4. RECREATIONAL USE OF MDMA

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1. INTRODUCTION

The recreational use of MDMA in the United States has never been documented adequately. According to some reports in the popular press, it is possible that MDMA may be one of the most widely used recreational drugs of the late 1980s. Alternatively, MDMA use may be restricted to a few locations and may be relatively inconsequential in comparison to drugs such as cocaine and marijuana. There are simply no good data on which to adequately define and assess the extent of recreational MDMA use in the United States.

As best as can be determined, however, the recreational use of MDMA does appear to have increased significantly in the mid-1980s. For example, it has been reported that approximately 10,000 doses of MDMA were being distributed monthly by a California laboratory in 1976 (1). By 1984, the monthly production increased to 30,000 doses per month at the same laboratory. By mid-1985, this single laboratory was reportedly producing nearly 500,000 doses of MDMA per month.

The manufacturers of MDMA appear to have responded to a surge in demand for the drug largely among recreational users. Prior to 1985, "Ecstasy" was popular as a recreational drug in two main areas of the United States: Texas and California. In Texas, the drug was sold openly in bars in many student areas of Dallas and Houston (2, see chapter by Beck, this volume]. MDMA was usually sold as a yellow tablet and cost approximately $10 to $35 per tablet. According to one anecdotal report, MDMA tablets were actually given away for free in at least one Houston bar on June 30, 1985, the day

Peroutka S.J. (ed), Ecstasy.

Table 1. Myths about MDMA.

– MDMA was developed by the CIA to be the ultimate "truth serum"
– MDMA can damage the kidney and should always be taken with large amounts of fluids.
– MDMA drains the spinal fluid
– If a male takes MDMA more than 3 times, he will be rendered permanently impotent. However, MDMA is an incredible aphrodisiac during the first 3 doses.

before the compound was placed on Schedule I by the FDA. The relatively extensive open use of MDMA may account for the fact that the majority of documented toxic reactions and deaths due to MDMA have been reported in Texas [3, see chapter by Dowling, this volume]. The use of MDMA as a "legal" euphoriant in Texas may also have played a large role in the decision by the FDA to place this compound on Schedule I in 1985.

The increase in popularity that occurred with MDMA in the mid-1980s has many possible causes. First, at all, "word of mouth" information concerning the supposed unique psychoactive effects of MDMA seems to have spread among recreational drug users and undergraduate students in the United States during the mid-1980s. At the same time, the potential dangers of drugs such as cocaine were beginning to be reported and discussed widely in the national media. Cocaine was also becoming an increasingly expensive recreational drug. Finally, a number of popular magazines published stories in mid-1985 concerning the purported psychotherapeutic benefits of MDMA. Articles on MDMA appeared in *Newsweek*, *Time*, *Life*, and *New York Magazine* and seem to have stimulated interest in this novel psychoactive compound among recreational drug users. The *Newsweek* article, for example, stated that the effects of a single dose of MDMA were equivalent to "a year of therapy in two hours" [4]. The well-publicized controversies surrounding the placement of MDMA on Schedule I by the Food and Drug Administration on July 1, 1985, also contributed to an increased awareness of its potential use as a recreational drug.

A variety of myths have developed about MDMA. Some of these claims and beliefs, which are derived from my interviews and discussions with approximately 200 MDMA users, are summarized in Table 1. MDMA, for example, was said to have been developed by the CIA in the 1950s as the "ultimate truth serum", despite the fact that it was patented in 1914. Supposed dangers of MDMA have included a propensity to damage the kidneys, a statement that may relate to the presumed dehydrating effect of the drug. Many undergraduates have been told that MDMA can "drain the spinal fluid," perhaps in reference to the frequent myalgic complaints of recreational users on the day following MDMA use. One of the more interesting comments concerns the ability of MDMA to induce sterility in males after four or more uses. However, in the words of one student, "it's an incredidible aphrodisiac during the first three doses!" In fact, MDMA has no apparent effect on sexual behavior, according to a study published in 1986 [5].

Although MDMA has been available on certain college campuses since the mid-1970s, recreational MDMA use among college students in the United States appears to have become much more common since 1985. In many ways, MDMA might be considered a "seductive" drug to students. The proponents of its use frequently cite its ability to make the user feel "warm and friendly" and claim that the drug causes them to have an increased sense of "closeness" with other people. This type of information is provided in an information sheet that is frequently distributed among recreational MDMA users [1]. Student users have also been told that "doctors" use MDMA because of its psychotherapeutic applications, and that the drug is "legal" (or at least that MDMA *was* "legal" until 1985). As a result, it is clear that recreational MDMA use may have appealed to many novice recreational drug users prior to the recent wave of publicity concerning the neurotoxic effects of the drug in laboratory animals.

2. RECREATIONAL MDMA USE ON A SINGLE UNDERGRADUATE CAMPUS

As noted above, the exact incidence of recreational MDMA use during the past few years is impossible to determine accurately. In the Fall of 1986, my laboratory began working on the pharmacological and neurotoxicological effects of MDMA in laboratory animals. At that point in time, reports from several laboratories clearly indicated that MDMA could produce long-term neurochemical changes in the brains of laboratory animals. However, these scientific data had not yet been communicated to recreational MDMA users.

In March, 1987, the Student Health Center at Stanford University published a study (that was performed in early 1986) that indicated that 8% of undergraduate students reported having used MDMA as a recreational drug [6]. The undergraduate students in my laboratory were surprised by this finding and felt that the use of the drug was actually higher, especially during the 1986–87 academic year. The interest of the students derived from their awareness of the significant controversies that existed concerning the legal status of MDMA and the possibility that it may cause irreversible neurotoxicity in human users. Importantly, the students in my laboratory felt that most of these issues were simply unknown to the vast majority of their undergraduate colleagues who were recreational users of MDMA. As a result, two students volunteered to do an informal survey of their colleagues in an attempt to obtain some data on the recreational use of this compound on a single undergraduate campus [7, 8]. The results of their survey are summarized below.

3. SUBJECTIVE EFFECTS OF MDMA IN RECREATIONAL USERS

3.1. Subjects and methods

Undergraduate students at a major university were polled anonymously by two student colleagues concerning possible recreational use of MDMA between May 4, 1987 and June 3, 1987. Subjects were selected and interviewed (in approximately equal numbers) at the student union, at an undergraduate

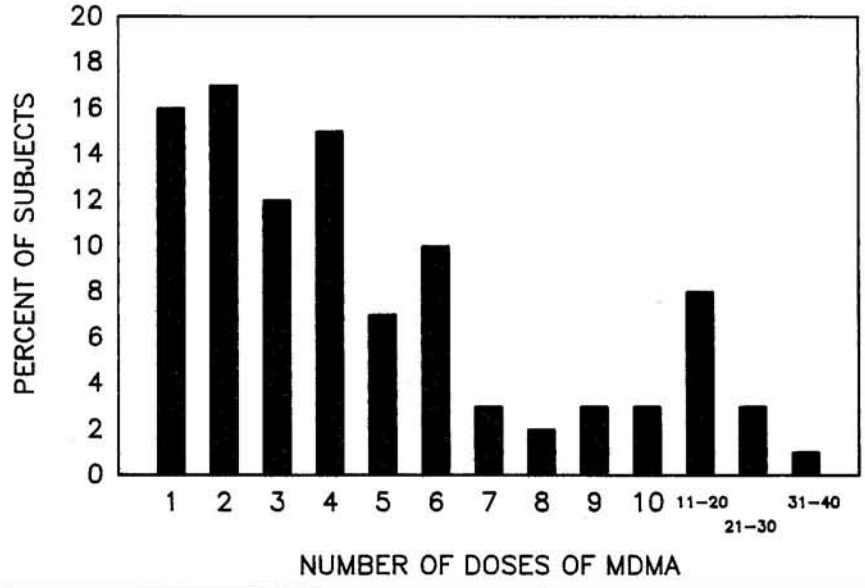

Figure 1. Frequency of MDMA use by recreational users (n = 100). (Taken from reference 8).

Table 2. Acute effects of MDMA (n = 100).

Subjective sensation	Number of subjects
Sense of "closeness" with other people	90
Trismus	75
Tachycardia	72
Bruxism	65
Dry mouth	61
Increased alertness	50
Luminescence of objects	42
Tremor	42
Palpitations	41
Diaphoresis	38
Difficulty concentrating	38
Paresthesias	35
Insomnia	33
Hot or cold flashes	31
Increased sensitivity to cold	27
Dizziness or vertigo	24
Visual hallucinations	20
Blurred vision	20

Taken from reference 8.

In addition, a variety of physiological effects were reported that were indicative of the sympathomimetic effects of the drugs. Tachycardia (72%), dry mouth (61%), tremor (42%), palpitations (41%), diaphoresis (38%), and parasthesias (35%) were the most frequently reported sympathomimetic effects. Trismus ("tight jaw muscles") and bruxism ("grinding of the teeth") were reported by 75% and 65% of the subjects, respectively. Similar sympathomimetic effects are observed with high-dose amphetamine use [13]. Although increased alertness was reported by 50% of the subjects, 38% reported that they had difficulty concentrating during the acute phase of MDMA effects.

Visual hallucinations were noted by 20% of the respondents. However, these visual sensations rarely consisted of well-formed hallucinations. Rather, the subjects reported sensing that a flash of light or an object was in their peripheral visual field but, when looking in that direction, they saw no objects. There were no reports of auditory hallucinations.

3.4. Effects of MDMA twenty-four hours after ingestion

The subjects were also asked to report any residual effects of MDMA that were experienced on the day following the ingestion of the drug (Table 3). The most commonly reported effect was drowsiness (36%), which was attributed to the insomnia that was acutely reported by 33% of the respondents. Diffuse muscle aches and general fatiguability were reported by 32% of the subjects. Depression (21%), difficulty concentrating (21%), and headache (17%) were considered to be "negative" aspects of MDMA use occurring on the day after ingestion. Both the sense of "closeness" with other people and trismus continued into the second day for 22% and 21% of the respondents, respectively. Finally, a general sense of anxiety, worry, or fear, as well as irritability, on the day following MDMA use, were reported by 12% of the subjects. Because of these frequent "negative" side effects, the respondents tended to prefer to use the drug on either a Friday or Saturday evening, so

Table 3. Subacute effects of MDMA (n = 100).

Subjective sensation	Number of subjects
Drowsiness	36
Muscle aches or fatigability	32
Sense of "closeness" with other people	22
Depression	21
Tight jaw muscles	21
Difficulty concentrating	21
Headache	17
Dry mouth	14
Anxiety, worry, or fear	12
Irritability	12

Taken from reference 8.

that these drugs effects would not interfere with their school and/or work performance.

The subjects were also asked whether the beneficial effects of MDMA decreased with usage. In the 43 subjects who had taken two to five separate doses of the drugs, 21 (49%) reported that the effects of the drug decreased with subsequent doses. In subjects who had taken six or more doses of MDMA, 67% reported a decrease in beneficial effects over time. In general, the subjects reported that the "positive" effects of the drug decreased while the "negative" effects increased with successive doses. An increase in the size of a single dose of MDMA was found to increase the "negative" effects of the drug while decreasing the "positive" effects.

3.5. Long-term effects of recreational MDMA use

Only two of 100 subjects reported any long-term effect of the drug. One claimed a tendency to clench the teeth when anxious for a period of months following two separate doses of MDMA. A second subject attributed increased emotionality to the effects of three separate doses of MDMA.

4. ANECDOTAL CASE REPORTS

The lack of adequate epidemiological and clinical data on recreational MDMA use is a serious impediment to the analysis of this drug. Moreover, because of its placement on Schedule I and the increasing public awareness of its neurotoxicological potential, the human effects of MDMA will be extremely difficult, if not impossible, to study adequately in the future. At the present time, anecdotal reports must be used in an attempt to determine the effects of this drug in recreational users. The following "Case reports" are derived from my interviews and discussions with approximately 200 recreational users of MDMA. These personal observations are an attempt to provide a reasonable, although nonscientific, overview of this complex issue.

4.1. "Ecstasy"

A frequently mentioned fact among recreational MDMA users is that the first ingestion of the drug is "the best." One individual reported that MDMA was taken for the first time before a day of skiing.

"The air was crisper, the snow was whiter, and the sky was more brilliant than I've been seen. I also skied better than I ever had. At the end of the day, I felt like I had experienced the most incredible day of my life. Moreover, when I think back on that day, the memories continue to be extremely vivid. I remember it as one of the best experiences that I ever had."

This report is typical of many first-time MDMA users. I once asked an undergraduate how MDMA users could be identified after having taken the drug. The individual said that if I saw a group of students walking together,

holding hands, and laughing or singing, then they may have ingested MDMA. This observation is in keeping with the fact that MDMA is most commonly used by undergraduates in groups before attending social functions on weekend nights. The perceived increase in verbal behavior and decrease in defensiveness, both induced by the drug, is thought by recreational users to facilitiate social interactions. MDMA is rarely reported to be taken by individuals who remain alone during the first few hours after ingestion.

4.2. Panic attacks

During the past two years, I have been contacted independently by four individuals who shared an atypical but similar experience following MDMA use. Each individual took a relatively large dose of MDMA over a relatively short period of time. For example, one individual took a total of four doses of 125 mg (total of 500 mg MDMA) over a 24 hour period, while a second individual reported taking three separate doses of approximately 150 mg MDMA (total of 450 mg MDMA) over a six hour period. Each of the four individuals reported the onset of "panic attacks" (as defined by the Diagnostic and Statistical Manual III) within approximately seven days of MDMA use. None of the four individuals reported a previous history of neurological or psychiatric disease. The number of "panic attacks" per individual ranged from two to eight. The "panic attacks" slowly became less frequent and ceased in all four individuals within eight weeks of the last ingestion of MDMA. Similar anecdotal reports of "panic attacks" have been published by other investigators [2, 14, 15].

4.3. Death

In the summer of 1988, a 37 year-old woman was found dead in Palo Alto, California, after supposedly ingesting an unknown quantity of MDMA [16]. According to police reports, she died approximately 90 minutes after MDMA ingestion. The individual who administered the drug to the woman was arrested on suspicion of possessing a controlled substance and administering a controlled drug to another person. As clearly documented in the chapter by Dowling (this volume), MDMA does possess the potential for lethality. This fact appears to be unknown to the vast majority of recreational MDMA users. The actual risk of MDMA, unfortunately, will remain unknown until adequate epidemiological and pathological data can be developed.

5. CONCLUSIONS

Although the observations described in this chapter do not constitute a formal epidemiological study, they do represent the first and, to date, the only analysis of the subjective effects of MDMA in recreational users. Previous descriptions of MDMA effects have focused on patients who used the drug as an adjunct to psychotherapy [10, 11]. As noted above, unconfirmed reports from various university campuses have suggested that the recreational use

of this compound has rapidly gained popularity since 1985. Indeed, two independent surveys on a single university campus, taken a year apart, found an 8% to 39% incidence of undergraduate MDMA use [6, 7], and a third study, at another major university, documented a 20% undergraduate exposure rate [12]. These data clearly indicate that a significant number of students in the United States have ingested this compound for recreational purposes. These observations are significant, since MDMA has been shown to produce neurotoxicity in animals [see Chapters 7–13, this volume]. MDMA has also been associated with acute toxicity and death in human users [see Dowling, Chapter 5, this volume].

A serious concern is the observation that the majority of multiple time MDMA users state that the "positive" effects of the drug decrease over time. This finding has now been reported in both recreational MDMA users and individuals who used MDMA in a therapeutic setting. For example, Greer and Tolbert [10] found that frequent or high doses of MDMA diminished the pleasurable effects of the drug while increasing its side effects. Conceivably, this finding may suggest subtle long-term effects of the drug on the human central nervous system, since the primary psychoactive effects of MDMA last only three to five hours [9]. These observations suggest strongly that the recreational use of MDMA should be avoided at the present time.

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