Developing System for the Identification of Opiates, their Acetyl Derivatives and Adultrants by Thin Layer Chromatography

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(Received 6th November, 1983, Revised 4th May,1985)

Introduction

The separation and identification of opiates and adultrants in narcotic Seizures have occupied a major role in forensic chemistry. There are various methods for the identification of narcotic alkaloids. The colour test and crystallization tests for narcotic alkaloids may be supplemented by thin layer chromatography. TLC is widely used for the separation and identification of narcotics. It offers a screening method prior to examination by GC and HPLC. The first reported satisfactory separation and identification by TLC of heroin and actyl codeine was achieved by Nakamura [1] using solvent system 1-butanol:ammonia: butyl: ether 20:5:70. Davey et al. [2] separated morphine, 3-O acetyl morphin 6-O acetyl morphine and diacetyl morphine using benzene: methanol: ammonia 90:10:0.2 Clarke [3] recommended the following solvent systems for the separation of heroin from structurally related compounds: (a) Ethanol: benzene: dioxane: ammonia: 5:50:40:5; (b) methanol: ammonia, 100:1.5; (c) ethanol : acetate acid: water 60:30:10.

None of these systems were able to distinguish between all of the narcotics commonly encountered in illicit heroin. Huizer et al. [4] separated heroin, mono-acetyl morphine, diacetyl morphone and codeine but caffeine which is sometime present in illicit heroin was not separated from mono acetyl morphine using solvent system chloroform: cyclohexane: diethyl-amine 8:10:3. Davidow [5] developed a system ethyl-acetate:methanol: ammonia 85:10:5 but this results in hydrolysis of heroin to monoacetyl morphine. Marumo et al. [6] have separated morphine, codeine mono acetyl morphine, diacetyl morphine and acetyl codeine using solvent system diethyl ether saturated with water: acetone:diethyl-lamine 85:8:7. This is a good system for the separation of heroin from impurities. The system we developed can separate and identify morphine codeine, mono acetyl morphine diacetyl morphine acetyl codeine and adultrants caffeine and quinine. The purpose of this study is to describe additional solvent system for the separation and identification of narcotic alkaloids by T.L.C. in terms of speed of analysis, sensitivity, reliability and reproduceability.

Experimental

Thin layer chromatography was carried out on E.Merck Silica Gel GF 254 0.25 mm thick glass backed commercial plates. 0.5 % w/w methanolic solution of mixture of reference morphine, mono-acetyl morphine, diacetyl morphine, codeine, acetyl

codeine and adultrants caffeine and quinine was prepared. In the same manner solution of illicit heroin were prepared. 10 ul of sample, and 5 ul of standards were applied to plates. The plates were developed in a tank containing solvent system chloroform: n-hexane:triethyl-amine 8:10:3. The volume of solvent used for each development was 21 ml and fresh solvent was prepared for each plate developed. The point of application of sample and standards was marked with pencil line and 13 cm from starting point was marked in layer with knife. The solvent was allowed to ascend 13 cm from the starting point. The plates after development were air dried (5 minutes) and the spots were located by examination under ultra violet light at 254 nm followed by spraying with iodoplatinate reagent (1 gm H_2 Pt Cl_6 6 H_2O and 10 gm K I dissolved in 500 ml water).

Results and Discussion

Heroin in illicit traffic varies considerably in chemical composition and contains significant amount of opium alkaloids. Generally the illicit heroin in addition to diacetyl morphine contains morphine, codeine, monoacetyl morphine, acetyl codeine and adultrants caffeine and quinine. Monoacetyl morphine is invariably present in illicit heroin due to hydrolysis of diacetyl morphine which may occur depending on conditions of storage, humidity and temperature.

Apart from other analytical techniques thin layer chromatography is being used extensively for the detection and identification of drugs. The technique is particularly attractive since it offers the drug analyst a rapid means for separating drugs from adultrants. Many TLC systems have been developed for the identification of illicit heroin but none of these have separated all the compounds encountered in illicit heroin. In the present study seven compounds (opitates, their acetyl derviatives and adultrants) have been separated by new solvent system.

Table:1

Compound	Rf
Morphine	0.06
Quinine	0.09
Codeine	0.31
Caffeine	0.44
O^6-Monoacetyl morphine	0.53
Diacetyl morphine	0.7
Acetyl Codeine	0.82

The Rf values of the compounds developed according to above procedure are shown in Table 1. Clark [3] and Davidow [5] recommended T.L.C. procedures for separation of these compounds but the Rf values obtained by these methods are so close to each other that it becomes very difficult for analyst to distinguish codeine and acetyl codeine, mono-acetyl morphine and diacetylmorphine.

The system developed affords distinct separation of all the components present in illicit heroin and has improved distribution of Rf values as compared to procedures of Clark and Davidow. The method is quite sensitive in the nanogram range, very simple, specific, rapid, reproducible and very

effective in separating and detecting heroin from its derivatives and adultrants.

Acknowledgements

We wish to thank Maj.Gen. M.I. Burney, Executive Director, National Institute of Health Islamabad for his guidance, keen interest and encourgement during this study.

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