Opium revisited: a brief review of its nature, composition, non-medical use and relative risks

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Abstract

Unlike the pure opioids such as morphine and heroin, opium is a complex and variable mixture of substances reflecting differences in both the starting material and the traditional practices of the regions in which it is produced. Analytical methods have improved greatly in recent years, to the point that the source of a preparation can often be identified by its opioid content and its impurities. Daily amounts used, both by smoking and by mouth, vary widely from less than a gram to 30 g, equivalent to 75–3000 mg of morphine.

The effects of opium are essentially those of morphine but unexpected toxicities, such as oesophageal cancer associated with "dross opium" and polyneuropathy due to deliberate addition of arsenic, are problems in some specific regions. Prevalence of use in different areas and countries is governed by the same factors of ease of availability, price and social acceptability that apply to the use of alcohol and other drugs in western countries. The risk of addiction to opium smoking appears to be somewhat less than to parenteral use of heroin, but appreciably greater than to alcohol. Even in countries where its use is traditional, opium smoking carries substantial risks of harm to health and social functioning.

Introduction

The use of opium, both by smoking and by oral ingestion, has a long history of medical and social acceptance in many parts of the world, not only in the opium-producing countries of Asia but also, during the 19th and very early 20th centuries, in Europe and North America (Brian, 1994; Jonnes, 1995) where it came to be regarded as a serious form of addiction. Now, however, it has to a large extent disappeared from the occidental literature on drug problems, and is not even mentioned in most recent pharmacology textbooks. The problems associated with use of, and dependence on, purified agents such as morphine, heroin and synthetic opioids have captured the attention of health and legal authorities and of the general public, to such an extent that in many countries opium is almost regarded as a thing of the past.

However, a significant amount of opium is still
used in its traditional regions in Asia (e.g. Kartikeyan, Chaturvedi & Bhalerao, 1992; Charles et al., 1994; Ganguly, Sharma & Krishnamachari, 1995). Efforts by various Asian governments to eradicate opium use appear to have led to its extensive replacement by heroin (Westermeyer, 1976; Suwanwela & Poshyachinda, 1986). Indeed, the rapid spread of HIV infection and AIDS among intravenous users of purified opioids has led to the suggestion that opium smokers should be actively discouraged from changing (Zheng et al., 1994). Moreover, it has recently become clear that opium is also used in industrialized countries in other parts of the world. Some of this is undoubtedly associated with migration, such as the evacuation of Laotian refugees to North America (Westermeyer, Ly- foung & Neider, 1989; Martin & Zweben, 1993), but this is unlikely to be the sole explanation. Recent cases of opium trafficking in Canada suggest that the drug may be finding a reception among non-traditional users.

This reactivation of illicit traffic in opium has raised problems for the judicial system, because in Europe and the Americas most judges, lawyers, and even physicians who might be looked to for expert medical information and opinion, find themselves unable to assess the importance of opium use from the point of view of its medical and social impact. For that reason, it seemed that a brief review of current knowledge on the subject might be of interest to a fairly broad and diverse group of readers.

Nature and composition of opium

Opium is a crude mixture of many different chemical substances contained in the juice of the seed capsule of the opium poppy *Papaver somniferum*. When the capsule is ripe, incisions are made in it, from which the milky juice or “latex” oozes out. This juice, when collected and allowed to dry in the air, forms a dark, sticky or crumbly mass that is known as raw opium. For medical purposes, this raw opium is dried further at 60°, powdered and assayed chemically to ensure that it contains at least 10% of morphine by weight (Terry & Pellens, 1928; Jaffe & Martin, 1985). For non-medical use by either smoking or eating, the raw opium is boiled in water for several hours, strained to remove insoluble materials, and then evaporated to form a sticky paste, known as prepared opium.

When prepared opium is smoked in a pipe the combustion is incomplete and about half the starting material is usually left adherent to the inside of the pipe as a black, dry, granular residue, which is known as dross opium. Since illicit opium is generally expensive, this dross opium is usually scraped out of the pipe and re-boiled to make more prepared opium, or added in with a new batch of raw opium to make more prepared opium (Suwanwela et al., 1978; Masood, 1979). The varying proportions of raw and dross opium account for some of the variation in appearance of different batches of opium sold in the illicit market (Lim & Kwok, 1981).

For medical use, opium is most often merely the starting material from which morphine, codeine and other alkaloids are extracted and purified. The pure alkaloids, their semisynthetic modifications (such as heroin, i.e. diacetylmorphine), or wholly synthetic compounds such as meperidine or fentanyl, have very largely replaced opium itself in clinical use. However, there is still some use of alcoholic solutions of opium given by mouth for the relief of pain, diarrhoea or cough. The available preparations are mainly deodorized tincture of opium (laudanum) and camphorated tincture of opium (paregoric). These differ in potency by a factor of 25, since tincture of opium contains 10 mg of morphine sulphate per mL of solution, whereas paregoric contains only 0.4 mg/mL. There have been occasional errors made in the prescribing of these preparations, because of failure to recognize the difference in concentration of morphine (Souney & Sharon, 1984).

Methods for the analysis of opium and its principal constituents have improved greatly over the past 50 years (Remberg, Nikiforov & Buchbauer, 1994). Formerly it was necessary to extract the opium with various solvents, fractionate the extract and analyse the individual constituents in the different fractions by separate chemical or colorimetric tests. This is still done in circumstances in which more modern methods are not available (see, for example, Vaidya, Pandlik & Meghal, 1980). In recent years this long and laborious procedure has been replaced by much simpler and more rapid ones based on different types of chromatography, including thin-layer, gas-liquid, capillary gas and high-performance liquid chromatography of simple solutions of the crude material or one-step derivatives of it (e.g. ; Fisher & Gillard, 1977; Narayanaswami, Golani & Dua, 1979; Neumann, 1984; Ayyangar & Bhide, 1986, 1988).
Table 1. Composition of opium from two different regions of India

<table>
<thead>
<tr>
<th>Region</th>
<th>Morphine (%)</th>
<th>Noscapine (%)</th>
<th>Codeine (%)</th>
<th>Papaverine (%)</th>
<th>Thebaine (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ghazipur</td>
<td>12.27 ± 0.22</td>
<td>5.47 ± 0.11</td>
<td>3.40 ± 0.07</td>
<td>1.00 ± 0.03</td>
<td>2.69 ± 0.06</td>
</tr>
<tr>
<td>Neemuch</td>
<td>11.56 ± 0.17</td>
<td>5.78 ± 0.09</td>
<td>3.61 ± 0.05</td>
<td>2.82 ± 0.04</td>
<td>2.41 ± 0.05</td>
</tr>
</tbody>
</table>

Data from Ayyangar & Bhide (1988).

The availability of these much improved methods has permitted not only the easier measurement of individual constituents of opium samples, but also the characterization of profiles or “fingerprints” based on the relative proportions of the different ingredients in a sample, including impurities and contaminants, that can help to identify the source of the sample (Narayanaswami et al., 1979; Remberg et al., 1994).

The major constituents of opium are morphine (about 10% by weight), noscapine (about 6%), papaverine (about 1%), codeine (about 0.5%) and thebaine (about 0.2%) (Reisine & Pasternak, 1996). Morphine and codeine are effective pain relievers, but are also abused as drugs for non-medical purposes. Noscapine (formerly known as narcotine) has no morphine-like effects on pain or on mood but is an effective cough suppressant, like codeine, morphine and heroin. Papaverine has no morphine-like actions, but is used medically for relief of spasm of smooth muscle in structures such as blood vessels, ureters and bile duct. Thebaine has effects that are in many ways opposite to those of morphine, and does not give rise to drug abuse or addiction; its main medicinal importance is as a starting material for the synthesis of other morphine-like compounds. Since these are all alkaloids, for solution in water they must be balanced by an equal amount of acid. The major acid ingredients of opium are sulphuric, meconic and lactic acids (Hawkins, 1937), so that the alkaloids are really present as their sulphate, meconate and lactate salts. Another preparation which was extensively used in clinical medicine some years ago is papaveretum, a mixture of the alkaloids of opium, but converted to their hydrochloride salts (Fisher & Gillard, 1977).

In passing, it is of interest to note that opium also contains a number of volatile substances that account for its characteristic odour. These are pyrazine derivatives that are detectable by trained noses, whether of humans or of police dogs (Buchbauer, Nikiforov & Remberg, 1994). However, these odoriferous substances are not morphine-like in either their structure or their pharmacological properties, so that the ability of an opium sample to be detected by sniffing gives no indication of how much morphine, if any, it contains. This must be established by proper laboratory analysis.

The actual amounts of the various alkaloids present in any given sample of opium can vary considerably from the average values stated above. For example, Ayyangar & Bhide (1988) found rather different percentages of the five major alkaloids in opium from two different regions of India (Table 1).

Vaidya et al. (1980) found even greater variations: in six samples of Indian opium, the morphine content ranged from 2.6 to 9.9%. Narayanaswami et al. (1979) analysed 10 samples of opium from different parts of the world, provided by the UN Narcotics Control Laboratory, and 19 samples from different regions of India. In the UN samples, the percentage of morphine ranged from a low of 6.97% in an Inner Mongolian sample to a high of 17.85% in one from Japan. Eight of the 10 contained over 10% morphine. The codeine content ranged from 1.71% in samples from Greece and Ecuador to 7.7% in one from China. Similarly, in the 19 Indian samples the morphine content ranged from 6.41% to 18.94%, and the codeine from 1.89% to 6.43%. The values for each sample were plotted on a triangular graph with three different axes: the % morphine, the % ratio of codeine/thebaine, and the % ratio of narcotine/papaverine. This method revealed several different clusters of points. The values for Greek and Turkish samples formed one cluster, those from Korea and Manchuria another, those from Inner Mongolia and China another, etc. The differences may represent different strains of opium poppy, different soil and climate conditions, different methods of preparing or storing the
opium, differences in degree of hydration, dilution by inert substances, and so forth.

**Routes of administration and dosage**

Opium can be used in two main ways, by oral consumption and by smoking (Hawkins, 1937). It is common to refer to oral consumption as “opium eating”, but it should be noted that this actually includes the drinking of liquid preparations of various types, including liquid extracts used medicinally, and an infusion of opium poppy heads that is known as poppy tea (Steenoft et al., 1988; Unnithan & Strang, 1993). When opium is eaten the morphine and codeine are present, as noted above, in the form of salts of various acids. In the acid milieu of the stomach they remain in the form of salts, which are very poorly absorbable across the lining of the stomach. However, in the alkaline milieu of the small intestine a substantial portion of the morphine is present as the free base, which is gradually absorbed into the bloodstream, from which it passes easily into the brain and other organs and tissues. Hence, the onset of action is delayed after oral intake of a dose, the delay corresponding to the time taken for the drug to pass through the stomach into the small intestine and be absorbed and distributed. In addition, morphine undergoes extensive first-pass metabolism in the liver after absorption from the small intestine, so that the bioavailability by this route is less than 50% (Jaffe & Martin, 1985). In contrast, when the opium is smoked the morphine in it is vaporized as the free base by the heat of combustion. The morphine vapour is rapidly absorbed across the lining of the lungs into the bloodstream, and reaches the brain within seconds. Therefore the onset of action is much more rapid and intense after smoking, but the duration of action is longer after oral intake because absorption from the intestine, although slower, continues over a prolonged period (Jaffe & Martin, 1985).

A much less frequently used route is sniffing powdered opium into the nose, as is done with cocaine (Westermeyer & Neider, 1982). This route has the advantage that absorption of the morphine begins almost as rapidly as when opium is smoked, and without the excessive loss of material that occurs through uninhaled smoke (see below). Also, it does not leave the tell-tale odour that is generated by the combustion of opium, so that the user is not as readily detected.

The pure alkaloids, morphine and codeine, as well as their derivatives such as heroin, can also be administered by injection by various routes, including the intravenous, intramuscular and subcutaneous routes. Opium itself cannot be administered by injection because it contains too large a proportion of insoluble material. Intravenous injection permits the greatest amount of drug to reach the brain most rapidly, and is the method favoured by most heroin addicts in occidental countries (Jaffe, 1985) although heroin, like opium, is widely used by smoking in many eastern countries. Smoking of opium permits the morphine to begin reaching the brain almost as rapidly as by intravenous injection, but the amount that can reach the brain in that short initial time is obviously much less by smoking, because the drug is absorbed only a little at a time, from each separate puff, whereas the entire amount can be given at once by intravenous injection.

The average daily dosage of opium used by an individual smoker varies widely. A very thorough study of 618 opium smokers in the Northwest Frontier Province of Pakistan (i.e. on the border with Afghanistan) indicated that the average daily amount used was 4.7 g, which would contain approximately 470 mg of morphine (Masood, 1979). However, the range was from 1 g to 24 g a day, the modal value being 3–4 g a day (approximately 300–400 mg of morphine). Suwanwel et al. (1978), in a study of opium use among the hill tribes in the opium-producing region of north-western Thailand, found the average daily dose of opium used by smokers to range from 0.75 g to 30 g. Westermeyer & Neider (1982), expressing the daily consumption of Laotian opium smokers in terms of money spent rather than of weight of material used, similarly found a very wide range (from US$0.25 to US$9.25 a day), although 80% of the users fell within the range of US$0.50–2.50 a day); it must be remembered that the price of opium in Laos was very much lower than in North America and Europe. Terry & Pellens (1928) estimated that the average opium smoker in the United States up to 1912 (the year in which importation of opium for smoking was banned) used about 2.5 lb of opium a year. This is equivalent to 3.1 g of opium, or 310 mg of morphine, a day. Thus, there is fairly good con-
sistency in the reports of typical dosage for smoking, in quite different parts of the world.

A similarly wide range of amounts used is seen among those who take the opium by mouth ("opium-eaters"). Thomas De Quincy (1856), whose memoirs of his opium experience are a classic, began using tincture of laudanum daily in 1813; by 1816 he claimed to be using 320 grains (19.2 g) a day, and during his period of greatest use in 1817–18 he says that he used as much as 480 grains (28.8 g of opium, equivalent to 2880 mg of pure morphine) a day. Hubbard (1881) described a female addict in New York who used 15 grains (900 mg) of morphine a day, and "Habitué" (1876) stated that a reasonable dose for a regular user was 12–16 grains (720–960 mg) of morphine sulphate a day, although he claimed to know of users who took up to 3.6 g a day. However, there may be a substantial element of exaggeration in all these claims (see below).

Smoking is a considerably more expensive way of using opium, because a high proportion of the morphine in the opium is lost during the smoking, although the magnitude of the loss may be decreased by practice. As noted earlier, about 50% remains in the charred material that adheres to the inside of the pipe bowl. Of the other half that is vaporized in the pipe, a large proportion is lost in the smoke that escapes into the surrounding air (Westermeyer & Neider, 1982). Thus, only a small fraction of the total amount placed in the pipe bowl is actually delivered into the user's lungs. In contrast, when opium is eaten, virtually the entire amount is absorbed into the bloodstream. If the fraction absorbed in opium smoking is about 20% and the modal daily dose as observed by Masood (1979) is equivalent to about 350 mg of pure morphine, the effective daily dose would be about 70 mg of morphine. The typical daily oral dose described by Hubbard (1881) and "Habitué" (1876) is equivalent to about 900 mg of pure morphine, or more than 10 times the average effective smoked dose. The maximum oral dose claimed by De Quincy, 28.8 g of opium a day (equivalent to 2880 mg of morphine), is over 400 times the typical smoked dose. For this reason, one must doubt either the accuracy of the claimed oral doses, or the potency and stability of the oral preparations used in the last century.

Effects of opium on the user

Acute effects

The term "acute effects" is used to designate those effects produced by a single dose or a short period of continuous administration of the drug. In the case of opium, the effects are essentially those of morphine, and are virtually identical to those produced by all other opiate or opioid drugs, including heroin. The major effects can be summarized by organ system, as follows (Jaffe & Martin, 1985):

Nervous system. Analgesia (blockage of pain sensation), drowsiness, euphoria, mental clouding; nausea and respiratory depression originating in the brainstem; reduced body temperature; decreased secretion of various neurohormones, including ACTH, lutetotropic hormone, and thyrotropic hormone; increased secretion of prolactin.

Cardiovascular system. Decreased tone of peripheral blood vessels, resulting in a fall in blood pressure when the person stands.

Respiratory system. Decreased depth and frequency of breathing, due to the action on respiratory centres in the brain mentioned above; decreased cough reflex.

Gastrointestinal system. Decreased motility of the stomach and intestine, resulting in temporary constipation; increased tone of the bile duct muscle, and of the sphincters (valves) at the outlets of the stomach and small intestine, which may actually cause, rather than relieve, biliary or intestinal pain; loss of appetite, that is partly of gastric and partly of nervous system origin.

Urinary system. Spasm of the ureters and sphincter of the bladder, resulting in urinary retention.

Endocrine system. Decreased secretion of the adrenal, thyroid and sex hormones.

Of these many effects, relief of pain, suppression of cough and control of diarrhoea are the major effects used medically, while the elevation of mood or euphoria is the main effect sought by non-medical users. All the other effects are generally regarded as side effects or toxicity.
Chronic effects

This term is used to designate those effects that result from the frequent repeated use, or prolonged continuous use, of the drug. To a large extent they are the predictable extensions of the acute effects mentioned above, but in the case of the nervous system there are additional consequences resulting from the ability of the brain to adapt to the presence of the drug. In addition, the manner of using the drug (smoking), and the presence of contaminants in the opium, can also have important harmful effects.

The major effects in chronic heavy users, resulting from prolongation and exaggeration of the acute actions, are:

(1) Loss of weight, due to chronic suppression of appetite (Terry & Pellens, 1928; Suwanwela et al., 1978). This may progress to an extreme degree that is referred to as cachexia. The reduced food intake also results in other consequences of malnutrition such as anaemia, and reduced resistance to infections.

(2) Chronic constipation.

(3) Chronic tiredness and lethargy. The users showing these effects are regarded as “lazy”, because they sleep late and work only sporadically (Suwanwela et al., 1978), or only part of the normal working day. In rare cases they may spend the whole day alternating between smoking and drug-induced stupor (Westermeyer, 1982, p. 90).

(4) Reduction in work and in earnings, together with diversion of money to the purchase of opium, contribute to the poor nutrition of the user, as well as to neglect of family members and other dependents.

(5) Chronic obstructive pulmonary disease, with both respiratory functional impairment and histological damage to the bronchi and lungs, that does not seem to be attributable to any concurrent use of tobacco (Da Costa, Tock & Boey, 1971; Poh, 1972).

(6) Decreased secretion of hypothalamic gonadotrophic hormones, and hence of sex hormones, tends to cause suppression of ovulation and menstruation in women and decreased sperm formation in men, so that fertility is reduced. Despite the belief among many users that opium has an aphrodisiac effect, chronic heavy users actually have decreased sex drive (Jaffe, 1985).

(7) Impairment of memory, mental slowing and reduced motivation for purposeful activities other than those related to drug use are common symptoms in chronic heavy users. That these are due to chronic toxicity in the nervous system, rather than to emotional problems of environmental origin, is suggested by the observation of various abnormalities in the electroencephalogram in up to two-thirds of a group of chronic opium-smokers (Seyfeddinipur & Rieger, 1978).

In the nervous system, the adaptive changes take the form of “drug-opposite” changes, which offset the action of the drug when it is present and thus give rise to tolerance, so that larger doses of drug are necessary to produce the effects that were formerly produced by smaller doses. When use of the drug is stopped, these drug-opposite changes now give rise to a withdrawal syndrome that is the hallmark of physical dependence. Thus, where the acute action of the drug causes constipation by suppressing motility of the bowel, the withdrawal syndrome includes cramps and diarrhoea due to excessive motility of the bowel. Similarly, the smooth muscle attached to the base of each hair follicle, which is relaxed by morphine, goes into contraction when morphine is withdrawn; this pulls the hair erect, and gives rise to the gooseflesh appearance that led to the term “cold turkey” for sudden withdrawal of opiates. Where morphine itself causes contraction of the iris of the eye, producing a pin-point pupil, morphine withdrawal causes marked dilatation of the pupil. The secretion of sweat, which is inhibited by morphine, is greatly increased during withdrawal. Most dramatically of all, where morphine produces relaxation, drowsiness and euphoria, morphine withdrawal produces agitation, restlessness, anxiety and depression. These features are sufficiently disagreeable that they are frequently responsible for the addict’s resumption of drug use in order to get rid of the withdrawal symptoms. Although not usually life-threatening, the opium withdrawal reaction is occasionally fatal in elderly addicts whose chronic smoking of opium has resulted in chronic obstructive pulmonary disease and other cardiorespiratory problems (Westermeyer, 1982, pp. 225–227).

The neonatal withdrawal syndrome can be seen
in newborn infants whose mothers were using opiates during the later part of pregnancy. This phenomenon is very well known with respect to female heroin addicts (Finnegan & Fehr, 1980), but it has also been observed in women addicted to opium smoking or to paregoric and other oral preparations (Hubbard, 1881; Terry & Pellens, 1928; Challier & Larue, 1987). The problem of the opiate withdrawal reaction is much more severe in the infant than in adults, and can be fatal in newborns if not treated promptly (Finnegan & Fehr, 1980).

Unusual chronic effects attributable to the manner of administration, or to certain contaminants in opium, have been described more recently. Widespread organ damage has resulted from the intravenous injection of crude opium (Bernheim, ten Cate & van der Heide, 1972). Mention was made above of the practice of scraping partly combusted residues of opium from the pipe bowls and re-boiling them to extract the remaining opium in them. Some years ago this practice was found to be associated with an unusually high incidence of cancer of the oesophagus in north-eastern Iran (Ghadirian et al., 1985). The explanation of this link appears to be that the dross opium scraped from the pipe bowls contains a number of carcinogenic materials, comparable to those formed during the combustion of tobacco, which have been isolated from the dross opium, chemically identified, and shown to be able to cause mutations in living cells (Hewer et al., 1978; Perry et al., 1983; Friesen et al., 1985; Tsuda et al., 1993).

Another unpredictable ill effect of chronic opium use is arsenic poisoning, characterized clinically by peripheral nerve damage, skin pigmentation and exfoliation and liver enlargement, and sometimes leading to a fatal outcome (Datta & Kaul, 1977). This problem was encountered in clusters of users who obtained their opium from the same sources in certain parts of India and Sri Lanka, where arsenic was deliberately added to the opium in the belief that it was a tonic and an aphrodisiac (Wijesekera, Henry & Ranasinghe, 1988). Despite the recognition of such cases, the practice of adding arsenic continued so persistently in certain regions, at least until 1988, that the identification and measurement of the arsenic compounds was proposed as a method for identifying the source of the opium (Wijesekera et al., 1988).

A recent report (Banerji, Dixit & Singh, 1993) indicates the presence of significant levels of the herbicide carbendazim in opium poppy material. Although no toxicity directly attributable to it has been proven, the finding indicates that the possibility of toxicity due to contaminants must always be borne in mind.

**Addiction to opium**

The use of opium is not synonymous with addiction to opium. The term "addiction" has been defined in various ways at different times and by different authorities. Much of the disagreement arose from different concepts of the relative importance of behavioural (psychological) dependence versus physical (physiological) dependence as the fundamental feature of addiction. In 1964, the World Health Organization Expert Committee on Drug Dependence recommended that the term "addiction" should no longer be used, and that it should be replaced by the term "drug dependence", which could include varying proportions of psychological and physical dependence in different cases. Nevertheless, the term "addiction" continues to be widely used. In 1989, a Committee of the Royal Society of Canada (Clarke et al., 1989) reviewed the question, examined the features common to all definitions of addiction, and recommended the following definition:

Drug addiction is a strongly established pattern of behaviour characterized by (1) the repeated self-administration of a drug in amounts which reliably produce reinforcing psycho-active effects, and (2) great difficulty in achieving voluntary long-term cessation of such use, even when the user is strongly motivated to stop.

All of the other features noted in addicts are consequences of such use, rather than defining criteria of addiction. In other words, the essential feature of addiction is the sustained high level of use, for non-medical purposes, which the user is unable to stop.

Opium is certainly able to meet these criteria, and therefore to give rise to addiction. In doing so, it can give rise to both psychological and physical dependence, as noted earlier. The degree of physical dependence in individual cases, as shown by the amount of methadone needed to abolish withdrawal symptoms at the start of
detoxication, is proportional to the amount and frequency of use, as would be expected (Westermeyer & Neider, 1982). Just as is true of other addictive drugs, the prevalence of addiction among users of opium depends upon several factors, of which the most important appear to be the degree of social acceptance of opium use, the manner in which it is used and the price and ease of availability of the drug.

Westermeyer (1977, 1979, 1981) has studied the influence of these factors on the rates of addiction in Laos and other countries of southeast Asia. His findings indicate that addiction rates are highest in the opium-growing districts, where the producers retain a certain amount of the crude opium for their own use, abundance is high, opium is present in virtually every household and the price is simply the foregoing of the extra revenue that would have come from the sale of the retained amount at very low wholesale prices. In such areas, rates of addiction ranged from 6.9 to 12.2 per 100 people. In contrast, in the urban areas constituting the final retail market for the opium, where the price in the illicit market was much higher and where availability and social acceptance were much lower, the addiction rates were only 0.3 to 2.3 per 100 people. Suwanwela et al. (1978) found even higher rates among the opium-producing hill tribes of Thailand, where the mean rate was 11.7 addicts per 100 inhabitants, but in some villages the rate was as high as 56.7% of inhabitants. It should be noted that these rates are per 100 of total population; therefore they would be about twice as high if expressed per 100 adult inhabitants.

On the other hand, a recent study in northwestern India (Ganguly et al., 1995), where opium use both by smoking and by drinking is widespread, indicated that about 10% of users were considered deviant, i.e. excessive users, by the rest of the population. This appears to suggest a low prevalence of dependence, but it is difficult to know what the criteria of deviancy may have been. Among Mien refugees from Laos, now settled in California, 80% were found to be opium users and many were physically dependent, but the use of opium was considered such an intrinsic part of Mien culture that there was no way to estimate how many might be behaviourally dependent (Martin & Zweben, 1993).

Comparison of opium with other drugs

From the point of view of the epidemiologist the relative risks of different drugs with respect to the prevalence of addiction and the probability of physical, mental and social ill-effects must be assessed under comparable conditions. Obviously, in societies such as those of North America, Western Europe and Australia, in which the great majority of adults use alcohol but very few use opium, the absolute numbers of addicts and of drug-related health problems are vastly greater for alcohol than for opium. This is not a very useful comparison for purposes of control policy. One wishes to know how the two substances would compare under conditions of comparable levels of use. The only way in which such a comparison can be made, however, is to compare societies in which social acceptance and availability are similar for the two drugs.

In Canada, approximately 80% of residents aged 15 years or older use alcohol to some extent (Single, Williams & McKenzie, 1994), but the percentage of alcoholics among those aged 20 years or more is estimated as less than 4%. The annual rate of hospitalizations for physical and mental illness related to excessive alcohol use is about 1.5% of those aged 15 or over. These figures are considerably lower than the rates estimated above for opiate addiction in Laos and other parts of Asia where opium use is as widespread and socially acceptable as alcohol use is in Canada. On this basis, one might estimate that opium is approximately three to four times as addictive as alcohol, recognizing that this is a very crude estimate based on pooled data for smoked opium and orally consumed opium. In addition, it must be remembered that cultural, economic, religious and other differences between Canada and Laos may well influence the relative magnitudes of the addiction problem, apart from the difference in drugs used.

Unfortunately it is not possible to make a comparable assessment of the relative risks of opium versus other illicit non-opiate drugs, such as cannabis, because the necessary data are not available. In 1990, approximately 5% of Canadians aged 15 or older were current users of cannabis, but this figure was not broken down to reveal the percentage who were daily users or showed dependent patterns of use. A survey in Chile found that 7.6% of the population had used cannabis in the past year (considered “current users”), and 4% were daily users.
(UNDCP, 1994). A recent review of the effects of cannabis on health (Hall, Solowij & Lemon, 1994) suggests that up to half of those who use cannabis daily for several months or longer will become dependent. This would suggest that up to one-quarter of the current users in Chile might be dependent, but this seems much too high a figure. In Venezuela, for example, 5.6% had used cannabis in the previous 6 months, but only 1.2% were daily users (UNDCP, 1994), suggesting that about 10% of current users there were dependent. The results of animal experiments suggest that cannabis is not highly addictive, and the percentage of Canadian users who are dependent is probably similar to that for alcohol, but this must be regarded merely as a “best guess”. In contrast, animal studies as well as clinical observations suggest that cocaine is much more addictive, probably even more so than heroin (Brady & Lukas, 1984).

Finally, opium can be compared with heroin in those countries where both are widely used. Westermeyer & Peng (1977) compared matched groups of opium and heroin addicts who had come for treatment in a Laotian clinic. The heroin addicts took more doses per day, spent more money on drug, required higher initial detoxication doses of methadone (i.e. were more physically dependent) and sought treatment much sooner than the opium addicts (i.e. they had run into problems sooner). The authors concluded that opium is not a harmless form of drug use, that it is clearly able to give rise to addiction, but that it takes longer than heroin does to produce problems sufficient to motivate the addict to seek treatment.

Conclusions

From the foregoing review it is probably fair to conclude that opium use, even in countries where it is traditional and accepted by a large proportion of the population, carries substantial risks of addiction and damage to health and social functioning. It is probably at least three-fold more likely to produce such consequences than alcohol or cannabis, but does so somewhat more slowly than heroin or cocaine. Its major actions are essentially those of morphine, which is its main active ingredient. Smoking opium is probably somewhat more harmful than eating it but the difference is not great, and experienced observers (Westermeyer & Peng, 1977; Ganguly et al., 1995) have concluded that it is definitely not a benign and socially harmless form of drug use.

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References

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