

Drug Abuse in Denmark (Jutland and Funen)

A Forensic Study Based upon Drugs Seized in 1982–1987

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Summary. Two thousand fifty-three samples submitted to forensic chemical analysis during the period 1982–1987 were characterized according to their content of narcotics and the year of seizure. Heroin and cannabis dominated the material, but a significant decrease in the number of heroin samples was observed in 1987. Amphetamine, on the contrary, hardly seen during the period 1982–1984, accounted for half of the narcotics submitted in 1987. The misuse of morphine, especially in the form of poppy capsules, was a problem for some years, whereas cocaine has not yet been a drug of abuse in Denmark. The mean concentrations of the heroin and the amphetamine samples were 30% and 44%, respectively, both for retail drugs and the entire material.

Key words: Drug abuse in Denmark – Heroin abuse – Amphetamine abuse

Zusammenfassung. Zweitausenddreihundertfünfzig Proben, die in Dänemark in den Jahren 1982–1987 einer gerichtschemischen Analyse zugeführt wurden, wurden nach dem Gehalt von Suchtmitteln charakterisiert. Heroin und Cannabis dominierten, aber eine signifikante Senkung der Heroinproben wurde im Jahre 1987 beobachtet: im Gegensatz zum Amphetamin. Dieses wurde kaum in den Jahren 1982–1984 beobachtet, um nachher im Jahre 1987 fast die Hälfte der zugeschickten Proben auszumachen. Der Mißbrauch von Morphin, hauptsächlich in der Form der Mohnkapseln, wurde in einigen Jahren beobachtet: Kokain wurde kaum als Suchtmittel in Dänemark beobachtet. Die durchschnittliche Konzentration der Heroin- und Amphetaminproben war 30% bzw. 44% in dem untersuchten Material.

Schlüsselwörter: Drogenmißbrauch in Dänemark – Heroinmißbrauch – Amphetaminmißbrauch)

Introduction

Drug abuse may be registered in several ways, none of which gives the sole truth about the drug problem in a country. Questionnaires submitted to, e.g., students may indicate the drug habits of this selected group. Registration carried out by treatment centers indicates, e.g., the number of addicts receiving treatment, whereas registration of drug-related deaths depicts the number of addicts dying of an overdose. In addition, the number of court sentences together with the number and quantities of drugs seized by the police authorities may be an indicator. A fall in price may be indicative of a greater supply of a drug on the illicit market.

All forms of registration depend on the resources available and the priorities made. This study deals with seizures of drugs for which a forensic chemical analysis was required, and is therefore limited by both the police resources for drug seizures and their practice regarding the requisition of a chemical analysis. As no significant change in this practice has apparently occurred during the survey period, the study gives an indication of the types of and changes in illicit drugs occurring in Jutland and on Funen during the period 1982–1987.

Materials and Methods

Two thousand fifty three samples (powders, plants, liquids, tablets, syringes, etc.) of which 1256 were dissimilar, seized in the years 1982–87 in Jutland and on Funen, were analyzed with a view to their content of euphoric drugs. The samples were considered dissimilar whenever they belonged to different seizures, contained different drugs or drug concentrations, or their wrappings differed (plastic bags, needle sheaths, paper sachets, etc.).

A quantitative analysis was performed whenever the amount of drug permitted it (>10 mg). Most often, not only the euphoriant drug but also diluents and adulterants were determined. The content of other alkaloids in heroin samples and other cannabinoids than THC in cannabis samples was used for comparative purposes.

At least two, but most often three analytical methods were used for confirmation of the identity of the euphoriant drug. The routine methods were GC, HPLC, TLC, and UV-spectrophotometry combined with qualitative tests for ions, sugars, etc. Microscopy was performed in cases of plant materials and whenever starch was suspected. Some of the analytical methods have been described in previous papers [2, 4, 7].

Results and Discussion

Table 1 shows according to the year of seizure the 2.053 samples arranged in seven groups. Five of the groups consist of the most frequently abused drugs (heroin, cannabis, amphetamine, morphine, and cocaine), whereas other euphoriant drugs and non-euphoriant each constitute a separate group.

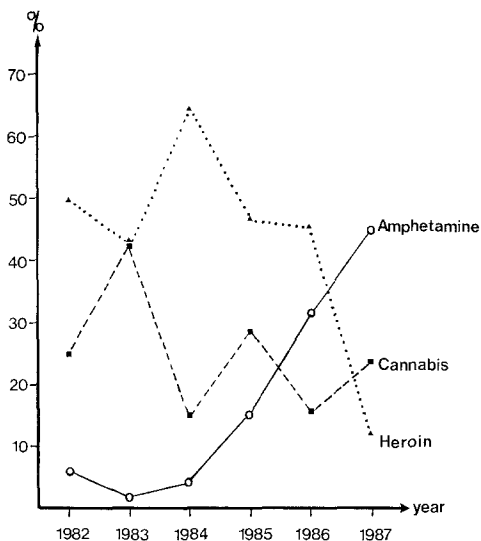
Figure 1 shows the number of samples containing heroin, cannabis and amphetamine, respectively, in proportion to the total number of euphoriant each year.

Heroin

Since the late 1970's heroin has dominated the material analyzed at this laboratory [6] and, also in this survey, is found to be the narcotic drug most frequently

Table 1. Drugs seized in Jutland and Funen and submitted to forensic chemical analysis 1982–1987

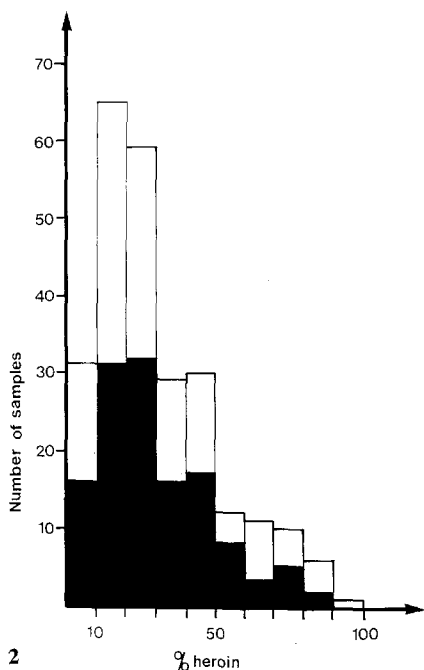
Drug	Year						Total
	1982	1983	1984	1985	1986	1987	
Heroin	119	139	145	118	91	46	658
Cannabis	60	141	34	71	33	86	425
Amphetamine	15	8	8	37	65	168	301
Morphine	22	18	9	9	3	41	102
Cocaine	0	0	7	10	1	10	28
Other euphoriant	22	24	24	8	9	19	106
Non-euphoriant	83	80	96	40	68	66	433
Total	321	410	323	293	270	436	2053

**Fig. 1.** Samples containing heroin ($n = 658$), cannabis ($n = 425$), and amphetamine ($n = 301$) in proportion to the total number of narcotics ($n = 1,620$) each year

encountered during the entire period (Table 1). From 1982 to 1986 heroin accounted for approximately half of the euphoriant samples, but in 1987 a significant decrease was registered (Fig. 1). The decrease in heroin submitted in 1987 is in accordance with a decrease in heroin seizures. In Denmark heroin is almost exclusively used for injection purposes.

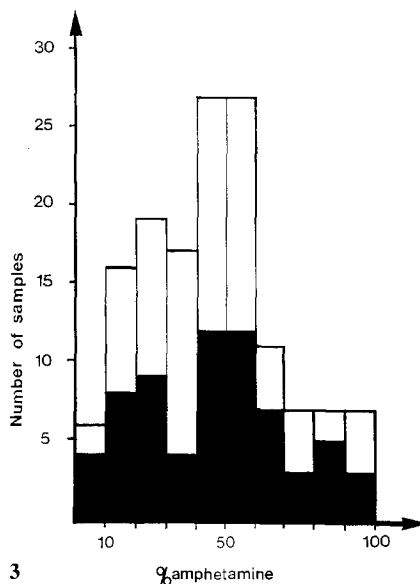
Of the 658 heroin samples, 302 were dissimilar. A quantitative analysis was performed in 84% of the cases ($n = 254$), the rest being qualitative analysis of apparently empty syringes, plastic bags, etc., containing only traces of heroin. Approximately half ($n = 130$) of the heroin samples were in consumer packages, i.e., small weights of heroin wrapped in needle sheaths, metal foil, or paper sachets.

Figure 2 shows the concentrations of the 254 different heroin samples upon which quantitative analysis was performed. The concentration of the consumer packages is also outlined. The mean concentration of the 254 heroin samples



2

% heroin



3

% amphetamine

Fig. 2. Heroin content of 254 different samples. ■ Retail samples ($n = 130$)

Fig. 3. Amphetamine content of 144 different samples. ■ Retail samples ($n = 67$)

was 30%, with a minimum of 0.2% and a maximum of 93%. The median value was 25%. The corresponding figures for the 130 samples distributed in consumer packages (street level purity) were 29% and 26%, respectively, showing no difference as compared to the total material. As compared to the strength of retail heroin in USA (approx 5%), the Danish retail purity is amazingly high [9]. Fourteen per cent of the consumer packages had a heroin concentration of more than 50% which may have caused several accidental deaths. This may be due to the fact that, according to Danish legal practice, only the weight and not the strength of the heroin is considered. Therefore, it is an advantage to be caught in possession of a small amount of strong heroin instead of a greater amount of diluted sample.

Fifty-seven percent of the heroin samples were in the base form, the rest were chloride in form. The base form has dominated since 1983 [4].

Most of the heroin samples were adulterated and/or diluted. Substances, such as caffeine, procaine, phenazone, phenacetin, methaqualone, phenobarbitone, amphetamine, chloroquine, paracetamol, ascorbic acid, salicylic acid, and sugars were found. Previous surveys on heroin have described these additives in detail [2-4].

Cannabis

Of the 425 cannabis samples, a quantitative analysis was performed in 345 cases, 260 of which were marijuana, 76 cannabis resin, and nine hashish oil.

The mean concentration of total THC (THC + THCA) of the 260 marijuana samples was 1.2%, but concentrations of up to 8.6% in fruiting tops were measured. The mean concentrations of the resin and oil samples were 7.4% and 33%, respectively.

Thirty-eight fresh hemp plants with a weight of 20–1042 g, representatively selected among five seizures, had a total THC concentration varying from 0.05% to 3.26%, a mixture of dried fruiting tops and leaves (marijuana) from the ripped plants being analyzed. The utility value, i.e., the yield of marijuana from a fresh hemp plant was approximately 8%. No connection between the THC concentration and the size of the plant was found. The content of the cannabinoids CBN and CBG was negligible, whereas concentrations of total CBD of up to 2.4% were measured.

For the total period, excluding 1983, cannabis accounted for 15%–30% of the narcotics submitted (Fig. 1). The increase in 1983 occurred prior to a judgement in a court case which stated that possession of any part of a hemp plant except the seeds was illegal without special permission from the health authorities. The effect of this judgement cannot be seen from the results in Fig. 1, but as the practice of requiring chemical analysis of especially cannabis products in particular varies greatly, the results of this study may not reflect the real misuse of the drug.

Amphetamine

Table 1 and Fig. 1 show that amphetamine was rather infrequent in the years 1982–1984. The occurrence increased from 1985, and in 1987 amphetamine accounted for half of the narcotic samples submitted. The increase is in accordance with the official drug seizure statistics, and is similar to the problem seen recently in many western European countries [1]. As a consequence of the increasing supply, a decrease in the price of street samples was noticed from 1985 to 1986 [8].

In Denmark amphetamine is injected, sniffed, and taken orally. The misusers are drug addicts supplementing their abuse of heroin, etc., with amphetamine as well as normal youths taking amphetamine for its stimulating and exciting effect.

Of the 301 samples 159 were dissimilar. A quantitative analysis was performed in 91% of the cases ($n = 144$), the rest being qualitative analysis of apparently empty syringes, plastic bags, etc., containing only traces of amphetamine. Approximately half ($n = 67$) of the amphetamine submitted was in consumer packages, i.e., small weights of amphetamine wrapped in needle sheaths, metal foil or paper sachets.

Figure 3 shows the concentration of the 144 different amphetamine samples upon which a quantitative analysis was performed. The concentrations of the consumer packages are also outlined. The mean concentration was 44% with a minimum of 2% and a maximum of 100%. The street level purity was similar. The median values were 45% and 44% for the retail samples and the entire material, respectively. All the amphetamine samples but one were in the sulfate form.

Large quantities of amphetamine were frequently damp upon receipt due to the presence of solvent residues. A weight loss of up to 30% and sometimes also color change in the material were observed upon drying.

Caffeine was a frequently used additive, especially at the end of the period. In 1987, caffeine was added to approximately two thirds of the samples. Other additives and diluents were procaine, phenazone, ascorbic acid, nicotinamide, starch, and sugars.

Morphine

The morphine group includes poppy capsules, opium, tablets as well as morphine powders in the form of base, chloride, or sulfate.

In Denmark it is very popular to steal poppy capsules from fields to make opium tea. Furthermore, dried Danish poppy capsules, which until 1986 were sold legally for decoration purposes, were also bought by narcotic addicts for tea preparation. Because of the misuse the law was tightened, and from 1986 the growing of opium poppies for decoration purposes has been allowed only after special permission from The National Board of Health. The growing of opium poppies for seed production is still allowed without any restrictions.

Danish poppy capsules may contain up to 5 mg morphine per capsule, and the content of morphine in opium from Danish poppies may amount to 24% [7]. This is similar to opium from poppies grown in a warmer climate. The Danish opium is both taken orally and injected.

Table 1 shows an increase in morphine-containing samples in 1987 which is mainly due to an increase in morphine powders (base or chloride form). Concentrations of morphine of up to 100% were measured. A special pink morphine containing other alkaloids has been seen recently.

In the first half of the 70's the misuse of morphine was greater than the misuse of heroin [6]. Perhaps the shorter supply of heroin will bring morphine back on the illicit market.

Cocaine

Cocaine only accounted for 1% of the samples in this study. Either misuse does not exist or the misusers of this drug (upper class) live in areas where the police do not normally make their seizures. Perhaps cheap supplies of amphetamine have ousted the much more expensive cocaine. Most of the cocaine seized in 1986 at the Copenhagen airport was not meant for the Danish market [8].

All cocaine samples in this study were in the form of chloride – the crack form has not yet been seen. The concentrations varied from 30% to 95%. Few samples containing mixtures with morphine or heroin („speedball“) were seen.

Other Euphoriant

This group includes all other narcotic drugs contained on the Danish list of euphoriant drawn up in 1984. Not all the drugs, e.g., the benzodiazepines were on the list before 1984, but in this survey the other euphoriant group includes

all drugs now on the list without regard to the year of seizure. Most of the drugs were in the tablet form, i.e., legally registered drugs sold on the black market.

The following drugs arranged due to their frequency of occurrence were found: Benzodiazepines (diazepam, nitrazepam, flunitrazepam, estazolam, oxazepam), ketobemidone, dextropropoxyphene, methadone, amfepramone, barbiturates, LSD, ethylmorphine, phendimetrazine, codeine, pentazocine, thebacon, STP, methaqualone, pethidine, methamphetamine, and monoacetylmorphine. Phendimetrazine and STP have not been seen since 1982 and LSD not since 1984. Methamphetamine seizures were very infrequent, which is surprising as compared to the increase in amphetamine. In contrast to many other countries, e.g., USA, methaqualone has never been a drug of abuse in Denmark.

In Denmark methadone and ketobemidone are used in drug addict treatment programs. As compared with their use and misuse they do not occur often in drugs submitted to chemical analysis. Together with dextropropoxyphene these two legal drugs were nevertheless the cause of most fatal intoxications amongst drug addicts in Jutland [5]. This is partly due to a shorter supply of heroin in Jutland than in Copenhagen.

Non-Euphoriant

Twenty-one percent of the samples did not contain euphoriant. The non-euphoriant group can be divided into identified ($n = 208$) and unidentified ($n = 225$) substances.

The substances identified were most often the adulterants and diluents added to illicit drugs (caffeine, phenazone, ascorbic acid, sugars, etc.). Mixtures of caffeine and phenazone in consumer packages were quite frequent. As phenazone, in contrast to caffeine, was not very frequently added to heroin and amphetamine samples, the occurrence of the combination suggests that these consumer packages were used to cheat rather than for diluting purposes. Also legal drugs, i.e., psychotherapeutic drugs, etc., are registered in this group. Ephedrine was seen quite frequently in 1982 but not in recent years, although the drug is known to be frequently misused.

The non-euphoriant, unidentified group consisted partly of drugs which, according to the information available, were either explosives or hormones seized from people who also dealt in euphoriant or were connected with body building centers. Others were different kinds of plant materials seized by the customs.

Conclusion

The specific substances chosen by drug addicts appear to be a function of need and availability, the latter being largely determined by economic and legal factors.

Since the 60's, cannabis has been the major drug of abuse in Denmark, whereas heroin misuse did not start until the 70's. Why the illegal misuse of amphetamine has only started recently in Denmark is incomprehensible, since the drug has been abused in Sweden for several years.

The extreme abuse of cocaine and the increasing misuse of designer drugs seen in the USA [9], has not yet been experienced in Denmark. Moreover, mixtures of narcotics frequently used in the USA were very seldom seen in this study.

The number of drug addicts in Denmark is estimated to be approximately 7000 [8]. From 1982 to 1985 a yearly number of approximately 150 deaths related to narcotics was registered. In 1986, this number decreased by about 25% [8] (the corresponding figure for 1987 is not yet available). This result, indicating a decrease in drug abuse, is neither reflected in the quantity of confiscated narcotics [8] nor in the results of this study.

The official drug seizure statistics give the quantity of the narcotics. These results may be too high if large seizures dominate or too low if seizures of narcotics intended for the Danish market are made abroad.

This study uses the number of samples and, as a large part were retail samples, the results indicate a better estimate of drug abuse in the survey period.

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