

Lethal Intoxications with Morphine in Sweden 1966–1974

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Summary. Fatal intoxications with morphine derivatives have become increasingly common in Sweden. Toxicologic data and pathologic findings in 34 cases of morphine intoxications from 1966 to 1974 in Sweden are presented. From 1972 on when morphine the black market, lethal intoxication appeared on with morphine derivatives has become more common than lethal intoxications with centrally stimulating amines.

Zusammenfassung. Tödliche Vergiftungen mit Morphinderivaten haben in Schweden in letzter Zeit zugenommen. Toxikologische Daten und pathologische Befunde von 34 Fällen, die in Schweden zwischen 1966-1974 stattgefunden haben, wurden beschrieben. Seit 1972 ist die Anzahl der Fälle von Vergiftungen mit Morphinderivate mit tödlichem Ausgang höher als tödliche Vergiftungen mit zentralstimulierenden Aminen. Von dieser Zeit an waren die Morphinprodukte auf dem Schwarzmarkt zugänglich.

Key words. Centrally stimulating amines – Codeine – Lethal intoxications, Codeine, Morphine – Morphine.

Introduction

Many reports of toxicologic data in morphine and/or heroin intoxications have been published (Siegel et al., 1966; Johnston et al., 1969; Robinson and Williams, 1971; Helpert, 1972; Garriott and Sturner, 1973; Felby et al., 1974). The main purpose of the present study was not to contribute to these data but to survey the situation of lethal intoxications with morphine and/or heroin in Sweden between 1966 and 1974 and to supplement a previous report on intoxications with centrally stimulating amines (CSA) in Sweden (Holmgren and Lindquist, 1975). During 1966 to 1974 a total of 34 autopsy cases were found positive for morphine derivatives on analysis at our laboratory.

Table 1. Pathologic and toxicologic findings in 34 cases of lethal intoxications with morphine derivatives in Sweden 1966 to 1974

Year	Age/ Sex	Case history	Morphine concentration	Other drugs	Autopsy findings	Route used
1967	16 ♀	Brought dead to hospital	7.4 mg% morphine in urine	14.9 mg% amphetamine in urine 1.2 mg amphetamine per 100g liver 3.3 mg amphetamine per 100g kidney 2.2 mg% phenmetrazine in urine 0.9 mg phenmetrazine per 100g liver 0.3 mg phenmetrazine per 100g kidney	Aspiration	Intravenous
1968	58 ♀	Suicide, found dead at home. Farewell letter	20 mg morphine per 100 g fat tissue at the injection site	6.6 mg amobarbital per 100g liver 5.9 mg meprobamate per 100g liver 1.4 mg phenazone per 100g liver	Pulmonary congestion	Intramuscular
1969	46 ♂	Found dead at home	10.6 mg% morphine in urine 2.2 mg% codeine or ethyl- morphine in urine	5.4 mg% benzodiazepine deriva- tives in urine	Pulmonary congestion	Intravenous or intramuscular
	26 ♂	Found dead at home. Heroin solution beside the body	< 0.05 mg morphine per 100g liver		Putrefaction Aspiration?	Not known
1970	17 ♂	Found dead in drug quarter	< 0.1 mg% morphine in urine		Pulmonary congestion	Intravenous

1970	18 ♂	Found dead at home	4.5 mg%	morphine in urine	< 0.1 mg%	phenmetrazine in blood phenmetrazine in urine phenmetrazine per 100 g liver benzodiazepine derivatives in blood benzodiazepine derivatives in urine	Pulmonary congestion Slight aspiration	Intravenous
1971	25 ♂	Found dead at home	0.3 mg%	morphine in urine	0.1 %	ethanol in heart blood ethanol in femoral vein blood ethanol in urine pheniazine derivatives per 100 g liver	Aspiration	Intravenous
	21 ♂	Found dead at home	1.9 mg% 1.0 mg%	morphine in urine codeine in urine	< 0.1 mg 0.06%	ethanol in heart blood ethanol in femoral vein blood ethanol in urine pheniazine derivatives per 100 g liver	Pulmonary congestion	Not known
	25 ♂	Possibly suicide	4.5 mg%	morphine + codeine in urine	1.2 mg%	benzodiazepine derivatives in urine benzodiazepine derivatives per 100 g liver	Pulmonary congestion	Intravenous
	19 ♀	Suicide, farewell letter. Found dead at home.	4.5 mg%	morphine in urine	0.3 mg 1.6 mg	methaqualone per 100 g liver	Pulmonary congestion	Intravenous

Table 1 (Continued)

Year	Age/ Sex	Case history	Morphine concentration	Other drugs	Autopsy findings	Route used
1972	17 ♂	Found dead at home	8.8 mg% morphine in urine		Slight cardiac hypertrophy Pulmonary congestion	Intravenous
	17 ♂	Found dead at home	3.0 mg% morphine in urine		Pulmonary congestion	Probably intravenous
	21 ♂	Found unconscious. Died on arrival at hospital	< 0.05 mg% morphine in urine	0.12 % ethanol in blood 0.28 % ethanol in urine	Fatty degeneration of the liver	Intravenous
	35 ♂	Alcoholic who had taken an overdose of tincture of opium	9.5 mg% morphine in urine	0.10 % ethanol in blood	Fatty degeneration of the liver Pulmonary congestion and bleeding	Oral
	17 ♀	Found dead in bed	1.2 mg% morphine in urine 0.4 mg% codeine in urine	0.4 mg methaqualone per 100 g liver	Pulmonary congestion	Intravenous
	21 ♂	Found dead at home	6.8 mg% morphine in urine 0.2 mg% codeine in urine		Aspiration	Intravenous
	29 ♀	Found dead at home	7.4 mg% morphine in urine		Pulmonary congestion	Not known

Year	Age/ Sex	Case history	Morphine concentration	Other drugs	Autopsy findings	Route used
1972	20 ♂	Found dead in a toilet. Heroin found with the body	< 0.05 mg morphine per 100 g liver	0.15 % ethanol in blood 0.26 % ethanol in urine	Putrefaction Pulmonary congestion Fatty degeneration of the liver	Intravenous
	42 ♂	Found unconscious in a hotel room. Died after 4 hours.	2.5 mg% morphine in bile		Fibrosis myocardii Bronchopneumonia Hepatitis Slight fatty degeneration of the liver	Intravenous
	36 ♂	Found dead at home	0.1 mg% morphine in bile		Pulmonary emphysema	Intravenous
	40 ♂	Found dead at home	4 mg% morphine in bile	2.0 mg salicylic acid per 100 g liver	Aspiration Pulmonary congestion Hypertrophied cordis	Intravenous
	26 ♂	Found dead in a park	0.3 mg% morphine in urine	12.7 mg% phenmetrazine in urine	Pulmonary congestion Chronic and acute hepatitis	Intravenous

Table 1 (Continued)

Year	Age/ Sex	Case history	Morphine concentration	Other drugs	Autopsy findings	Route used
1973	39 ♂	Found dead at home	0.8 mg% morphine in bile 0.2 mg% morphine in urine	0.01 % ethanol in blood 0.21 % ethanol in urine	Pulmonary and cardiac bleeding	Intravenous
	30 ♂	Found dead at home	0.5 mg morphine per 100 g kidney		Putrefaction	Intravenous
	32 ♂	Found dead at home	11.5 mg% morphine in bile	0.05 % ethanol in urine	Putrefaction	Intravenous
	23 ♂	Found dead at home	22 mg % morphine in urine		Aspiration	Intravenous
1974	73 ♂	Found dead at home Legal addict	76 mg% morphine in urine 6 mg morphine per 100 g liver 13 mg morphine per 100 g kidney		Bronchopneumonia	Intravenous
	24 ♂	Found dead in a „bar“	0.2 mg % morphine in urine	0.07 % ethanol in blood 0.13 % ethanol in urine	Pulmonary congestion Chronic hepatitis	Intravenous
	23 ♂	Found dead at home	8.5 mg% morphine in bile		Aspiration Pulmonary congestion Chronic hepatitis	Intravenous

Year	Age/ Sex	Case history	Morphine concentration	Other drugs	Autopsy findings	Route used
1974	18 ♀	Found dead at home	20 mg% morphine in bile		Aspiration	Intravenous
	28 ♂	Found dead at home	2.5 mg% morphine in urine	0.16 % ethanol in blood 0.18 % ethanol in urine	Pulmonary congestion	Intravenous
	28 ♂	Found dead at home	17 mg% morphine in urine		Pulmonary congestion	Intravenous
	19 ♂	Died in a flat	1 mg% morphine in bile	0.05 % ethanol in urine 1.0 mg% vinbarbital in blood 1.5 mg vinbarbital per 100 g liver	Pulmonary congestion	Intravenous
	21 ♀	Found dead in a public toilette	0.05 mg% morphine in blood 0.05 mg% morphine in urine		Pulmonary congestion Cardiac bleeding	Intravenous

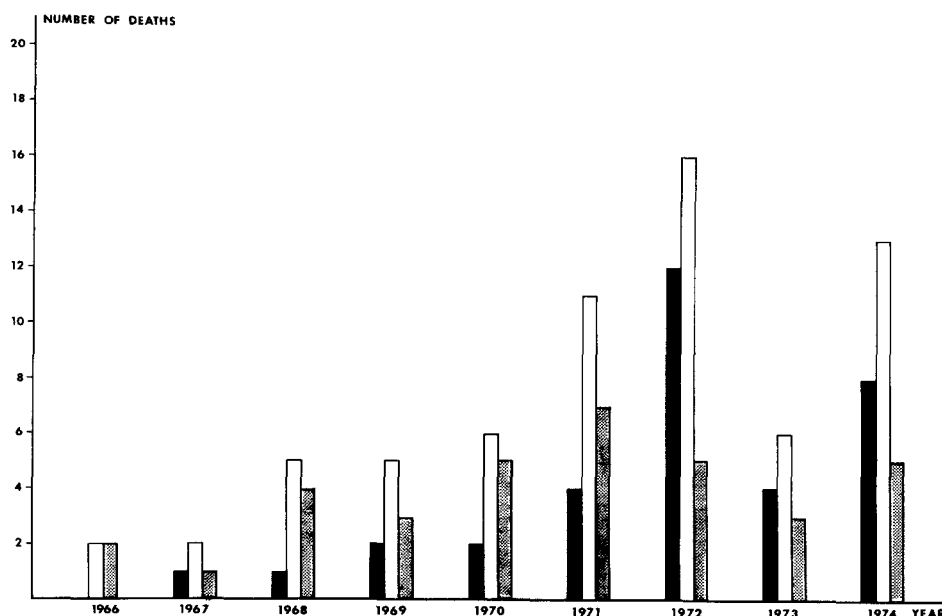


Fig. 1. Lethal intoxications with morphine derivatives and/or centrally stimulating amines (CSA) in Sweden 1966 to 1974

■ = morphine intoxication, ▨ = CSA intoxication, □ = total number of morphine and CSA intoxications

Material and Methods

The material consisted of 27 men and 7 women autopsied at the different departments of forensic medicine in Sweden in 1966 to 1974. Cases of suspected suicide or overdose are routinely screened for morphine (Bonnichsen et al., 1957; Petrovics, unpublished results), CSA (Bonnichsen et al., 1969) and other addiction drugs (Bonnichsen et al., 1961; Maehly et al., 1962) when indicated by the police reports. Since the examined material is hydrolysed in the analysis of morphine it is not possible to determine whether the drug originally taken was morphine or heroin.

Results

The morbid-anatomic and toxicologic findings are presented in Fig.1 and Table 1. From 1966 to 1974 a total of 34 lethal intoxications with morphine derivatives were registered. Before 1972 lethal intoxications with morphine were less frequent than those with CSA, but after that year the situation was reversed.

Discussion

Since 1972, when morphine base was introduced into the black market in Sweden, a large increase in the number of lethal morphine intoxications has been noted in this country. The increase in these deaths during 1972 may have been due to the fact that the addicts were unused to this new drug, which is much more dangerous than CSA.

This is shown by the marked difference between the present material and that concerning lethal CSA intoxication (Holmgren and Lindquist, 1975) in the ages of the victims. In the cases of CSA intoxication 33 % of the women and 15 % of the men were under 25 years of age, while the corresponding figures for these dying of morphine intoxication were 71 % and 52 % respectively. The increased mortality from morphine intoxication may also have been partly due to reduced tolerance following drug-free intervals, e.g. due to long periods of imprisonment and/or an uneven supply of the drug on the market.

Comments

Morphine base is the name used for illegal preparations containing morphine in different concentrations. (Hanson and Lindgren, 1973).

The method by Bonnichsen et al 1957 was used up to 1968. The method included hydrolyses of the material with hydrochloric acid, extraction with amylacetate and chloroform and separation by paper chromatography on papers with different pH zones on the same paper. Quantitative determination was achieved by ultraviolet spectrometry.

From 1969 the material is hydrolysed by hydrochloric acid 1 h at elevated pressure, extracted at pH 8-9 by chloroform, back extraction into O.I.N. sulfuric acid and reextraction at pH 8-9 with chloroform. Qualitative and quantitative determination is made by thinlayerchromatography (SiO₂/methanol: butanol: aqdest: benzen, 60: 15: 15: 10:). After development the plates are dried at 100° C for 30 min. and sprayed with Dragendorff reagents and acidified jodoplatinate. The intensity of the spots are compared with standard spots at different strength. The spots are eluted with alkaline ethanol and the concentration measured by ultraviolet spectrometry. The recovery of this method is about 50 %.

In the last years gaschromatographic determination of the trimethylsilylethers of morphine and massspectrometric identification is achieved, which is a much more specific and sensitive method than those previously used.

The sensitivity of the method can be increased further by gaschromatographic determination of the trifluoroacetylated morphine with an electron capture detector instead of the common flameionization detector. (Wallace and Hamilton, 1974).

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