DEVELOPMENT OF A CHROMATOGRAPHIC BASED METHOD FOR THE SOURCE DETERMINATION OF "STREET" SAMPLES OF HEROIN

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ABSTRACT

The determination of the origins of "street" samples of heroin is frequently of considerable assistance to Authorities engaged in crime investigation; hence, the value of and need for the current study.

The degradation of di-acetylmorphine present in "street" samples of heroin takes place, dependent in degree, on factors such as temperature of storage, nature of packing, diluents and adulterants present. Therefore, an estimation of the di-acetylmorphine (DAM) contents of samples, some weeks after seizure, would not provide accurate data to express an opinion on their origins. This may be attributed to storage of the seized samples in different places under diverse conditions of temperature, humidity which may lead to the possible degradation of DAM.

The principal methods for the determination of the source of "street" samples of heroin currently undertaken involve the following:-

1. Determination of heroin contents of the samples
2. Determination of the Diluents and Adulterants present
3. Impurity profiling of the given samples by T.L.C. etc.
4. Estimation of the acetylcodeine/morphine ratios

This investigation was focussed with a view to evaluating a parameter, which will be of value in determining the source of "street" samples of heroin. To achieve that objective this study is based on the following principles:-

1. Determination of the constituents of the samples such as opiates, diluents etc..

2. Determination of the following ratios of the "street" samples of heroin.

(i) $\frac{\text{heroin}}{\text{acetylcodeine}}$ (ii) $\frac{\text{acetylcodeine}}{\text{acetylated compounds}}$

[(ie) diacetylmorphine(heroin)+acetylcodeine+MAM]

The first method involves the determination of opiates and diluents and/or adulterants present in the respective samples. Most illicit heroin is adulterated and/or diluted several times before reaching the user. Adulteration consists of the addition of substances like caffeine, paracetamol, diazepam, strychnine and sugars such as lactose, glucose, fructose and sucrose in order to increase the bulk of the final product. The qualitative and quantitative determinations of these substances were used as a method of source identification in this study. The techniques of thin layer chromatography (TLC) , high performance liquid chromatography (HPLC) and gas chromatography (GC) were used for this purpose.

The experimental basis of the second method is the estimation of heroin, acetyl codeine, morphine, monoacetylmorphine, paracetamol, caffeine, diazepam and strychnine contents of the respective samples followed by the determination of the respective heroin:acetylcodeine ratio and acetylcodeine:acetylated compounds ratio of the samples. These ratios would characterise the respective sources of these samples as these proportions remain constant despite any subsequent dilution of the sample.

The ratios of acetylcodeine:morphine, acetylcodeine:caffeine and opiates:diluents/ adulterants were also determined for possible confirmation of the results obtained by a consideration of the combined values of the heroin:acetylcodeine and acetylcodeine:acetylated compounds ratios. The same analytical techniques employed in the first method were also used in this.

The calculation of the Pearson Product values for all the ratios of the various constituents of the respective heroin samples was employed to identify the correlation among them. It has been statistically identified that if the Pearson Product value is greater than 0.7, the correlation between those substances is quite significant. Further if the Pearson Product value is between 0.5 and 0.7, the correlation between those substances is of fair significance.

Fifty seven "street" samples of heroin collected from different areas of Sri Lanka were subjected to analysis for the above investigation.