

B84 The Detection of Chloroquine in Opium Using Gas Chromatography/Mass Spectrometry (GC/MS): A Toxic Adulterant

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Learning Overview: The goal of this presentation is to establish the fact that chloroquine detection in higher concentrations in routine opium samples is of major concern for opium ingesters/traffickers, where the chances of toxicity coupled with opium alkaloids are manifold. Furthermore, chloroquine may also be characterized as a major marker of opium resin.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by providing information regarding the presence of chloroquine in opium resin specifically related to opium ingesters/abusers and its toxicity along with opium alkaloids. Moreover, this presentation will provide information that will help to determine the source of opium as well.

Opium is a dried milky exudate or latex obtained from unripe pods of *Papaver somniferum* L. Opium poppy contains more than 80 tetrahydrobenzyl isoquinoline-derived alkaloids including morphine, codeine, papaverine, noscapine, laudanine, and laudanosine. Various analytical methods are applied for qualitative detection and quantitative estimation of opium alkaloids. The opium is usually smuggled as “body packers,” “swallowers,” or “mules” using plastic bags, balloons, or condoms. Chloroquine is an antimalarial drug of the 4-aminoquinoline group. The lethal effects of chloroquine intoxication such as congestive heart failure and myopathy leading to complete heart block are observed in suicide or murder cases. It is observed as adulterant in heroin in Afghanistan, Iran, and Pakistan along with acetaminophen, phenolphthalein, and caffeine. It is quite cheap and easily available due to its crystalline nature. The addition of chloroquine in heroin samples is debatable as some Malaysian experts suggested that it increases the heroin efficacy by inhibiting the P-450 cytochrome.

The case samples submitted for forensic drug analysis were randomly selected (2017, 2018, and 2019) for analysis of opium. The methanolic extract of opium resin and plant material was analyzed using GC/MS (an Agilent® GC system 7890A series coupled to MSD 5977 with ALS 7693). The following parameters were used for GC/MS analysis.

GC (7890B)	
Inlet	Split mode (50:1)
Inlet temperature	250°C
Inlet pressure	13.332psi
Oven program	150°C for 1min then 25°C/min to 300°C for 5min with total run time of 12min.
Carrier gas	Helium (flow rate 1mL/min) with injection volume of 1µL.
Column	DB-5MS column 30m×250µm×0.25µm (Length x Internal Diameter x Film thickness)
MS (5975C) in Scan Mode	
MS Source	230°C
Scan Range Mass	43–550
Quad temperature	150°C

Major ion peaks for chloroquine were compared with that of the reference literature. Results were also compared with authentic reference library.

Morphine, codeine, thebain, papavarine, and noscapine were detected in both opium resin and plant material. Chloroquine was detected in large abundance in the majority of opium resin samples while no traces of it was detected in crushed plant parts.

This detection of higher quantity of chloroquine in opium resin enhances toxicity alone or in combination. The intoxication of chloroquine leading to suicidal effects has been vastly studied and found to be lethal at higher doses, causing a threat to the opium ingesters and body packers.

Forensic Analysis, Opium, Chloroquine