MDMA (ECSTACY): USEFUL INFORMATION FOR HEALTH PROFESSIONALS INVOLVED IN DRUG EDUCATION PROGRAMS

CARRIE ELK, M.ED.
The Pennsylvania State University

ABSTRACT

3,4-Methylenedioxymethamphetamine (MDMA; "Ecstacy") is an amphetamine derivative that is related chemically to both amphetamines and hallucinogens. Despite reports of an increase in MDMA usage among adolescents and young adults in the past decade, systematic scientific information concerning MDMA and its effects remains insufficient, thus limiting or eliminating MDMA from inclusion in the drug education curriculum.

Although conclusive research data about the nature and effects of the drug is not currently available, several studies have produced, some consistencies regarding MDMA use in light of user profile, administration, dosage, patterns of use, and psychological and physiological effects. The available information about MDMA to date has been acquired through uncontrolled clinical trials and descriptive reports. The Food and Drug Administration recently has approved MDMA for formal human research, so the possible dangers of recreational use of this illegal designer drug need to be addressed. This article provides a brief history of MDMA, a summation of current findings, and implications for including MDMA in drug education.

Little information about the effects and dangers of MDMA is being conveyed by educating those who most commonly encounter or use the drug. MDMA is a stimulant/hallucinogen commonly used recreationally on college campuses and even more so in dance clubs playing "Acid House" music. The hallucinogenic effects of this drug are not as intense as those of LSD or mescaline with hallucinations reported by users only 20 percent of the time. The stimulant effects of MDMA are reported to be similar to those of amphetamines and cocaine in regard to physical effects but are secondary effects of MDMA. The majority of users report no negative long lasting or debilitating effects after taking MDMA.

Results of studies of the effects of MDMA on humans and formal scientific research about MDMA are insufficient at this time. However, a substantial amount of general information concerning the nature and effects of MDMA has been collected through informal studies and is available to be presented and discussed in drug education programs.

BRIEF HISTORY

MDMA was patented in 1914, placed on Schedule I on an emergency basis by the Drug Enforcement Administration (DEA) in 1985, and has recently returned as a designer drug in the late 1980s and early 1990s.

The chemical precursors for MDMA are contained in the oils from plants such as nutmeg, dill parsley seed, calamus, crocus, saffron, vanilla beans, and sassafras. MDMA is most often produced synthetically in laboratories from methamphetamine [1]. It was first synthesized by German chemists in the 1900s and patented by Merck Pharmaceutical Company in 1914 as an appetite suppressant for soldiers in the First World War [1-3]. In 1953, the U.S. Army Medical Centre experimented with this drug on mammals [2]. Alexander Shuglin synthesized myristicin into MDMA in 1962 by extracting it from the oils of nutmeg and mace [1].

Not until the 1970s did MDMA become popular for its therapeutic and recreational properties. The first report of the psychoactive effects of the drug appeared in 1976 in scientific literature. In 1980 MDMA became popular among drug users in the United States [4]. In 1985 the Drug Enforcement Administration (DEA) made MDMA a Schedule I controlled substance which banned the possession, manufacture, and sale of the drug in the United States despite arguments from physicians using it in their practice as an adjunct to psychotherapy prior to the DEA's ban. Due to the wide media coverage of the controversy over its abuse potential and its therapeutic benefit, MDMA became even more popular as a recreational street drug [5].

Some of the same psychoactive properties that made MDMA popular as a recreational drug also made it appealing as a potential therapeutic aid in psychotherapy. It has been reported to facilitate interpersonal relations, increase esteem, elevate mood, increase self-insight, and enhance communication and empathy. Because the use of MDMA has not been proven safe under medical supervision there is no accepted medical use for MDMA at this time and it remains a controlled Schedule I substance [4, 6, 7].

Although the Drug Abuse & Alcoholism Newsletter reports that in a laboratory examination of street samples of the drug, only one of four samples actually contained MDMA; in another study, Hayner found that 80 percent of samples were in fact MDMA [8]. The range of MDMA contained in one capsule is anywhere from 16-150 mg. The result of this inconsistency in dosage may be acute intoxication or fatal overdose [8].

DOSAGE

MDMA is a white powder which is most commonly administered orally as a pill or capsule. It can also be administered via injection (intravenously or subcutaneously, snorting, smoking and less frequently, as a suppository [2, 4]. The average dose taken is 120 mg [2, 4]. Great variations in potency have been reported by laboratory analysis of street samples ranging from 16 mg-150 mg which indicates quality and dose control issues [2, 4, 8].

EFFECTS

The effects of ingesting the average dose of MDMA can be divided into positive and negative physical and psychological categories (see Table 1).

Table 1. Reported Effects of Average Doses of MDMA (80-150 mg)

Negative Physiological	Positive Physiological
Elevated systolic/diastolic blood pressure	Increased energy level
Muscle hypertonicity	Heightened sensory perception
Elevated heart rate	Desire to be in constant motion
Jaw clenching	Appetite suppression
Transient nausea	High level of stimulation
Insomnia	
Dehydration	
Hot/Cold flashes	
Nystagmus	
Negative Psychological/Behavioural	**Positive Psychological/Behavioural**
Poor concentration	Euphoria
Anxiety/Restlessness	Elevated self-esteem
Visual hallucinations	Closeness to others/Empathy
Fear of loss of control	Talkativeness
Paranoia	Overall sense of well being
	Accepting
	Greater self-insight
	Heightened sensuality

The most universal and consistent psychological effect reported by MDMA users in a study by Solowij, Hall, and Lee was a "positive mood state" [4]. This quality was reported 94 percent of the time the drug was taken. The second most commonly reported effect was "activation." Other perceived positive psychological effects included a sense of euphoria, elevated self-esteem, feelings of spirituality and closeness to others, open mindedness, empathy, and need for intimacy [2-4, 9-11]. These qualities are reflected in the slang terms for MDMA— "Ecstacy," "XTC" and the "hug drug." Negative psychological effects are described by users to be less severe than those of hallucinogens such as LSD and mescaline and are reported less frequently [2, 4]. Some of these effects include paranoia, panic attacks, transient hallucinations, and fear of loss of control. These effects are seen more commonly with higher doses of MDMA and are thought to be more frequent in subjects with predisposed sensitivity to the drug [2, 4].

The physical effects of MDMA are more closely related to those of amphetamines than those of hallucinogens [6, 12]. The universal physical effect of MDMA that is reported as positive by users is that of a high level of stimulation, described as feeling energetic or the desire to be in constant motion [3]. Following these reported stimulant effects were heightened sensory perception and appetite suppression.Consistent negative physical effects reported by MDMA users include nausea (for the first hour), muscle hypertonicity, and elevated pulse rate and blood pressure. Less frequently reported are tremors, dry mouth, jaw tension, insomnia, and hot and cold flashes [4, 10].

Acute toxic psychological and physical effects seem to be more frequent or exacerbated with higher doses of MDMA and also with combinations of MDMA and other drugs. Some of the effects reported by Hayner and McKinney included vomiting, visual hallucinations, tachycardia, hyperthermia, hypertonicity of the body, hypo/hypertension, palpitations, renal failure, and disseminated intravascular coagulation (a blood clotting disorder) [8]. Fatal reactions to MDMA are usually cardiac in nature as acute intoxication usually results in adrenalin-like overactivity and overstimulation of the heart (see Table 2) [2].

The most controversial effect of MDMA at this time is its possibly irreversible neurotoxicity. Based upon laboratory experiments with animals, it has been suggested that even moderate or therapeutic doses of MDMA have adverse effects on the amount of the neurotransmitter serotonin in the brain. Low levels of serotonin are associated with depression and sleep regulation [6]. Glanzrock reported that in one study, a 30 percent decrease in serotonin levels in MDMA users was found [6]. Schuckit, in another study using animals, reported a 90 percent loss in the ability of cells to accumulate or uptake serotonin [2]. It must be noted, however, that the results of animal research may not pertain to humans because of the difference in the amount of MDMA that is neurotoxic to rats and humans. In addition to the effects on serotonin, MDMA has also been suspected to act on another neurotransmitter, dopamine. Like the hallucinogen LSD, MDMA is thought to stimulate dopamine release thus contributing to behavioural toxicity [11, 12].

Table 2. Acute Reactions or Overdose Reactions

Physiological	**Psychological/Behavioural**
Vomiting	Persistent insomnia
Palpitations	Rage reactions
Tachycardia	Psychosis
Hyperthermia	Agitation
Hypertonicity of the body	Depression
Hypo/Hypertension	
Renal failure	
Disseminated intravascular coagulation	

It has been reported that MDMA's positive effects decrease and its negative side effects increase with frequent and/or successive doses [13]. For instance, a double dose of MDMA would simply increase the negative side effects of the drug rather than double the positive effects. Because of this, recreational users report that they usually use MDMA only once every several weeks [2]. Most likely, this unusual and sporadic pattern of use is one of the reasons that MDMA is believed not to be physically addictive. There have been no cases of physical addiction reported to date [4, 13].

Acute intoxication is usually characterized by hallucinations, adrenaline-like overactivity, psychosis, and overstimulation of the heart which may result in death. Again this reaction has been seen with high doses or in users with predisposing conditions. The most controversial issue surrounding the safety of MDMA is its effects on the brain chemicals serotonin and dopamine.

USER PROFILE

Few epidemiologic surveys have been conducted concerning MDMA. In several informal studies and reports from DEA officials it has been estimated that around 40 percent of college students have been exposed to MDMA [1, 2, 9, 11]. The DEA also reported areas of concentration to be California, Texas, Florida, New York, and the New England area [10]. Recreational use of MDMA is most popular among college students, young professionals, and those who frequent rave parties or dance clubs playing Acid House music [1, 2, 4, 9]. The age range for recreational users appears to be from sixteen through forty-eight years with the mean age being twenty-seven [4]. The majority of these people live in the city or suburbs and have or are completing higher education. There does not seem to be any particular ethnic group over-represented among users [4].

The most frequently reported reasons for taking the drug are curiosity, fun, for experimental reasons, and for recreational purposes [4]. It is most commonly used on weekends, during special occasions; most frequently at dance clubs and rave parties [1]. The idea that MDMA enhances both social and introspective or intimate relations is reflected in the context of use. Users report taking the drug with close friends or a large group of people before going out and also with one's partner or a few close friends at home in lieu of the dance club scene [1, 4].

Overall, MDMA use occurs within a group of adolescents or young adults before attending a rave party at a club (most likely in the city) where the atmosphere is conducive to enjoying the MDMA experience. The use of strobe lights, dry ice, psychedelic imagery, and the hypnotic, synthesized sound of acid house music create such an environment [1,14]. Due to the stimulant effects of this drug, "ravers" typically dance for long periods of time and may become dehydrated. It is not usual to drink alcohol when under the influence of MDMA. Instead, users typically consume natural energy replenishers such as fruit juices and "smart drinks" containing vitamins and various herbal rejuvenators [1].

THERAPEUTIC ASPECTS

In the 1970s, MDMA became popular in the medical field as an aid in psychotherapy [4]. It was hypothesized that the psychoactive properties induced by MDMA, such as feelings of intimacy, enhanced communication, elevated self-esteem, and ability to relax inhibitions and enhance insight could be an asset to psychotherapy [2, 9, 11]. MDMA may assist in establishing trust and breaking down barriers between therapists and patients, lovers, and family members [10]. It is estimated that between 1977 and 1985 approximately half a million doses of the drug were administered in this context [3]. It has been used to relieve pain and emotional distress in terminal cancer patients, speed the recovery of those suffering from post-traumatic stress disorder, and has also been used to treat patients suffering from depression, anxiety, rape-related trauma, and schizophrenia [6].

After the DEAs initial banning and scheduling of MDMA in 1985, the drug was removed briefly from Schedule I by the U.S. Court of Appeals in Boston on technical grounds after a Harvard psychiatrist filed a petition in 1987 [7]. Because its safety has not been demonstrated and there is no current medical use for MDMA, in 1988 it was agin placed on Schedule I as a controlled substance.

Recently MDMA is being reconsidered for medical use as an adjunct to psychotherapy. In 1994 the FDA, for the first time, formally approved MDMA for research in humans [6]. Studies to establish basic human safety and effects on brain chemistry are under way at the University of

California at Los Angeles by Charles Grob, M.D., a psychiatrist [6].

SUGGESTIONS

Despite the lack of formal scientific data regarding the nature and effects of MDMA, there are some general qualities and possible dangers inherent in using this stimulant/hallucinogenic drug that are suggested by the information gathered in informal studies and surveys to date. MDMA is being used by adolescents and college students who are exposed to information regarding other substances of abuse in their academic curriculum but MDMA is often excluded. Although conclusive data remain insufficient, some general information regarding MDMA is available.

The absence of apparent immediate negative or debilitating effects of this drug coupled with the lack of information being taught to students in drug education programs where other frequently encountered drugs are discussed may encourage students not to question initial or subsequent use of MDMA. By excluding discussions of MDMA within such programs, awareness of its potential dangers may be minimized if students perceive this drug not worthy of discussion or that it is of minimal risk or danger compared to other drugs that are included in the curriculum. If anything, the lack of information about the use of MDMA should be interpreted and portrayed to students as and even great danger in itself. Therefore, including discussion of some of the consistent data gathered thus fat can only assist students in becoming more aware of the dangers of taking such a drug and possibly deter their initial or future use of it.

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Direct reprint requests to:

Carrie Elk, M.Ed.
219J Driftwood Drive
Greenwood, SC 29649