

MARIJUANA

History of Marijuana Use

- The hemp plant, *Cannabis sativa*, is one of the most important plants in human history.
- The main active ingredient of cannabis is *delta-9-tetrahydro-cannabinol*, abbreviated as delta-9-THC or simply THC.

Cannabis sativa



Cannabis sativa



- There are over 80 known cannabinoids.
- THC concentration is greatest in the resin found on the flowers, seeds, and upper leaves of the female plant.
- THC is not water soluble, but it is soluble in alcohol and fat.

- There is evidence of early use of marijuana throughout much of Asia, India, the Middle East, and Africa.
- The Jamestown settlers brought hemp to Virginia in 1611 to cultivate it for its fiber.
- George Washington grew hemp at Mount Vernon in 1765 for its fiber and perhaps also for medicinal use.
- During the nineteenth century, marijuana was often prescribed as a medicinal drug, usually administered as an alcohol extract.

- Modern use has included reduction of the unpleasant side effects of chemotherapy for cancer and to reduce intraocular pressure that can lead to blindness from glaucoma.
- Marijuana for smoking was introduced into the United States in the early twentieth century.
- In 1926 two New Orleans newspapers published sensational exposes of the “menace” of marijuana.

Subjective Effects of Marijuana:

- Charles Tart (1971) did a systematic survey of the potential effects of marijuana and their relative frequencies.
- In order to avoid the artificialities of the laboratory, he had college students circulate a 220-item questionnaire addressed “to anyone who has smoked marijuana more than a dozen times.” The questionnaires were filled out and returned anonymously.

The following characteristic changes (or effects) were defined as those that occurred “very often” (over 40 percent of occasions) in at least half of the respondents:

- Sensory Perception
- Time Perception
- Memory
- Thinking
- Judgment of Meaning or Significance
- Emotions
- Self-control
- Interpersonal Relations

Experimental Research on Marijuana

Physiological Effects of Marijuana:

- The most reliable physiological effect is an increase in heartbeat rate (pulse rate).
- Heartbeat increase is reliable enough that it can be used to determine whether the subject has smoked marijuana effectively enough to get the chemicals into the bloodstream.

- Smoked marijuana at social doses (8 – 14 mg THC) does not produce any dramatic changes in brain wave (EEG) recordings from the cortex surface.
- The most important neurophysiological effects of marijuana are on subcortical structures of the brain, rather than the cerebral cortex.
- There is evidence that marijuana disrupts cholinergic synaptic transmission in the limbic system.

Cognitive Effects of Marijuana

Sensory-perceptual effects:

- Studies with objective measures have failed to find evidence of enhanced sensory-perceptual abilities during marijuana intoxication.

Cognitive Effects of Marijuana pt. 2

Sensory-motor performance:

- Studies by Sharma & Moskowitz 1974 showed that marijuana caused increasingly greater disruptions in the ability to maintain continuous attention to a task, compared to placebo, as the amount of time-on-task increased.
- Studies on reaction time showed that marijuana increased the variability of reaction times. Most responses are as fast with marijuana as with placebo, but marijuana increases the frequency of unusually long reaction times (Clark, Hughes, & Nakashima 1970)

Memory

- Memory disruption is probably the most reliable objective behavioral effect of marijuana.
- Marijuana affects short-term memory operations only when reporting is delayed, allowing time for a shift of attention to occur, resulting in interference with STM.
- Marijuana decreases STM's functional capacity by increasing its susceptibility to interference.
- It does not interfere with retrieval from LTM of material learned earlier while straight.

What is the process by which marijuana affects memory?

- Miller and Branconnier (1983) suggest that marijuana affects transmission at cholinergic synapses in the limbic system, particularly in the septal-hippocampal pathway:
- Drugs that disrupt limbic cholinergic transmission have effects on memory and attention similar to marijuana's effects.

- THC decreases the turnover rate of acetylcholine (a neurotransmitter) in the hippocampus.
- Electrophysiological recordings show effects of marijuana on limbic system activity.
- There are similarities between marijuana effects and certain neurological syndromes where memory deficits have been linked to disruption of neurotransmission in the limbic system.

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