

# The Health Effects of the Abuse of Ketamine

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## Abstract

Ketamine is a dissociative anesthetic which is used in powdered or liquid form. A number of individuals have abused this drug or have been instrumental in others using this drug as a “date-rape” drug. Abuse of ketamine can result in a number of systemic manifestations including gastrointestinal issues, depression, and respiratory problems and amnesia. Serious debilitating urinary tract symptoms are also seen frequently in those individuals who abuse ketamine.

**Keywords:** Ketamine; Anesthetic; Phencyclidine; Delirium; Hallucinations; Depression; Psychedelic; Addiction

## Introduction

Addiction is defined as being a primary chronic disease of the brain reward, motivation, and memory in this complex circuitry. A dysfunction in this complex circuitry can lead to certain manifestations in an individual [1]. The individual who suffers from addiction does not have the ability to abstain from this harmful pursuit and, as a result, addiction can take control of one’s life. Ketamine, an anesthetic which has provided much needed relief of pain in medical surroundings, has been subject to abuse by individuals leading to their dependence of this drug. Ketamine is used in the treatment of chronic and acute pain in adults and children [2]. Like all forms of addiction it is imperative that the substance-abusing individual seek professional counselling and treatment immediately in an attempt to break the powerful bonds of addiction.

Ketamine is a dissociative anesthetic which means that it distorts the perception of sight and sound while producing a feeling of detachment from one’s self and surroundings [3]. It is known by a number of street names such as Special K, Green, K, Super K, Super acid, Jet, and Cat Valium [3]. Ketamine has also been known as a psychedelic club drug and a date-rape drug due to its ability to quickly numb and render an individual immobile. Ketamine’s

use as a “club drug” rose in popularity during the 1990’s. When used as a recreational drug ketamine can produce delirium, a slowed perception of time and altered states of consciousness [4]. Recent studies indicate that ketamine might have the ability to aid in the treatment of severe depression [5]. Ketamine is considered to be safe for pain relief and sedation even in those intensive care patients who are experiencing cardiovascular instability [6] as ketamine is able to provide anxiolysis while maintaining cardiovascular stability [7].

Accidental overdose is fairly common as some users underestimate its potency. It can be taken in pill form or smoked but, it is usually injected or snorted. Ketamine may be administered orally, rectally, intranasally, IV, IM, or intrathecally [8].

Ketamine was first synthesized at Parke-Davis Company in 1962 by Alvin Stevens and was first used in humans by Corssen and Domino in 1965 [9].

The mechanism of action of ketamine, which is lipid and water soluble [10], is the non-competitive antagonism of the n-methyl-D-aspartic acid receptor [11,12]. Ketamine shows a chiral structure which consists of two optical isomers and undergoes oxidative metabolism primarily

due to norketamine by cytochrome P450 (CYP) 3A and CYP2B6 enzymes [13]. Ketamine acts as a non-competitive antagonist of glutamatergic N-methyl-D-aspartate (NMDA). This results in changes in synaptic and cellular plasticity via local glutamate non-NMDA-receptors [14].

The abuse of ketamine may lead to a syndrome of cystitis and contracted bladder. Also, abusers often suffer secondary renal damage resulting in these individuals becoming dependent on dialysis [15,16]. Another frequent presentation in ketamine abusers is upper gastrointestinal symptoms [17].

The recreational use of ketamine results in a number of central nervous system effects such as floating sensations, alterations in body image and mood, drowsiness, vivid dreams, delirium, and hallucinations [18-20]. Individuals who abuse ketamine have been reported to binge on ketamine which is a behavior frequently seen in cocaine addicts [21]. If the ketamine user is mixing ketamine with other drugs or alcohol, a ketamine overdose may result with only a very small amount of ketamine [22]. Frequent users of ketamine have exhibited disturbances in verbal memory. These individuals may experience difficulty in remembering conversations and people's names [23].

The usual illicit dose of ketamine ranges from 50 mg to 100 mg [24-26]. Acute toxic effects of ketamine abuse include tachycardia, cognitive dysfunction, abdominal pain, muscle rigidity, hypertension and raised intracranial pressure with death being the end result at times [27,28]. Cholestasis has also been linked to chronic ketamine abuse [29,30]. Cholestasis is a reduction or stoppage of bile flow from the liver to the duodenum.

Ketamine withdrawal symptoms are usually not as severe as some other drugs being that the symptoms are psychological. However, these symptoms are usually accompanied by strong cravings. Ketamine can cause amnesia which may lead to overdose deaths as abusers of ketamine may not be aware of the dose of the drug which they have taken [31].

There are many drugs which are abused for a wide variety of reasons. The common denominator to understanding all forms of abuse is knowledge of addiction. Ketamine is a drug which has been abused through the years by many individuals due to its psychological effects. Unfortunately, it has also been used on unwitting victims as a "date-rape" drug.

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