

Cannabis potency in Europe

There has been much recent interest in the possibility that the concentration of Δ^9 -tetrahydrocannabinol (THC), the active principle in cannabis, is now greater than it was. If pronouncements in the popular media are to be believed, the THC content (potency) is 10 or 20 times the levels of only a generation ago, giving apparent cause for concern about increased problems. The more cynical might comment that this is also a convenient rallying cry for those against an increasingly permissive attitude to cannabis use. But to what extent do the available data justify this fear? If one begins to explore the issue in more detail, it becomes evident that concerns about high potency cannabis are by no means new, and the reality appears both less alarming and more complex.

THE FACTS AS FAR AS THEY ARE KNOWN

A recent study [1] found that data overall were weak, but the evidence available suggested that the potencies of resin and herbal cannabis that have been imported into Europe have shown little or no change, at least over the past 10 years or so. This is hardly surprising, as these products have been made by traditional methods that have probably remained the same for generations. In Europe, average potencies of imported resin and herbal cannabis are typically between 2% and 8%. Cannabis (hash) oil is uncommon in Europe, but its THC content has also shown no clear trend over many years. What has changed throughout Europe and elsewhere is the appearance, from the early 1990s, of herbal cannabis grown from selected seeds by intensive indoor methods. This material, best described as domestically produced 'sinsemilla' (from the Spanish *sin semilla*—without seeds), is also known as 'skunk', 'buds' or 'nederwiet'. Its hydroponic cultivation, with artificial control of 'daylight' length, propagation of female cuttings and prevention of fertilization certainly does produce cannabis with a higher potency; on average it may be twice as high as imported herbal cannabis, although the two potency distributions overlap and some samples of imported cannabis are, and have always been, of high potency [2]. The increased THC content of herbal cannabis produced by

indoor methods is a consequence of both genetic and environmental factors as well as freshness (i.e. production sites are close to the consumer and storage degradation of THC is thus avoided). There is some evidence that the potency of domestically produced sinsemilla is gradually increasing, perhaps as a result of continual improvements in technique. This product is distributed through the same networks as other cannabis products but, as indicated by the presence of home-grow shops in some European countries, consumers are also producing the drug at home.

However, a note of caution is needed when assessing this information. Data on potency trends over 5 years or more were available only from five countries in Europe; in some of these the test sample sizes were low or unknown. Questions exist in terms of how representative the seizures are of the overall illicit market and in terms of the subsampling and selection of material from individual seizures for forensic testing. In addition, for a number of methodological reasons, both the reliability and comparability of data from different forensic laboratories were questionable. By far, the greatest number of THC analyses was carried out in Germany, with over 7000 measurements annually, but no distinction was made between imported and home-grown herbal cannabis. There has also been a rise in overall potency in North America, but in Australia and New Zealand the picture is less clear.

THE IMPLICATIONS FOR PUBLIC HEALTH

If the strength of some forms of cannabis has increased, then is this a cause for concern? The first matter to address is whether the availability of a more 'concentrated' form of a drug is in itself an issue. A parallel might be drawn here with the consumption of alcohol. Public health consequences of alcohol consumption are not a simple function of the strength of the beverage consumed, be it beer, wine or spirits. Rather, at population level, research suggests that it is the total quantity of alcohol consumed that is important rather than the concentrations in which it is sold. How far this parallel holds for cannabis is unknown, but it does raise the question of

whether the availability of high potency cannabis impacts on total consumption levels of THC. It is still unknown whether those who smoke higher potency cannabis have higher blood levels of THC or whether they titrate the dose according to the subjective and relatively immediate pharmacological effects. It should be noted that even if we consider only the smoking of cannabis cigarettes/joints, all the following factors will influence an individual smoker's dose exposure: the amount used per cigarette/joint, sharing with others, the number of cigarettes/joints consumed per session, the number of sessions in any given time period, and individual smoking technique. As Hall *et al.* [3] note, age of onset of use and frequency of use are likely to be more influential than changes in potency in determining consumption levels.

It is also important to note that, as far as we can tell, for most countries the market share of sinsemilla appears to be currently quite low. For example, in the United Kingdom it is estimated that resin comprises 70% of consumption. Of the remainder, about half comprises 'traditional' herbal cannabis and half sinsemilla. In other words, if the effective potency (the weighted average) had been 5%, then the appearance of sinsemilla can be estimated to have increased this to no more than 6%.

Of other countries for which data were available, cannabis resin was similarly the most common product in Germany, Ireland and Portugal, whereas herbal cannabis (of whatever origin) was the dominant form in Belgium, the Netherlands and the countries of Eastern Europe. The situation in the Netherlands provides an extreme example; not only does sinsemilla dominate the market, but effective potencies are well above 12%. But even here, local observers have argued that there is no evidence so far to suggest that this has led to an increase in observed problems.

The alcohol parallel raises a further question relevant to the cannabis potency debate; the alcohol and public health literature points to the crucial importance of price in determining population consumption. In respect to cannabis, robust data in this area are lacking. However, what we know is that different cannabis products are priced differentially and that prices reflect both potency and variety. In the Netherlands a close correlation between the mean THC content of different products and price has been documented. In the United Kingdom the price differential between good quality sinsemilla and imported resin (a factor of around 1.5) is consistent with their relative THC concentrations.

THE FURTHER QUESTIONS

In conclusion, we should not be unduly alarmed by the modest changes that have occurred in average cannabis

potency; but neither should we be too complacent, particularly as the evidence base is relatively weak and the relationship between potency, dose and problems remains poorly understood.

The EMCDDA study [4] cited of available data on potency was prompted in part by the observation that in some European Countries the numbers of those entering specialised drug treatment centres, who are reported as having cannabis related problems, have been rising and the suggestion that high potency cannabis may be a factor in this trend. Although no evidence was found to suggest that increased treatment demands were related to cannabis potency, if acute cannabis problems are considered, such as panic attacks or accidents at work or while driving, then a short-term dose-related impact is plausible. High-dose cannabis may also be a consideration in evaluating the impact of cannabis on the psychosocial development of young people, particularly in relation to impaired educational achievement, although again such a relationship remains speculative. An increasing body of work has noted the association between the use of cannabis with the development of mental health problems such as psychosis, depression and schizophrenia [5–7], especially in those with pre-existing vulnerability. Here, however, as noted earlier, exposure to the drug over time is likely to be the most important factor rather than potency of cannabis consumed in any one individual session of use.

Any better assessment of the impact of high potency cannabis will not be possible until and unless some major data deficiencies and questions can be resolved. These include: the availability of more data from more countries; a better understanding of relative levels of consumption of different forms of cannabis in different countries; the extent of indoor cultivation; whether home production has increased the availability of the drug; the relationship between smoking behaviour, THC blood levels and potency; the pharmacological implications of smoking cannabis with and without tobacco; more analysis of the cannabis content of cigarettes; resolution of nomenclatural inconsistencies; improvements in the quantitative analysis of THC; statistical presentation of data, including whether the mean rather than the modal potency is really the best measure of the population average; and to what extent other factors, such as earlier or more intensive use of cannabis by individuals or a wider use in the population at large, are more important than potency alone. Furthermore, critically, we are lacking the necessary epidemiological studies to illuminate how, and if, different patterns of cannabis use are manifest in the development of problems at the population level. Changing patterns of cannabis use in Europe may present us with important issues for public health, but they are not simple ones and

neither science nor the public good is served by treating them as such.

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