

## Retrospective Study of Methamphetamine and Mitragynine in Postmortem Cases

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### Abstract

*The aim of the retrospective study was to find the relationship between methamphetamine (MA), and mitragynine (MG), and several death factors such as: place, time, cause, gender and age in postmortem autopsied cases. The information was obtained from the Forensic Autopsy Department, Central Institute of Forensic Science (CIFS), Ministry of Justice, Thailand, during the five-year period from January 2008 to December 2012. A total of 562 fatal cases consisted of 370, 174, and 18 for MA, MG and both, respectively.*

*The most common cause of death of MA cases was from firearms followed by traffic accidents and asphyxia, whereas MG cases were from disease. The relationship between drug substances and other factors such as age, place of death, and cause of death were statistically significant at  $p$ -value  $< 0.01$ . However, the fatal effect of MG on death from disease was unclear. Further studies on the fatal effects of MG on the cardiovascular system are needed.*

**Keyword:** Mitragynine, Methamphetamine, Cause of death

### 1. Introduction

Narcotic drug is one of the serious problems in Thailand. Number of people involved in the drug prosecution showed an increased tendency every year from 2008 to 2012 (POLIS Data base of Thai Royal Police). Moreover, the data of the drug users who attend

the treatment program reported by the Thai Office of the Narcotics of Control Broad (ONCB showing the top five drugs abuse in 2010: MA, Cannabis, Volatile Substance, Heroin and *Mitragyna speciosa* Korth (MG, Kratom in Thai). Kratom is considered as an illegal plant in Southeast Asia including Thailand, Australia, Myanmar and Malaysia. At present, the ONCB is trying to list Kratom outside the illegal drug. In Thailand, Kratom has been controlled since 1943. In 1979, it had been listed as one of five Thai narcotics categories by the Narcotic Control Division in Food and Drug Administration, Thailand [1]. At present, the Thai government is trying to list *Kratom* outside the illegal drugs.

Kratom is used to motivate work and ability to do hard monotonously physical work such as farmers and hard workers.

MA, derived from amphetamine, was used in the treatment of depression, obesity and nasal congestion [2]. Deaths associated with MA, homicidal or suicidal violence had been reported.

The aim of the retrospective study was to relate MA, MG, and several death factors such as: place, time, cause, gender and age in postmortem autopsied cases.

## 2. Material and Method

The information was obtained from the Forensic Autopsy Department, Central Institute of Forensic Science (CIFS), Ministry of Justice, Thailand, during the five-year period from January 2008 to December 2012. For each case, data were extracted from a death certificated. The variables collected are general information such as name of dead, age, gender, and occupation. The other variable is cause of death which was determined by the forensic pathologist considering testimony of witness and autopsy report. The numerical data in the present study were analyzed by using descriptive statistics and Chi-square test.

## 3. Results

A total of 562 autopsy cases were studied and classified into three groups according to MA, MG and both drugs.

- MA 370 cases (65.84%)
- MG 174 cases (30.96%)
- Both MA and MG 18 cases (3.20%)

The number of MA cases was increased from 2009, and the highest was 30.27% in 2012. The numbers of MG cases fluctuated over the five-year of study. It rapidly increasing from 6.32% (2009) to 29.31% (2010) and drop down again in 2011 (Table 1).

**Table 1** Distribution of postmortem cases classified by substances and year

Years	Drugs		Number of Cases (%)
	MA (%)	MG (%)	
2008	50 (13.51)	2 (1.15)	52 (9.56)
2009	47 (12.70)	11 (6.32)	58 (10.66)
2010	75 (20.27)	51 (29.31)	126 (23.16)
2011	86 (23.24)	46 (26.44)	132 (24.27)
2012	112 (30.27)	64 (36.78)	176 (32.35)
Total	370 (100)	174 (100)	544 (100)

## 4.1 Characteristics distribution of MA and MG in autopsy cases

Both MA and MG were found in males more than females. According to the age, most MA cases (262 cases, 70.81%) were found in young adult (22-40 years). While MG cases were mostly found in the middle age (91 cases, 52.30%; 41-60 years), and followed by young adult group (67 cases, 38.51%; 22-40 years). The average age of MA cases was 31.24 years old (SD = 9.42). The average age of MG cases was 42.40 years old (SD = 10.93). The detected substances and the age groups were significantly associated when the elderly group (>60 years) was not included (Table 2).

The occupation of MA, and MG cases were student, employee, trader, agriculturist and unemployed (Table 3). More than half of the MA and MG cases, deaths were found in the employee group (MA cases n = 261, 70.54%; MG cases n = 135, 77.59%). However, the association between occupations and drugs was not statistically significant.

**Table 2** Distribution of postmortem cases classified by substances and age

Age Group (year)	Drugs		Number of Cases (%)
	MA (%)	MG (%)	
13-21			58 (10.66)
22-40	52 (14.05)	6 (3.45)	329 (60.48)
41-60	262 (70.81)	67 (38.51)	144 (26.47)
> 60	53 (14.32)	91 (52.30)	13 (2.39)
	3 (0.81)	10 (5.75)	
Total	370 (100)	174 (100)	544 (100)

$\chi^2 = 98.942$ ,  $p$ -value = 0.000, Significant at  $p$ -value < 0.01\*

\*Elderly group (> 60 years) was not considered.

#### 4.2 Factors involved in MA and MG autopsy cases

Two factors of death were considered: time of death and place of death. The night time was the most frequent time of death in MA and MG cases but different in period of time. In statistical analysis using chi-square, the result showed no association between time of death and drugs ( $p$ -value = 0.077).

When a place of death where the bodies found was considered, the most common place of death in MA was public places (180 cases, 48.65%). For MG cases, deaths were often occurred at home or living places (60 cases, 34.48%) such as apartment, dormitory, rented house and construction worker camp.

**Table 4** Distribution of postmortem cases classified by substances and place of death

Places of death	Drugs		Number of Cases (%)
	MA (%)	MG (%)	
Living Place	92 (24.87)	60 (34.48)	152 (27.94)
Public Place	180 (48.65)	58 (33.33)	238 (43.75)
Hospital	79 (21.35)	49 (28.16)	128 (23.53)
During Transfer	19 (5.14)	7 (4.02)	26 (4.78)
Total	370 (100)	174 (100)	544 (100)

$\chi^2 = 12.901$ ,  $p$ -value = 0.005, significant at  $p$ -value < 0.01

#### 4.3 Causes of death in MA and MG autopsy cases

There was association between drug and the causes of death in MA and MG autopsy cases. ( $p$ -value = 0.000, Table 5), except toxin related death. The results showed that disease had the greatest number in MG cases ( $n = 39$ , 22.41%) when compared to the other causes of death (Table 5). The highest disease diagnosis in MG cases was cardiovascular disease ( $n = 23$ , 58.97%).

**Table 5** Distribution of postmortem cases classified by substances and causes of death

Causes of Death	Drugs		Number of Cases (%)
	MA (%)	MG (%)	
Organ failure	44 (11.89)	26 (14.94)	70 (12.87)
Diseases	35 (9.46)	39 (22.41)	74 (13.60)
Traffic accident <sup>d</sup>	66 (17.84)	34 (19.54)	100 (18.38)
Drowning	10 (2.70)	7 (4.02)	17 (3.13)
Electrocution	15 (4.05)	15 (8.62)	30 (5.52)
Firearm	84 (22.70)	6 (3.45)	90 (16.54)
Toxin	5 (1.35)	1 (0.58)	6 (1.10)
Blunt force injury	35 (9.46)	28 (16.09)	63 (11.58)
Sharp force injury	26 (7.03)	5 (2.87)	31 (5.70)
Asphyxia	50 (13.51)	13 (7.47)	63 (11.58)
Total	370 (100)	174 (100)	544 (100)

$\chi^2 = 58.933^e$ ,  $p$ -value = 0.000,  
Significant at  $p$ -value  $\square$  0.01\*  
<sup>d</sup> Including driver, passenger and pedestrian deaths  
\* Not consider toxin related death

## 5. Conclusion

### 5.1 The Association between Substances Detected and Characteristics / Factors of Death

For the association between drugs and age, the interesting health problems are an increment in drugs abuse in young postmortem cases (13-21 yr.). The main targets were children, parents or family. They should be

warned about the danger of drugs. Another way to solve this problem is to increase police workforce and create extremely effective law to stop illegal drug dealers.

### 5.2 The Association between Substances Detected and Causes of Death

The association between substances detected and causes of death were statistically significant. The highest number of firearm deaths indicated in MA cases was related to violence. According to traffic accident deaths, the police use the law enforcement and blood or breathe alcohol test to reduce the traffic accidents. The traffic accident death was almost 20% of 544 MA and MG cases. The results suggested that except alcohol test, the police should also test other drugs.

For the association between cause of death and drug abuse, the result revealed that MG users commonly died from disease which different from MA cases. The main disease in MG cases was involved cardiovascular system which was similar to MA cases. Kaye and colleges (2007) concluded the effect of MA on cardiovascular system. MA has adverse and potentially fatal effects on the cardiovascular system [3]. For MG cases, Grewal and Macko investigated the effect of MG to cardiovascular system in animal [4]. However, the fatal effect of MG on cardiovascular system is still unclear.

It was found that 18 male used both MA and MG; and there were 6 cases (33.33%) that used substances with alcohol which might be a cause of death. The combination between drugs and alcohol can lead to extreme depression of the Central Nervous System and be fatal, especially with MA. The use of MA with alcohol could not counteract the effects of MA. This is dangerous because the user would be less aware of the effect of the drug in his or her body.

### References

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