rapid accompanied with the elimination of fatigue, a feeling of euphoria or an antidepressant action was felt within 15 to 20 min. There was also an appearance of increased psycho-motor action, a state of tension typical to alertness, along with an increase in activity or the desire to do something. Sensory functions became more intense. Higher level intellectual activities were faster, there was a slight feeling of consciousness expansion (which could explain its use during religious rituals). Emotionally, the individual feels

euphoric, happy, optimistic, and willing to undertake action. Corporal needs, such as hunger, sleep, or rest are postponed by the energetic impulse of the momentary effects of the drug. The user's capacity to work and work yield improve noticeably.

The symptoms and effects are strong early on after the initial chewing but they disappear progressively and it is necessary to increase the intake slowly to maintain the effect. According to the work done by Carter and Mamani [1], intensive users of coca, such as miners and farmers, chew the leaf two or three times a day, sometimes even four, when the workload is heavy. This amounts to thirteen ounces a week (390g). When the habitual user (or chewer) is physically inactive, generally he/she does not consume coca or very little of it.

Consumption can be easily abandoned indefinitely without any undesirable withdrawal effects. Even when the user is chewing coca and is offered a nutritious and appetizing meal, he will stop chewing to eat. In general, the desire to chew coca can be abandoned indefinitely, without suffering physical or psychological effects, or the appearance of compulsive behavior to alleviate the desire. I have seen many habitual coca users show no signs of withdrawal symptoms when, for reason beyond their control, such as an incapacitating accident, they were forced to remain several months in a hospital without any possibilities to continue their habit, which had to be interrupted suddenly.

During my research I spent long periods of time in 1983, 1984, and 1985, in the farming communities of the coca producers. It was not possible to avoid my own habitual tendency to practice psychiatric analysis after several years of practice in my profession! I met thousands of coca chewers, descendants of Aymara and Quechua parents and grandparents who were also coca consumers. And even though it was not an in-depth analysis, I had a very close general impression, from within the community, of the effects of coca chewing on the human body inside its social context.

In my observations, I found that among the habitual coca users, the higher intellectual functions, such as abstract thought, concentration, attention span, discrimination or memory, were normal; similar to non-coca users of the same racial origin. I did not find, at any time, any physical or moral derangement among the coca users, which are typical symptoms in cocaine sulphate or pasta users. The coca users' emotional response was healthy and without distortion. Secondary symptoms, such as social and economical non-adaptation, which are typical of cocaine sulphate abusers, were absent in the case of the leaf chewer.

Additionally, I can confirm that coca chewing is a fundamental element needed for adaptation for some areas of the population. For example, it is impossible for workers enduring semi-slave labor conditions, such as the Bolivian miners, to work if they do not chew coca. This was a fact that was recognized during the many years of the Spanish Conquest, when after prohibiting coca chewing, it was not only allowed, but was in fact encouraged. The situation is similar today within the mining and agricultural industries.

### Comparison between coca leaf and cocaine base addiction

In the past 20 years during my psychiatry practice, I have seen hundreds of mentally ill patients, whilst working as a visiting psychiatrist at the National Health Fund, the Drivers Complementary Fund and the Railroad Social Security Hospitals. These hospitals have a regular incidence of habitual coca chewers. One of the symptoms found in cocaine base addicts is paranoid psychosis, we found that this symptom was not related in any way to habitual users of coca leaves. I will return to this matter further ahead when I detail how Coca Chewing can be used as a mechanism of regulation of the maximum cocaine dose.

The IBBA, an agency of the Universidad Mayor de San Andres, (the principal Bolivian university) in cooperation with the Center for Botanical and Ecological Research of the Universidad Mayor de San Simon in Cochabamba, and the French Institute of Scientific Research for Development in Cooperation (France), have developed a joint project on several scientific topics. Documents produced by this project state: "In the field of physiology, with respect to muscular exercise, we have noted that the capacity to do more work does not increase with coca chewing, but it does increase work tolerance. In relation to respiratory sensitivity, we could observe that chewing does have a stimulating effect on respiratory centers. Both findings could be related to the increase of catecholamine, found after chewing. On the other hand, the results achieved show that the chewing of coca leaves acts on hemoglobin and inhibits platelet aggregation. The results obtained indicate that coca exerts a moderating effect on general consumption of glucose. Finally, coca chewing does not influence the daily nutrient intake. The results obtained show a positive effect of coca use on the adaptation processes to life at high altitudes." [2]

The most important point in the above reference may be the increase of respiratory frequency with the resulting increase in blood oxygenation. Andean inhabitants must endure altitudes of 4,000m above sea level, where oxygen concentrations are very poor. The analeptic or stimulating effect on respiration is the perfect complement to offset this chronic lack of oxygen. This is why altitude sickness ("sorojche") is traditionally cured with the classic coca infusion, very well known by high altitude travelers.

A chronic lack of oxygen is considered the major cause of erythrocytosis, a widely known blood disease in which the organism, in an attempt to overcome the lack of oxygen, produces everincreasing amounts of red cells, thereby increasing blood viscosity, circulatory difficulties and the associated thrombosis risks. The decrease of platelet aggregation found by the investigators of the IBBA, could also explain this other interesting complement which allows life at 4,000m a.s.l. The decrease of hematocrits or red cell concentrations in chronic coca consumers was previously demonstrated by Buck, Sasaki, Hewitt and Macrae in their long-standing article "Coca Chewing and Health. [3]

From this perspective, coca plays an indispensable role in adaptation to high altitude and very hard labor. This could explain why coca became an instrument for survival when the Spaniards imposed slavery. Likewise, when the Industrial Era demanded that the Bolivian tin miners spend a second period of slavery underground. This is an indication of how the Department of Potosi, and the boom of the concentrated chemical, cocaine, became known in the modern Western World.

Why is there such a radical difference between the symptoms suffered by cocaine base addicts and coca leaves users? Why is there a contradictory benevolence in the symptoms when both parties are abusing cocaine's chemical derivatives? One clue towards an answer is in the tendency of rapid overdosing. Experiments carried out with monkeys showed that when they had learned to auto-stimulate an electrode that had been placed in the pleasure center of the hypothalamus, the monkeys died of pleasure after 4000 electric orgasms. The animals quit taking nourishment and stopped reproduction functions completely [5]. The same symptoms arise from the pulmonary intake of base cocaine which permits higher doses and generates chemical orgasms.

### Coca as a therapeutic element

I would like to point out that there is a distinct possibility that Coca leaf chewing does not allow overdosing. This is due to the fact that it is consumed via the digestive track and the limitations of the typical method of intake (chewing). There could be elements in coca leaf chewing that could be beneficial.

The famous botanist Paracelsus said: "Every element in nature has its own poison and its antidote as well." Therefore, there is a need and a new trend to revert to nature and more natural remedies. In the case of coca and its derivatives, this idea is more specific. Coca is an important source of vitamins and minerals, particularly calcium, phosphorus and vitamin B complex, which is beneficial for healthy brain function.

However, there is an antagonistic relationship between cocaine and calcium which has already been reported by Dr. Carlos Jordan during our work with drug dependent patients at CETRAR (La Paz, Bolivia, 1992). We observed that the healing process in broken bones regressed when a patient returned to his/her cocaine addiction. With the opposite effect when the cocaine consumption was stopped. The administration of calcium helped a lot, not only in the healing of broken bones, but also improved the mental state of the patients. The cocaine-calcium antagonism is well known to anyone who works with drug users; one of the most common and early effects of chronic cocaine intake is teeth damage.

If we compare the coca leaf content with the known composition of a geriatric compound, such as Zellaforte, we notice a similarity. In addition to Coca containing the same vitamins and minerals of this geriatric tonic, Zellaforte also contains a so called "youth potion" or procaine (KH3) which is a synthetic derivative of cocaine. The

coca leaf on the other hand, contains the “original” substance, or natural cocaine.

It has been argued that the coca chewer only absorbs the alkaloid, and not the natural nutrients. I have personally looked into this matter, analyzing microscopically the residues after chewing, which are usually discarded or eliminated, and found only whitish fibrous residues. Due to the chewing technique used, it is impossible to absorb only one chemical, which is dissolved in the juices resulting from the rupture of vegetal cells, when all the juice is ingested in full. There was no evidence, with which to evaluate the capacity of the human digestive tract to absorb the proteins contained in the leaf, from the feeding habits of the Andean inhabitant. In contrast to the now popular chemical method of extraction, coca extraction by mouth allows for all of the elements contained in the leaf to be assimilated. It could possibly be the combination of all these elements, in addition to other factors which we will see below, that counteracts the toxicity attributed to cocaine abuse. With chemical processing, 98% of the leaf's contents are destroyed and only a single alkaloid remains, cocaine. It is important to note that the actual effects of coca leaves can only be deduced from the examination of chronic chewers. All current scientific investigations on the abuse of stimulants derived from coca began with cocaine. This does not give license by any means, to generalize the results of these investigations and attribute them to the leaf itself.

These facts outlined above could be sufficient enough explanation of the basis for the benevolent effects of the leaf and its chewing on the human body. There is however, another factor which I consider to be important and which could explain the phenomenon.

### **Chewing, an automatic, practical regulator of the maximum therapeutic dose**

From a pharmacological point of view, we know that the effectiveness of a pharmaceutical is in direct proportion to the dosage and the regularity of its dispensation. However, we cannot deny the relationship that exists between high or rapid doses and toxicity. In this respect, the extraction of the active drug by chewing is a very important factor. We know from the laws of physics that a machine's yield is determined by several factors: size, quality of the mechanism, materials employed, energy used, etc. In this case, the mouth is the machine processing coca contents.

Due to the mouth's size, only 8-10g of leaves at a time can be processed. Extraction of the drug is slow and relatively inefficient; since the mouth, in addition to crushing the leaves, must also soak the leaves for a while in the weak acids of saliva. For analytical purposes, we will describe an imaginary coca user, who chews 24 h a day without rest, and will use the maximum theoretical capacity of his oral cavity. That would equal approximately 10g of coca leaves every 60 min, which is the minimum estimated time needed to extract the alkaloid contained in 10grams of leaves. We will also assume that the user's

oral cavity is 100% efficient! Chewing all day and night, without rest, in 24 h the user would process 240g of coca leaves. Considering that the alkaloid content in the leaves is between 0.5% and 2%, and that extraction is 100% efficient, we can conclude that our imaginary (and super efficient) chewer would be capable of extracting between 1.2 and 4.8g of alkaloid, depending on the leaves, in 24 h of continuous chewing.

It is important to remember that in the above example of an extraction process, the consumer is obligated to self-dispense the drug in a controlled form, the dose and frequency would always be the same. In the past few years, modern medications called deposit medication (Controlled Release Drugs) attempt to the same thing, but more effectively.

Carter and Mamani have demonstrated, through a study of over 3.000 leaf users, that mine workers, the largest consumers, chew an average of 13 ounces a week, i.e. extracts an average of 3.9 net grams of alkaloids per week. Therefore, the theoretical maximum dose is half a gram per 24 h (assuming 100% efficiency by oral extraction). Recent investigations conducted by the IBBA disclose that after chewing about 30g of leaves, the blood analysis indicated cocaine contents could be traced to around 98ng by using High Pressure Liquid Chromatography. That is 0.00000098g!

The research above indicates that, due to the physical and chemical reasons analyzed, coca chewing does not allow more than a minimal daily dose of the alkaloid. Additionally, it is understood that individual doses will generally always be the same, and temporally spaced.

### **Coca chewing for cocaine maintenance therapy?**

The fact that the two different forms of cocaine have the same origin and yet have such different effects over the human body, has led me to believe in the possibility of using one, in order to cure the other. To support this proposal, I selected 50 well-studied cases from the years between 1984 and 1992.

The average length of treatment was for a period of around 27 months. The patients had habitually used the drug for about 25 months prior to treatment. The social origin of the patients showed a prevalence in the lower classes. Here is important to remember that the upper classes do not consume cocaine base. The drug consumption by the upper classes is more related to the use of Crystal or chloride, which is more expensive.

### **Outcome**

The criteria I used in order to assess the outcome of this random group of patients, were the socioeconomic adaptation and mental state of each patient and not their relapses into drug addiction. Social and economical adaptation were qualified individually on a scale of 50 points.

50 points: allocated to the subjects that were employed or successfully following an educational programme.

50 points: allocated to those with very stable and good social relationships.

100 points: Total.

Another variable was taken into consideration to determine success or failure in the treatment, which was the subject's mental condition.

Bad or poor mental condition: those that showed psychotic symptoms.

Fair mental condition: no psychotic symptoms but alterations in superior mental functions or emotional disturbances such anxiety or depression were evident.

Good mental condition: when none of the above symptoms were evident.

Observing the subjects, state of mental health before and after treatment showed a clear tendency towards improvement after treatment. Before treatment only 2% demonstrated good mental health, whereas 35% reached that condition after treatment. 54% of the subjects were in a poor state of mental health before treatment and this percentage was lowered to 32% after treatment.

The effects of treatment was even more evident when I observed the subjects, ability to adapt in society and achieve a stable economical level. At the start of treatment, the majority of patients showed less than 50% ability for adaptation. After treatment there is a clear increase.

Twelve patients achieved a good level, between 80 and a 100% of social and economical adaptation. The correlation between the variables showed that when the period of prior drug use was longer, social adaptation levels were lower. When the treatment period was longer, social adaptation was higher. It is important to note again that this

study did not include the patients' relapses in the analysis. We were not able to measure patient relapses since all of the subjects in this study were out-patients. What was highly significant and important for us is that they achieved a better quality of life, with or without relapses.

Today, after several years since the above study was carried out, the chewing of coca leaves for cocaine maintenance therapy continues in a rough form. This is due to economic limitations and this alternative has become a part of the new coca culture in Bolivia. In the last year our work has received support through a training program sponsored by the COCA MUSEUM at La Paz. An "expert" trained in the difficult and ancient technique of coca chewing teaches a group of interested people.

For scientific analysis and study it is necessary to carry out another study in a controlled and closed environment. Then we would be able to quantify cocaine concentration in blood, relapses, and other variables as well as test delicate superior mental functions.

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