Hallucinogenic Mushrooms

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Ingestion of mushrooms containing psilocybin produces hallucinogenic effects and has become a popular form of substance abuse among some adolescents and young adults. We have reviewed the medical literature on psilocybin mushrooms and describe current patterns of use, provide background material on the botony and pharmacology of these crude drugs, and report results of a small study on usage patterns among identified adolescent drug abusers. Among 174 adolescents already identified as substance abusers, 45 (26%) reported having used hallucinogenic mushrooms, frequently in conjunction with alcohol or other drugs. An average intake of 2–4 mushrooms was obtained for about $8, and led to intoxication for 5–6 hours. Mixing of intoxicants such as alcohol, marijuana, and psilocybin mushrooms was the rule. The acute adverse reactions may have been the result of drug synergy. Pediatricians should become aware of the specific patterns of the use of hallucinogenic drugs by adolescents and consider the possiblity of such use when evaluating a delerious or psychotic adolescent.

MUSHROOM POISONINGS have increased over the past 2 decades, perhaps as a result of the growing interest in natural foods and experimentation with less conventional food sources.[1] At the same time, mushroom ingestion has become an increasingly popular form of substance abuse.[2–6] In some populations, it is now more common than any other form of hallucinogen abuse. In a recent survey of 1,500 American college students, 15 percent admitted to mushroom abuse, while only 5 percent reported using LSD.[7] A major statewide study of drug use patterns by California high school students,[8] completed in 1986, reported that the use of psilocybin mushrooms exceeded that of LSD among 7th, 9th, and 11th grade students. Mushroom use was reported at 3.4 percent, 5.8 percent, and 8.8 percent, respectively, for adolescents in the three grades surveyed.

Message for the Clinician:

The adolescent substance abuser, when seen in a state of panic, may have ingested hallucinogenic mushrooms, possibly with simultaneous LSD, alcohol, PCP, and marijuana. Treatment is supportive.

This paper reports the results of our recent survey of mushroom abuse among a group of 174 adolescents enrolled in a drug abuse treatment program in metropolitan Washington D.C.

Patients and Methods

Patient Population

Straight Incorporated in Springfield, Virginia, is a private, not-for-profit drug treatment program for

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adolescents and young adults between the ages of 12 and 22 years. The majority of clients are white and come from middle- to upper-class suburban families. Marijuana or alcohol are the drugs most frequently abused by these adolescents. Approximately 90 percent of clients are brought into treatment by one or both parents; the remainder have been in a detention center or have been ordered into treatment by the court.

Study Procedure

A comprehensive survey concerning patterns of drug use was administered to all adolescents present at the facility. Fourteen of the 39 questions specifically concerned use of mushrooms. Participation in the study was voluntary. There were no inducements to participate and no consequences for refusal. The results from the completed questionnaires were analyzed by a computer program designed for the study.

Results

The questionnaire was answered by 174 of the 184 teenagers present at the drug treatment program on the day of the study. Ten patients refused to participate. There were 109 males and 65 females who answered the questionnaire on their use of several hallucinogenic drugs. The median age was 16 years (range 14–18 years). The group was 91 percent white, 5 percent black, and 4 percent other (including Hispanic).

Psilocybin mushroom ingestion was reported by 45 (26%) of the respondents, more often by males (32%) than females (15%). In general, use of hallucinogenic mushrooms was infrequent; the majority of the adolescents reporting mushroom ingestion only one to three times. However, ten of the adolescents had taken psilocybin mushrooms at least ten times, and two reported mushroom abuse on over 50 occasions. Forty four of the 45 respondents who took mushrooms had also previously experimented repeatedly with LSD.

The respondents reported that psilocybin mushrooms were not readily available, regardless of what they were willing to pay. Most of the adolescents had purchased the mushrooms dried, either whole or sliced. One respondent had bought fresh psilocybin mushrooms from a teenage drug dealer who maintained he had grown them from spores that he had purchased by mail order. The typical cost for two to four psilocybin mushrooms, an average "dose," was $7–9. This intake reportedly produced a state of intoxication that lasted up to 6 hours.

Serious adverse effects during mushroom intoxication were reported by six (13%) of the adolescents. Four of ten respondents who took mushrooms at least ten times each reported having had accidents during mushroom intoxication versus two of the 35 respondents who took mushrooms less than ten times. Injuries reported in association with hallucinogenic mushroom intoxication included head trauma resulting from falls off roofs (N = 3) and loss of consciousness (N = 2). Flashbacks were reported by mushroom abusers. Since these adolescents also admitted to LSD abuse, it is impossible to incriminate either hallucinogenic drug alone as the cause for the flashbacks. Similarly, mushrooms were frequently ingested simultaneously with alcohol and other drugs, and thus the reported adverse reactions may have been the result of drug synergy.

Follow-up of the ten respondents who took mushrooms ten or more times was done 18 months after the study. Four (40%) had graduated from the drug treatment program after an average program length of 15 months. There was no difference in the completion rate for this group and that of the remaining 164 patients in this study.

Discussion

Three major genera of mushrooms, Psilocyba, Panaelous, and Conocybe, are known to contain the indole psilocybin (0–phosphoryl–4–hydroxy–N,N–dimethyl tryptamine), which has hallucinogenic properties. Psilocybin was first isolated in 1958 by Dr. Albert Hoffman, who also discovered lysergic acid diethylamide (LSD). The effects of psilocybin mushrooms however, have long been recognized. The apparently mystical actions induced by psilocybin ingestion are described as a part of the ancient religious ceremonies of Aztec Indians.[9–11]

In the United States, mushrooms with hallucinogenic properties grow naturally in fields and cow pastures, particularly in the northwest and southeast. The most popular psilocybin mushroom in the United States, *Psilocybe cubensis,* contains about 10 mg of psilocybin/g of fresh mushroom weight. Between 4 and 10 mg of psilocybin is considered as an average

dose.[12] In the Washington, D.C. area, homegrown psilocybin mushrooms, primarily *P. cubensis* are the usual source of fresh or dried "magic mushrooms." Only an expert mycologist can unfailingly recognize species belonging to the three major genera of hallucinogenic mushrooms and distinguish them from poisonous species. Although most fresh psilocybin mushrooms, when cut or bruised, oxidize and turn blue to purple within 30 to 60 minutes, this "bluing phenomenon" is not specific for psilocybin species nor does a positive test prove that a fresh mushroom is not poisonous.[13]

While the hallucinogenic effects of psilocybin are similar to those of LSD, psilocybin is 200 times less potent and has a shorter duration of action.[12] It is, however, frequently more expensive. Thus, home mushroom cultivation can be profitable to satisfy the demands of psilocybin afficionados ("shroomers"). Indeed, mushroom-growing kits that contain spores and an appropriate growth medium are available and advertised along with books on mushroom horticulture in popular drug-oriented magazines such as *High Times,* (August 1981, p. 28). Hallucinogenic mushrooms come under the provisions of Public Law 91–513, Section 202, Schedule 1 (c) and Schedule 3 (b); their unauthorized possession, sale, or use is illegal. Shipment or possession of psilocybin mushroom spores is not illegal.

It is not well understood how psilocybin causes its effects, but it is believed to alter brain concentrations on indole compounds including serotonin.[12] Within 20 minutes of mushroom ingestion, users report such effects as muscle relaxation, and sympathomimetic signs such as tachycardia, pupillary dilatation, dryness of the mouth, and nausea.[14] Psychedelic changes include powerful distortions of space and time and mood alterations.[14] Higher doses may induce frank visual hallucinations and dysesthesia.[13,14] However, synkasthesia (blending of sensory input) was not noted by the adolescents in our study, although it is often mentioned in descriptions of the effects of hallucinogenic drugs.[14]

Sensory distortions from hallucinogenic mushrooms may be quite pleasurable, but can be very frightening and can lead to panic reactions or even an acute psychosis.[12,15] Faces of friends or strangers may appear to change shape or color or to suddenly age dramatically, as reported by the respondents in this study. This can occur during or after mushroom ingestion, and may be long-lasting and impossible to differentiate from true schizophrenia.[3,12,14,15] After an acute intoxication, which lasts approximately 6 hours, psilocybin mushroom abusers complain of lassitude, extreme exhaustion, and profound mental depression.[14,15] Serious acute side effects such as convulsions have also been reported in association with accidental psilocybin poisonings.[16]

Management of the acute adverse effects of acute psilocybin intoxication is supportive and involves "talking down" of panic reactions. Gastric lavage should be considered if there is any doubt as to the identity of the mushrooms ingested.[5] If needed, diazepam can be used for sedation and is to be preferred over phenothiazine derivatives as the latter drugs have an association with such adverse reactions as lowering the threshold for seizures.

The behavioral effects of psilocybin intoxication is further complicated by two factors. First, mixing of different abusive substances is the rule during early adolescence. This practice may have resultant additive or synergistic effects, as confirmed by the patients in our study. Secondly, mushrooms sold illicitly for their mind-altering actions may not actually be psilocybin mushrooms, but the common mushroom purchased in a store, and laced with phencyclidine (PCP) or LSD. Of 886 samples alleged to be psilocybin mushrooms and analyzed by Pharm Chem Street Drug Laboratory, only 252 (28%) were actually hallucinogenic mushrooms while 275 (31%) were LSD or PCP, and 328 (37%) contained no drug at all.[17]

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Auto-amputation of Appendix in Inguinal Hernia

A previously unreported occurrence of auto-amputation of an appendix in an incarcerated hernial sac, presenting as an inflammatory swelling in the inguino-scrotal region of a 20-day-old male infant is documented.

A 20-day-old male infant was admitted to the hospital because of restlessness and swelling of the right inguino-scrotal region. On admission, there was an obvious right scrotal mass with an inflammatory reaction and edema of the scrotum, upper thigh and right lower quadrant of the abdomen. Rectal temperature was 37.8 C. Laboratory findings including electrolytes and complete blood count were normal. Exploration of the right scrotum via a groin incision was undertaken. The testicle was found to be normal. The hernial sac was not clearly defined. Pus and bloody necrotic material were observed leaking through the external ring. Exploratory laparotomy was performed. The abdominal wall was thick and edematous, and free pus was found in the abdominal cavity. Two-thirds of the length of the appendix were found to be extremely thin, necrotic and detached, and only a short stump remained attached to the caecum. The appendectomy was completed and the hernia repaired. The post-operative course was uneventful, and the child was discharged on the 11th post-operative day.

The primary event was most probably strangulation with gangrene of the appendix in the hernial sac. A severe inflammatory response ensued with amputation of two-thirds of the appendix. The caecum retracted back into the abdominal cavity, and the leaking appendiceal stump caused the generalized peritonitis. Although auto-amputation of the appendix has been previously reported,[1] it has never been described as becoming detached within the inguinal canal. If a localized inflammatory process is present in an inguinal hernia mass on the right side, the possibility of an inflamed or incarcerated appendix should be considered.[2,3]—ARIEL HALEVY, MD, YITZHAC KATZ, MD, EYOB AZIZI, MD, AND BOBBY GROSS, MD, *Departments of Surgery "A," and Pediatrics "A," Assaf Harofeh Medical Center, affiliated with the Sackler School of Medicine, Tel-Aviv University, Zerifin, Israel.*

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