

# Stimulant Methamphetamine and Dextromethorphan Use Among Thai Adolescents: Implications for Health of Women and Children

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**Abstract** For over a decade, amphetamine-type stimulants have made their way into the adolescent culture of Thailand. Coupled with the more recent emergence of the legal, over-the-counter cough medicine dextromethorphan (DM), they represent the most commonly abused substances among Thai youths today. Methamphetamine is the second most popular drug of abuse in Thailand, the first being cannabis. It is available in the crystalline version, ICE, and the less pure methamphetamine tablets. The tablets are frequently crushed and smoked. Its use has gained enormous popularity among teenagers and young adults, including women of child-bearing age. As such, it has become the most common drug being detected in the urine of peripartum women, resulting in peripartum and postpartum complications for both mother and child. DM is a newer drug which has gained popularity among middle school and high school students due to its easy availability as a single product over the counter. It is usually taken with soft drinks at parties and gathering. It is metabolized by CYP4502D6 to dextrophan, the substance responsible for the feeling of euphoria. Consequently, those who are poor metabolizers often experience the “negative” effects associated with the drug. The

recreational use of methamphetamine and dextromethorphan in teenagers and young adults in Thailand is a serious problem. Recognizing not only the toxicological but also the emotional and psychosocial impacts of these drugs on Thai youth is an integral part of approaching the problem.

**Keywords** Methamphetamine · Dextromethorphan · Adolescent · Recreational drugs · Thailand

## Introduction

For over a decade, amphetamine-type stimulants (ATS) have made their way into the adolescent culture of Thailand. Coupled with the more recent emergence of the legal, over-the-counter cough medicine dextromethorphan (DM), they represent the most commonly abused substances among Thai youths today. Their physical, emotional, and psychosocial impacts are felt not only by the teenagers themselves but also by their families, schools, and communities.

## Methamphetamine: The Tried and True Illicit High

### History of Methamphetamine in Thailand

Originally called “Ya Ma” or “horse tablet” in Thai, the original amphetamine manufactured by the Wellcome Foundation had a horse emblem on it. The name gained popularity among young male truck drivers and farmhands for its stimulant effect, allowing them to combat fatigue and work for longer periods of time. In 1996, the Thai Ministry of Public Health changed the drug’s name to “Ya Ba” or mad medicine in the attempt to give a negative connotation to the

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drug which had been implicated in several cases of severe hallucinations and psychotic behavior [1, 2].

#### Who are the Users of Methamphetamine?

Most ATS are manufactured in the Southeast Asian region, particularly methamphetamine, thus making them highly accessible. For population ages 15–64 years, methamphetamine is the second most popular drug of abuse in Thailand, the most popular being cannabis [3]. Methamphetamine is also the primary substance of abuse in 82 % of Thais seeking treatment for addiction in 2009. Data from the Thayarak Hospital Drug Treatment and Rehabilitation Center from 2006 to 2010 show that, while the largest group (approximately 20 %) seeking treatment comprised 15- to 19-year-olds, the proportion of 0- to 14-year-olds seeking treatment has grown from 8 % in 2006 to nearly 14 % in 2010 [4]. In a survey of 15- to 21-year-old vocational students in Northern Thailand, the prevalence of having ever used methamphetamine is 41 % [5].

#### Types and Mode of Abuse of Methamphetamine in Thailand

Amphetamine can be ingested, smoked, snorted, or injected. Methamphetamine in Thailand is available mainly as crystal methamphetamine, or ICE, and methamphetamine pills in which pure methamphetamine has been adulterated with other substances and made into pill form. In Thailand, the most popular method of use is by smoking crushed methamphetamine tablets from either the tin foil lining from a cigarette pack or specially formulated bamboo straws [6]. The smoke is inhaled in a fashion similar to the “chasing the dragon” method described for heroin users [7]. Price remains the biggest factor influencing the drug’s popularity. One tablet of methamphetamine is sold for 200 THB on the street, while a gram of ICE is sold for nearly 2,000 THB (65 USD, 49 Euro, 41 GBP). In 2005, The Regional Medical Center 10 in Chiang Mai Province studies the constituents of methamphetamine tablets confiscated in the area. They are found to have at least 19 colors with seven variable emblems, most of them with the letters WY, and containing an average of  $23.32 \pm 9.01$  mg of methamphetamine per 100 mg tablet. The rest of the tablet is adulterated by other stimulants such as caffeine, theophylline, or ephedrine. A more recent analysis of the pills shows methamphetamine content to be declining to as little as 15 mg per 100 mg tablet [4].

#### Methamphetamine in Special Populations: The Pregnant Woman and Her Infant

Smoked methamphetamine is also associated with high-risk sexual behaviors such as unprotected sexual intercourse.

Almost 15 % of methamphetamine users who are in a rehabilitation program are under the age of 18 years [6]. Since the year 2001, Yaba has become the most common illicit substance found in the urine of antenatal women at Siriraj Hospital, Bangkok, Thailand. According to the hospital’s data, pregnant women under the age of 18 years make up nearly 30 % of this population. Typically, the majority of these women do not obtain prenatal care (72 %), and nearly 40 % are unwilling to take the infant home after delivery [8].

Methamphetamine has also been found to cross the placenta and is excreted significantly in breast milk. Bartu et al. [9] assayed methamphetamine and amphetamine concentration in breast milk samples after two women injected their “usual” doses. In both milk and urine, methamphetamine is the predominant drug, with amphetamine being found in very small amounts in both. The half-lives of methamphetamine in breast milk were 13.6 and 7.4 h. The total absolute infant dose of methamphetamine and amphetamine for both subjects, given in methamphetamine equivalents, were 17.5 and  $44.6 \mu\text{g kg}^{-1} \text{day}^{-1}$  during the first 24 h after use. Given that one tablet of Yaba weighs approximately 93 mg and the average methamphetamine content is 22.8 mg per 100 mg of pill weight, this equates to about a third to half a tablet of Yaba daily which can be delivered to infants who are exclusively breastfed. Therefore, contrary to the WHO’s recommendation regarding breastfeeding, it is an accepted practice at Siriraj Hospital to recommend withholding breastfeeding for up to 48 h in this particular group of mothers. The trade-off is the missed opportunities for early mother–infant bonding through breastfeeding, which is a protective factor against abuse and neglect later on in life.

The adverse effects of methamphetamine exposure in utero and during infancy have been demonstrated. Intrauterine exposure causes decreased growth parameters of exposed newborns [8] as well the decreased growth trajectory in the first 3 years of life [10]. Infants that have been exposed to concurrent cigarette smoke as well as methamphetamine in utero are more likely to have intrauterine growth restriction. Other long-term consequences are neurobehavioral and include increased aggressive behavior, delayed acquisition of mathematics and language skills, and poorer visual recognition memory [10, 11].

#### Neonatal Abstinence Syndrome

In adults, methamphetamine withdrawal is characterized by increased sleeping and eating and depression-related symptoms. A similar abstinent syndrome of sleep disturbance, feeding intolerance, and irritability has been reported in infants exposed to methamphetamine in utero. The incidence can vary from as low as 2 % to as high as 49 % in some studies. However, unlike its cocaine

counterpart, methamphetamine withdrawal in neonates rarely necessitates pharmacologic intervention [8, 11, 12].

### Dextromethorphan: The Over-the-Counter High

#### History of Dextromethorphan in Thai Youths

Unlike methamphetamine, the recreational use of DM in Thailand is a relatively new phenomenon. Its illicit use was first reported in Korea in 1998 and in the USA in 2000. However, to this author's knowledge, the first report of DM abuse in Thailand appeared in 2005 [13]. It is available as a 5-mg, single-product tablet. This, coupled with its low price of 1 THB per tablet (0.03 USD, 0.02 Euro, 0.02 GBP), has made it a very popular recreational drug among teens.

#### Who Uses Dextromethorphan?

Non-medical use of DM is prevalent among teenagers. The American Poison Control System reported a 300 % increase in DM cases in teenagers 13–19 years of age in 2000–2003 [18]. In May 2010, a group of Thai middle school students procured DM tablets from an Internet game shop proprietor near their school. Over 80 students were involved in the incidence, with 44 being seen at a nearby hospital. The dose ingested varied from 0.3 to 9.8 mg/kg. Of these, approximately 45 % experienced tachycardia and vertigo, 27 % had hypertension, and 11 % experienced mental status changes (personal communications) [14]. In Thailand, the most common scenario for using DM is in a group situation where the drug is distributed among friends and several pills are mixed in soft drinks such as coke or orange juice [13]. Many teenagers feel that recreational use of dextromethorphan is a safe, viable alternative to other “illicit” recreational drugs such as ketamine or methamphetamine. Information available on the Internet regarding its low price, wide availability, lack of significant physical dependence, and withdrawal have encouraged the recreational experimentation of this drug [15].

#### Metabolism and Special Genetic Susceptibility

DM is converted by the CYP450 2D6 to three active metabolites in humans, namely, dextrophan, 3-hydroxymorphinan, and 3-methoxymorphinan. Of these, dextrophan has been the most extensively studied. Dextrophan is a more potent antagonist of the glutamate receptor *N*-methyl-D-aspartic acid (NMDA) which is responsible for the reported “positive” psychotropic effects. At very high doses, it can also produce sensation such as euphoria, distorted perception, and

dissociative anesthesia that are seen with other NMDA antagonists such as PCP and ketamine. CYP 2D6 exhibits polymorphism in certain ethnic groups. Greater than 75 % of Chinese-Asians have decreased CYP 2D6 activities and are poor metabolizers of the drug. The parent compound, DM, is known to increase central dopamine level as well acts as a weak serotonin reuptake inhibitor. Poor metabolizers, with increased DM level, often report more “negative” or undesirable effects such as intense hallucination, psychosis, and psychomotor disturbances, which are related to the dysregulation in the levels of dopamine and serotonin [15, 16].

### Clinical Presentation and Management

The symptoms and toxicity of DM are dose-dependent. Patients present with a combination of sympathomimetic, psychedelic, and serotonin symptoms. Users often describe an “out of body experience” and present with pronounced tachycardia, hyperexcitability, and nystagmus. There can also be significant hypertension, hypertonia, and hyperthermia in very large overdoses and life-threatening symptoms such as stupor, coma, seizures; respiratory depression can also occur. The use of naloxone in treating respiratory depression from dextromethorphan overdose is still controversial. Some case reports suggest that repeated doses should be used if reversal of opioid toxicity does not occur, but no clear recommendation of dosing regimen exists [15, 17, 18].

### Conclusion

ATS and DM have gained unprecedented popularity as recreational drugs among Thai adolescents. Their effects, both short term and long term, are diverse depending on the drug, but in both cases can be permanent. Efforts must be made to control their distribution, abuse potential, and their far-reaching complications.

**Conflict of interest** There is no conflict of interest to report.

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