Available online at www.sciencedirect.com
SCIENCE DIRECT®
International Journal of Drug Policy 15 (2004) 214–216
THE INTERNATIONAL JOURNAL OF DRUG POLICY
www.elsevier.com/locate/drugpo

Short report

Morphine and codeine in the water extract of poppy straw: a traditional substitution used by drug users in Calcutta, India

Samiran Panda[a,1], Anindya Chatterjee[b], Chandan Saha[c], Sanjoy Bhattacharjee[a], Sujit K. Bhattacharya[a,d], Abu S. Abdul Quader[e,*]

[a] *Society for Positive Atmosphere and Related Support to HIV/AIDS (SPARSHA), 108 Manicktala Main Road, Flat 3/21, Kolkata 700 054, India*
[b] *Country and Regional Support Department, UNAIDS, Geneva, Switzerland*
[c] *Department of Chemistry, School of Tropical Medicine, Chittaranjan Avenue, Kolkata 700 073, India*
[d] *National Institute of Cholera and Enteric Diseases (ICMR), P-33 CIT Road, Scheme-XM, Beliaghata, Kolkata 700 010, India*
[e] *Department of Psychiatry, St-Luke's-Roosevelt Hospital Center, New York, NY, USA*

Received 16 January 2003; received in revised form 1 October 2003; accepted 14 October 2003

Abstract

Since the introduction of methadone in the 1960s, a variety of other substances have been proposed and piloted as substitutes for opioids. Recently, with the growing problem of HIV/AIDS and other blood-borne infections among drug users, oral substitution therapy has been given more importance. This paper reports on findings of an exploratory study examining the possibility of using liquid extract of poppy straw (broken pieces of poppy shell after extraction of opium seeds) as a substitute for heroin. The paper is based on observations of drug users in Calcutta, India, found drinking liquid extract of poppy straw, interviews with a sample of 103 injecting drug users (IDUs) and 39 non-IDUs, and chemical analysis of poppy straw extract. Eighty-two percent of IDUs and 72% of non-IDUs who had used poppy straw in the last year reported that it provided at least some relief from withdrawal from heroin. Findings from these two sub-studies suggest the possibility of using liquid extract of poppy straw as a substitution for heroin as well as a novel harm reduction approach for reducing blood-borne infections.

Keywords: Injecting drug use; Poppy straw; HIV; Harm reduction; India

Introduction

Since the introduction of methadone in the 1960s, a variety of other substances have been proposed and piloted as substitutes for opioids. Recently, with the growing problem of HIV/AIDS and other blood-borne infections among injecting drug users (IDUs), oral substitution therapy has been given greater prominence. This paper reports on findings from two exploratory studies conducted in Calcutta, India, describing first the use of liquid extract of poppy straw by IDUs and second, laboratory analysis of liquid extract of poppy straw. The first study, based on ethnographic observation of drug users and data collected through individual interviews with IDUs, describes the practice of drinking liquid extract of poppy straw soaked overnight in water. The second study reports on laboratory analysis of the poppy straw extract to determine its quantity of morphine and codeine. Taken together, the paper raises the possibility of using liquid extract of poppy straw as a substitute for heroin in the context of interventions oriented to harm reduction.

Study 1: Ethnographic observation and interviews

During data collection for an assessment (a different study) conducted to develop HIV prevention interventions, a number of opioid drug users were found drinking liquid extract of poppy straw. It was decided to conduct systematic observations as well as interviews with IDUs and non-IDUs involved in heroin and opioid use to further examine this practice.

The observations and interviews were conducted by two researchers over a 2-month period. Observations were undertaken at various locations where drug users were found

* Corresponding author. Present address: 3104 Rockaway Road, Atlanta, GA 30341, USA. Fax: +1-404-639-0944.
E-mail addresses: samiran_panda@rediffmail.com (S. Panda), Chatterjeea@un.org (A. Chatterjee), Quader1@msn.com (A.S.A. Quader).
[1] Fax: +91-33-3376290.

0955-3959/$ – see front matter © 2003 Elsevier B.V. All rights reserved.
doi:10.1016/j.drugpo.2003.10.004

Table 1
Characteristics of the study population

Characteristics	All drug users ($n = 142$)	Injectors ($n = 103$)	Non-injectors ($n = 39$)
Age: median (mean ± S.D.)	31 (32.7 ± 7.2)	30 (32.4 ± 7.0)	32 (33.6 ± 8.0)
No formal education	41.5%	34.0%	61.5%
Married	55.6%	50.5%	69.2%
Ever jailed	85.2%	87.4%	79.4%
Unemployed	33.8%	31.1%	41.0%
Percent began using drug ≤15 years	35.9%	35.9%	35.9%

to congregate either to buy and/or sell drugs or use drugs with others. These included a number of small neighbourhood parks, some of the low-income residential neighbourhoods, a number of tea/coffee shops within the neighbourhoods, and areas surrounding the local shopping market.

Both IDUs and non-IDUs were observed preparing and drinking poppy straw extract. The preparation involved soaking the straw overnight in a bowl of water and drinking the liquid extract next morning. The residual solid mass of poppy straw remaining in the glass was then boiled with water and ingested again as the next dose in the evening. The use of liquid extract of poppy straw was more prevalent when drug users could not obtain heroin. As the poppy straw had to be soaked in water overnight, this tended to be done alone. However, in certain cases, drug users pooled their resources to buy poppy straw and divided the liquid according to contribution made.

In order to substantiate the initial findings from these observations, 103 IDUs and 39 non-IDUs were recruited from the street and interviewed. Data were collected on demographic characteristics, experience of using or experimenting with poppy straw water as a substitute for their usual drug of choice, and their assessment of its effect on withdrawal symptoms.

Interview results

The majority of IDUs were in their early thirties (Table 1). The most frequently injected drug was buprenorphine (known locally as TD, an abbreviation for the trade-name tidigesic). This was used alone or in combination with injectable diazepam, promethazin or chlorpheniramine maleate. All non-IDUs reported smoking heroin (known as brown sugar). Among 39 non-IDUs, 13 had injected in the past. Injectable heroin was not available in the city at the time of study. They bought buprenorphine at three times the price (Rs. 30–35; $1) of the retail market through clandestine arrangements with street drug dealers or pharmacists.

Of 103 IDUs, 68 (66%) had used poppy straw water as a substitution for injection in the previous year. More than half of the non-IDUs (22/39) had also tried the poppy straw water. This was done when there was no money to buy drugs and/or the drug for smoking or injecting had suddenly become scarce. Two-thirds of the drug users reported using approximately 25–50 g of poppy straw for preparing a single dose. A little less than a third used a greater amount of poppy straw ranging from 50 to 100 g; a few soaked 25 g of the substance overnight.

Table 2
Relief from withdrawal symptoms among those who tried poppy straw water as a substitution for injecting or chasing[a]

Relief from withdrawal symptoms	Injectors ($n = 68$)	Non-injectors ($n = 22$)
Did not help	12 (17.6%)	5 (22.7%)
Some relief	38 (55.9%)	8 (36.4%)
Complete relief	18 (26.5%)	9 (40.9%)

[a] Smoking heroin.

More than a quarter (26%) of the IDUs mentioned that they experienced complete relief from withdrawal symptoms by drinking the water extract of poppy straw. A higher proportion of non-IDUs reported complete relief from withdrawal (Table 2). Reported limitations of using poppy straw as a substitute for heroin were “pleasure not as good as injecting buprenorphine or smoking heroin”, “difficulty associated with preparing it at home”, “difficulty in working/disturbance in sleep”, and “constipation”. Others mentioned the bitter taste of the preparation and a difficulty in purchasing the poppy straw. In most cases, depending on the strength of the water extract, most drug users felt almost immediate relief and it lasted long enough for them to be able to avoid withdrawal. None of the users we interviewed reported injecting the water extract.

Study 2: Laboratory analysis of water extract of poppy straw

Laboratory analyses were conducted on the water extract of poppy straw as a means of verifying and estimating the concentration of morphine and codeine in the extract. The poppy straw was bought from the local market for chemical analysis. Tap water was used for preparing the extract in order to mimic the natural conditions under which drug users prepare the extract. A high-performance liquid chromatographic (HPLC) technique was employed to estimate the concentration of morphine and codeine in the extract. A glass of distilled water (200 ml) was used for overnight (16 h) soaking of 7.5 g of poppy straw. The water extract was collected by filtration and then washed with another 200 ml of water. This was made ammonical with 3 ml of liquor am-

Table 3
Concentration of morphine and codeine[a] by HPLC[b] in the water extract of poppy straw[c]

Alkaloids	Room temperature water extract[d]	Boiling water extract of residual poppy straw after removal of room temperature extract
Morphine	3.308 mg (3308 μg)	1.598 mg (1598 μg)
Codeine	10.306 mg (10306 μg)	Below detectable level

[a] The concentration indicates average of three experimental findings in each case where the dispersion of individual data did not go beyond 500 μg from the mean.

[b] Instrument: Waters Automated gradient Controller: Waters 510 HPLC Pump; Waters Injector; Waters 484 Tunable UV detector (Detected at 254 nm); Waters 746 Data Module.

[c] 7.5 g of poppy straw (broken pieces of poppy pod shell after extraction of poppy seeds from it) available in the market was the starting material for preparing water extract and subsequent HPLC analysis.

[d] Recorded room temperature was found to be 25 °C.

monia to release organic morphine and codeine from their salt forms. The ammonical solution was extracted with 3 × 100 ml of chloroform and 3 × 100 ml of chloroform–ethanol mixture (3:1). The organic extract was washed and dried over anhydrous sodium sulphate. The chloroform extract was collected by filtration and the sodium sulphate residue was washed with 5 × 200 ml of chloroform. The chloroform was removed by distillation to obtain the organic extract which contained both morphine and codeine. One hundred millilitres of 1N alkali (NaOH) was added to separate morphine from codeine and the codeine was removed from the alkaline solution by 3 × 100 ml of chloroform extraction. The alkaline aqueous layer was acidified with dilute hydrochloric acid. This was subsequently made ammonical to extract and estimate quantity of morphine (3.1). To estimate codeine, the chloroform extract was dried over anhydrous sodium sulphate and distilled and processed as described above.

The poppy straw residue remaining in the glass was boiled with 200 ml of distilled water for 5 minutes as practised by the drug users. The hot water extract was processed in a similar way to the methods described above. Table 3 provides the results obtained from laboratory analysis which gives the concentration of morphine and codeine in poppy straw extract.

Discussion

These studies highlight the practice of drinking liquid extract of poppy straw as well as the presence of a considerable amount of morphine (3.3 mg) and codeine (10.3 mg) in the extract (7.5 g). It is unclear whether this amount can combat withdrawal symptoms. However, the findings raise the possibility of using water extract of poppy straw as a substitute for injections of heroin and buprenorphine.

Because of the growing concern about the spread of blood-borne viruses like HIV, Hepatitis B and Hepatitis C among IDUs, including in India, substituting injecting with an oral alternative—such as buprenorphine—is given serious consideration by several agencies in the country (Dorabjee, Samson, & Dyalchand, 1996). A recent study conducted in Calcutta identified an increase in injecting drug use and the risks associated with it (Panda, Chatterjee, Sarkar, et al., 1997). A substance that could combat withdrawal symptoms and help facilitate a change to oral drug use is, therefore, of immense potential importance.

However, it is important to make some cautionary points. It is necessary to take into account the fact that buprenorphine is 25–40 times more potent than morphine; the bio-availability of oral preparation is less than for its parenteral form and, in contrast to morphine, it is approximately two-thirds as effective orally as parenterally (Cowan, Doxey, & Harry, 1977; Gilman, Goodman, Rall, & Murad, 1985). One participant reported experiencing severe toxicity following ingestion of overnight water extract of 100 g of poppy straw. However, a number of participants reported complete substitution of injecting and/or smoking heroin with the drinking of poppy straw water, a behaviour change that lasted for 4 months to 2 years. As most of the participants reported taking 6 mg of buprenorphine injection (2 ml ampule containing 0.3 mg/ml) per day, it might be presumed that 50 g of poppy straw mixture could act as a useful substitute; the equivalent to taking 21 mg of morphine and 70 mg of codeine orally. In addition to considering the lesser bio-availability in oral administration compared to injection, there is the possibility of the presence of other alkaloids in the water extract of poppy straw like thebaine, papaverine and noscapine. Supervised trial and dosage titration would be necessary before suggesting a prescription.

Liberalising the use of poppy straw water may be prudent at this time. The narcotic department of police in the city has recently proscribed the sale of buprenorphine tablets. In this context, poppy straw water could be a useful substitute for heroin users in the region who do not choose detoxification and/or abstinence as an alternative to injecting drug use.

References

Cowan, A., Doxey, J. C., & Harry, E. J. R. (1977). The animal pharmacology of buprenorphine, an oripavine analgesic agent. *British Journal of Pharmacology*, *60*, 537–554.

Dorabjee, J., Samson, L., & Dyalchand, R. (1996). A community based intervention for injecting drug users (IDUs) in New Delhi slums. *Asian Harm Reduction Network Newsletter*, *1*, 3–5.

Gilman, A. G., Goodman, L. S., Rall, T. W., & Murad, F. (1985). Morphine and related opioids. In *The pharmacologic basis of therapeutics* (pp. 505–506).

Panda, S., Chatterjee, A., & Sarkar, S. et al. (1997). Injection drug use in Calcutta: A potential focus for an explosive HIV epidemic. *Drug and Alcohol Review*, *16*, 1.