E2-20: A Comparative analysis of market samples of "Madana Modakaya", an indigenous drug containing *Cannabis* (ganja)

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Madana Modakaya (MM) is a very popular Ayurvedic drug containing the narcotic substance Δ^9 Tetra hydro cannabinol (THC). Unauthorized usage of this drug causes problems of addiction. There was a ban on the manufacture of the drug by the Ayurvedic Drugs Corporation some years ago. As a result numerous brands prepared by private manufacturers have flooded the market, making the problem even more acute.

Table 1 - Δ^9 THC content of packets of MM in packages of different brands.

Sample[a]	Δ^9THC %(w/w)±s.d	Range
A	0.0230±0.0066	(0.0127-0.0363)
B	0.0279±0.0036	(0.0256-0.0320)
C	0.0747±0.0157	(0.0581-0.0894)
D	0.0204±0.0040	(0.0176-0.0250)
E	0.0183±0.0040	(0.0146-0.0225)
F	0.0447±0.0094	(0.0361-0.0548)

a - 15 packets of A and 3 each of B-F.
The average weight of the pkts, is as follows:- A = 7.99 g,B = 8.66 g, C = 6.79 g, D = 7.06 g, E = 6.12 g,
F = 7.37 g

The method developed for the extraction and analysis of THC is convenient, reliable and accurate.

Market samples of MM show wide variation in the THC contents (0.0183 to 0.0747) Brand C, which had the highest THC content is not surprisingly one of the most popular brands.

It is necessary to control the levels of THC in this drug. The acceptable levels will have to be determined by a study of the manufacturing method approved by the Ayurvedic Pharmacopoeia.

By determining levels of THC in the various preparations available it is hoped to provide sufficient data to decide on the acceptability or otherwise of any of these preparations. Accordingly a method was developed to determine the THC contents of the MM samples and an analytical survey of brands available in the market carried out.

Samples (packages) of 23 brands of MM were collected from different parts of the island. Each package contained 25 small packets. Six of the most popular brands were chosen for analysis and were labelled A,B,C,D,E, and F, 15 packets chosen at random from package A, and 3 packets each from the other packages were subjected to analysis.

Quantification of THC was carried out using Gas Liquid Chromatography (GLC). Trial extractions were carried out to determine the best solvent for extraction of THC from the drug. The extraction process was monitored by Thin Layer Chromatography (TLC) on silica, with Fast Blue B salt as a spray reagent. The extract was chromatographed on a silica column, and the THC containing fractions were collected, concentrated and made up to a fixed volume prior to GLC analysis.

A standard addition recovery experiment was conducted to determine the accuracy of the overall procedure. A calibration curve was drawn using standard solutions of THC, (from United Nations Drugs Control Laboratory, Vienna, Austria) over the range 0.1 -0.5 mg/ml.

Although toluene is recommended as the best solvent for the extraction of THC from *Cannabis*, results showed that a mixture of MeOH and $CHCl_3$ (9:1) was a better solvent for the quantitative extraction of THC from the complex drug matrix (indigenous preparation).

A linear standard curve passing through the origin was obtained within the range examined ($r=0.9878$).

The standard addition recovery experiment gave a recovery of 97.2%. Analytical results for the samples are given in *Table 1*.