

Summary

Because of continued widespread use of marihuana, more knowledge of its behavioral toxicity is needed to judge risks involved for the user as well as others in his environment. The studies reported are a preliminary effort in this direction. A number of the performance tests proved insensitive to marihuana in the doses used. These failures may be a useful guide to others in designing their test battery.

A high level of inter and intra subject variability in effects of marihuana occurs in both animal and man. Wide oscillations in magnitude of dose effects appear particularly characteristic of this drug. The use of subjects as their own controls, averaging of repeated measures with a given procedure during the period of drug intoxication, and use of tasks which require longer time intervals to carry out are some means of limiting this variability.

Effects on complex (choice) reaction time and on a digit code memory task were most consistently impaired. Even here, however, there were marked individual differences. These results are not different than those often found in studying drug effects on complex behaviors, which are obviously influenced by a variety of non-pharmacological variables. So with LSD, the very unpredictability of marihuana on different individuals and on the same individual at different times and under different conditions increases the risk to the user.

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Spontaneous Recurrence of Marihuana Effect

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Four individuals reported the recurrence, in a drug-free state, of unusual visual or somatic sensations previously experienced during marihuana reaction. None had used other hallucinogens. Two of the four were distressed by these recurrences. Such events should be distinguished from the recurrence of clinical psychopathology first experienced during marihuana reaction and from reports of nonspecific heightening of perception subsequent to marihuana use.

FOUR MARIHUANA users reported the spontaneous recurrence of unusual somatic or visual sensations originally ex-

perienced during the drug reaction. None of the four had ever used any other hallucinogenic drug. These occurrences precipitated such severe anxiety in two individuals that emergency psychiatric treatment was required. The cases are reported to call attention to the fact that marihuana can have such an effect.

The spontaneous recurrence of the effects of lysergic acid diethylamide (LSD) has been described frequently(1, 3, 4). Nevertheless, Smart and Bateman(5), in a comprehensive review of the literature, enumerate only 11 cases. This phenomenon is of interest but has attracted few attempts at

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explanation beyond the presupposition of a persistent biochemical effect of the drug (3, 5). No evidence is available to support this contention.

Four restrictions must be applied to consider recurrence of marihuana effect in a coherent manner. These restrictions could usefully be applied to descriptions of the spontaneous recurrence of the effects of other hallucinogens.

The first restriction is that recurrence of clinical psychopathology that was present during the drug reaction is not a spontaneous recurrence of drug effect. It is more properly viewed as precipitation by the drug of psychopathology to which the user was predisposed. Anxiety or thinking disorder that occurs during the drug experience and thereafter would fit in this category. Such events, although they are not spontaneous recurrences of drug effect, are adverse reactions.

The second restriction is that recurrence of marihuana or LSD effect is not necessarily an adverse reaction and should be classified as such only if it precipitates anxiety or interferes with function. Spontaneous recurrences are tolerated by some and enjoyed by others. This may account for the comparatively few case reports of spontaneous recurrence of LSD reaction. Such events, not experienced as adverse reactions, are not likely to be brought to medical attention.

The third restriction applies to situations in which an individual has had similar reactions to more than one hallucinogenic drug. Spontaneous recurrence in this situation can be assigned to neither.

A fourth restriction is less definite. We have interviewed six individuals who stated that they did not hallucinate during the marihuana reaction but that their perceptual awareness was increased and some degree of this enhancement remained with them. Such reports should be evaluated as another consequence of marihuana use.

Case Reports

Case 1. A 21-year-old man smoked more than four marihuana cigarettes. He experienced confusion, disorientation, panic, and the sensation of loss of control of his hands;

he could not talk and hallucinated colored spots and designs during the drug reaction.

For three weeks thereafter he experienced confusion and disorientation and hallucinated designs similar to those which appeared during the marihuana experience. This took place most often when he was attempting to go to sleep. These events precipitated anxiety which required hospitalization. There were no evidences of schizophrenia or affective disorder. His symptoms gradually subsided during the next week.

Case 2. A 23-year-old man smoked between one and two marihuana cigarettes on eight occasions during a seven-day period. During the drug reactions he experienced elation, confusion, and the sensation that what was central in his visual field stood out with unusual clarity and what was peripheral was dim and foggy.

These same sensations recurred intermittently for seven days thereafter and precipitated anxiety which had not been present during the actual drug experiences. The anxiety was sufficient to impair his performance of daily activities. Treatment with thioridazine (25 mg., three times a day) was initiated and the recurrent reactions subsided by the ninth day after drug use.

Elation and psychomotor acceleration were present on the fourth day but not on the ninth day after his last use of marihuana. At no time was there evidence of thinking disorder.

Case 3. A 21-year-old man smoked between one and two marihuana cigarettes. During the drug reaction he felt that his fingernails were heavy on his hands, that his throat was covered with fuzz, and that the air was heavy as it moved in and out of his lungs and resistant as his arms moved through it. These sensations recurred intermittently for two days after drug use. They were accompanied by a feeling of recognizing the "absurdity" of the situation.

There were no evidences of anxiety, schizophrenia, or affective disorder. His ability to carry out activities was in no way impaired.

Case 4. A 22-year-old man reported that when he smoked more than three marihuana cigarettes the limbs of trees would appear to undulate and objects would be covered with sparkling points of light. He stated that these visual experiences would recur markedly during the day after drug use. He looked forward to and enjoyed these recurrences,

which had taken place on at least five occasions.

There were no evidences of anxiety, schizophrenia, or affective disorder.

Discussion

Cases 1 and 2, but not cases 3 and 4, represent adverse reaction to marihuana as well as spontaneous recurrence of drug effect.

Persistent biochemical effect has been offered as one explanation of spontaneous recurrence. Another explanation of the cases described above proceeds as follows. Hallucinations of color and design occur in many circumstances, including stroboscopic and entoptic stimulations, as well as during the reactions to a psychotomimetic. On this basis, Kluver(2) deduced that such phenomena depend on mechanisms inherent in the visual system. The topic does not have an extensive literature.

Most people can make themselves aware of the motion of their lungs or limbs by concentrating, although the normal modulation of attention consists of ignoring such sensations. During the drug experience the awareness of vagaries of visual or kinesthetic experience becomes conscious. This may be because the drug disorganizes systems

responsible for processing sensory input so as to heighten such awareness. Heightened attention could also occur if the mechanisms responsible for modulation of attention are impaired. Once a sensation has been noted, it is not quite so easy to ignore lesser degrees of the same event.

Early experiences with marihuana users at the University of North Carolina Medical Center suggest that spontaneous recurrence of drug effect may be relatively common and that this event may often be accompanied by a degree of anxiety sufficient to constitute a psychiatric emergency.

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Motivation for Marihuana Use: A Correlate of Adverse Reaction

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Curiosity and conformity were cited as the principal reasons for initial marihuana use by 54 users interviewed. Twenty-six of the 40 who became regular users sought an experience combining tension relief with mild stimulation of thought. Fourteen of the 40 continuing users desired some type of psychotomimetic experience. Desire for psychotomimetic experience was correlated with higher dosage and higher incidence of psychopathology.

THIS PAPER reports on 54 users of marihuana who were interviewed; they were questioned about motivation, dosage, reaction, adverse reaction, and frequency of use. All were white, had attended college,

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