

**Ketamine-induced 'near-death experience' states in a sample of 50 misusers.**

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## **Abstract**

Increase in recreational ketamine use may be a cause for concern. We aimed here at assessing, in a sample of ketamine misusers, concordance between the typical near-death experience (NDE) features and the on-drug psychoactive effects the subjects experienced. In 2003-2005, a sample of previous ketamine misusers recollecting a ketamine-related NDE were recruited through snowballing and screened with the means of the Greyson NDE Scale; 125 participants made an initial contact with the researcher and 50 reported a minimum score of 7 at the 'Greyson NDE Scale'. Interviewees were in the range 21-66 years old; 27 participants (54%) were educated at BA level; 18 (36%) had an MSc and 5 (10%) a PhD. Eight (16%) interviewees had a definite religious background. An average lifetime ketamine intake of 140 occasions was reported by the interviewees, who typically presented with a polydrug, including cannabis and MDMA/ecstasy, misuse history. In 45 (90%) cases, the NDE occurred during the first few occasions of intake. Most frequent features of reported NDE states included: altered perception of time (90%); strong sense of detaching from own physical body (88%); and a sense of peace/joy (76% of subjects). Although results here described were elicited from a self-selected, non randomized, limited size sample of misusers, we suggest that recreational ketamine intake may be associated with occurrence of near-death related states, and this may be a reason for concern.

**Key words:** ketamine; drug misuse; near-death experiences (NDEs); out-of-body-experiences (OBEs)

## **Glossary:**

- Ketamine: a phencyclidine (PCP) related, non-competitive, glutamate N-Methyl-D-Aspartate receptor (NMDA) antagonist classified as a dissociative anaesthetic. It is typically used in the UK in both Emergency Departments and chronic pain clinics, but its recent increase in recreational misuse in the clubbing scene may be a cause for concern.
- Near-death experiences (NDEs): a range of clinical and non clinical events are thought to be typically associated with NDE occurrence, including: cardiac arrest; near-drowning and prolonged isolation/sensory deprivation. Most frequently described features of an NDE include: a sense of joy, peace, love; the detachment from own physical body; travelling along a region of darkness towards a light at the end; visualization of past experiences/life-review.
- Greyson NDE Scale: a validated and standardised 16-item questionnaire, successfully used in previous studies to assess NDE core components in a variety of medical patients.

## **(Spanish) Experiencias 'cerca de la muerte' inducidas por Ketamina en una muestra de 50 consumidores.**

El aumento en el consumo ilícito de Ketamina es un hecho preocupante. El objetivo del estudio consistió en valorar en una muestra de consumidores de Ketamina la concordancia entre experiencias subjetivas de estar cercano a la muerte y otros efectos psicoactivos bajo el efecto de la droga. Se reclutaron participantes con dichas experiencias y fueron evaluados con la escala 'Greyson NDE' entre 2003 y 2005. 125 participantes fueron contactados, de los cuales 50 puntuaron al menos 7 en dicha escala. Las edades de los sujetos estaban comprendidas entre 21 y 66 años. 27 participantes (54%) poseían una licenciatura universitaria, 18 (36%) habían hecho un Master y 5 (10%) tenían un doctorado. 8 sujetos (16%) se identificaron con una creencia religiosa concreta. Los muestrados reportaron una media de consumo total de 140 experiencias con ketamina, presentando un perfil de politoxicomanía en la que el cannabis y el éxtasis predominaban en su historia de consumo. En 45 casos (90%) la experiencia de estar cerca de la muerte se asoció a las primeras ocasiones en que

la Ketamina fue consumida. Las características más típicas de esta experiencia que fueron encontradas en la muestra estaban relacionadas con: percepción alterada del tiempo (88%); una sensación vívida de morir y de distanciarse del mundo físico (88%); una sensación de paz/regocijo (72%). Aunque los resultados aquí descritos se recogieron a través de una muestra no aleatoria, autoseleccionada y con un número limitado de participantes, los datos parecen sugerir que el uso ilícito de Ketamina puede estar asociado con la ocurrencia de estados subjetivos de estar cerca de la muerte. Tales datos son un resultado preocupante.

**Palabras Clave:** ketamina; toxicomanía; experiencias cerca de la muerte; experiencias extracorporales.

### **(French) "Evaluation des 'Expériences de Mort Imminente' engendrées par l'usage de la Kétamine chez un échantillon de 50 toxicomanes"**

#### **Résumé**

L'augmentation de l'usage de la Kétamine à des fins non-médicales peut être un facteur d'inquiétude. Notre but était d'évaluer la concordance entre les caractéristiques typiques de l'expérience de mort imminente (EMI) et les effets psychoactifs du stupéfiant chez un échantillon de drogués à la Kétamine (ou consommateurs de Kétamine). En 2003-2005, un échantillon d'anciens drogués à la Kétamine a été constitué et examiné selon l'Échelle EMI de Greyson. Un contact initial eut lieu entre 125 participants et le chercheur et 50 ont obtenu le niveau minimum de 7 selon cette échelle. Les interviewés étaient âgés de 21 à 66 ans. 27 (54%) possédaient un diplôme universitaire; 18 (36%) avaient une Maîtrise et 5 (10%) un Doctorat. Huit (16%) d'entre eux étaient membres d'une religion définie. Les personnes interviewées rapportèrent avoir consommé la Kétamine en moyenne 140 fois dans leur vie, ainsi que d'autres drogues dont le cannabis et l'ecstasy. Dans 45 (90%) des cas l'état EMI eut lieu lors des toutes premières consommations. Les caractéristiques les plus fréquentes de l'état EMI comprennent: perception altérée du temps (90%); expérience de sortie de corps (88%); extase/sensation d'apaisement (76% des sujets). Bien que les résultats décrits ici soient issus d'un échantillonnage limité de toxicomanes volontaires, non choisis au hasard, cette étude suggère que l'usage non-médical de la Kétamine peut être associé à la survenance des états EMI et cela soulève des inquiétudes.

**Mots clés:** Kétamine (ou spécial k); toxicomanie; expérience de mort imminente (EMI); expérience de sortie de corps (ESC)

#### **Introduction**

Ketamine is a phencyclidine (PCP) related, non-competitive, glutamate N-Methyl-D-Aspartate receptor (NMDA) antagonist classified as a dissociative anaesthetic. The term 'dissociative' suggests that the sensory loss and analgesia as well as amnesia is not accompanied by actual loss of consciousness (Bonta 2003). Ketamine causes mild stimulation of the cardiovascular system and does not suppress respiration and gag reflex. Because of these characteristics, ketamine has a good safety record (Wolff and Winstock, 2006), being typically used in the UK in both Emergency Departments and chronic pain clinics (Green et al. 1998; Sehdev et al. 2006; Bell et al. 2006). Conversely, administration of the drug in high doses can cause cardiovascular and respiratory toxicity (Smith et al, 2002) and increase in unregulated use outside controlled environments may be a cause for concern. Schifano et al (in press)

recently focused on ketamine misuse mortality figures (UK; 1993-2006), extracted from various sources and identified 23 victims (typically males, in the 25-44 age group) who self-administered themselves with a miscellany of psychoactive compounds (including ketamine) and alcohol. Ketamine was detected in 4 cases on its own and they suggested that ketamine high safety profile should be questioned.

In the UK, lifetime prevalence of use in clubbers recently increased from 25.5% to 39.8%, (McCambridge et al, 2007). Behind its popularity a few reasons can be identified (Drugscope, 2005; Morgan et al. 2004c), including both short (5-30 minutes after intranasal administration) duration of action and low cost.

Recreational ketamine psychotropic effects (sometimes referred to as the 'K-hole'; Pomarol-Clotet et al, 2006) range from confusional states, vivid dreams, hallucinations, flashbacks, referential thinking, dissociation and depersonalization to psychotic experiences.

At sub-anaesthetic doses, ketamine intake has been anecdotally described to be associated with effects somewhat similar to those reported during a near-death experience (NDE; Greyson and Stevenson 1980; Jansen 1989; Bonta 2003; French 2005).

Conversely, a vast range of clinical and non clinical events are thought to be more typically associated with NDE occurrence, including: cardiac arrest (van Lommel et al, 2001); hypovolemic/septic/anaphylactic shock; intracerebral haemorrhage; cerebral infarction; near-drowning or asphyxia; apnoea (for a review, see Parnia et al. 2001); electro-stimulation of the temporal lobe (Persinger 1983); and prolonged isolation/sensory deprivation (Comer et al. 1967). Most frequently described features of an NDE include (Moody 1975): (a) the ineffable nature of the experience; (b) a sense of joy, peace, love; (c) the detachment from own physical body (out-of-body experiences; Blanke et al. 2002; Sartori 2005); (d) travelling along a region of darkness towards a light at the end; (e) visualization of past experiences, sometimes organized into a life-review (Greyson and Stevenson 1980; Moody 1975); (f) visions and communications with deceased relatives and friends or 'beings of light'; (g) a decision to return to life; and (h) altered perception of time. Ketamine effects and NDEs might bear some level of resemblance at a neurobiological level as well. In fact, both ketamine and NDEs involve events at glutamate N-methyl-D-aspartate (NMDA) receptors (Bonta 2003; Jansen 1989; Fenwick 1997). However, it is still unclear if reported ketamine psychoactive effects may appropriately fit into typically described features of an NDE. As a consequence, we aimed here at assessing, in a sample of recreational users, concordance between ketamine psychoactive effects and classically described NDE features. This may help in better understanding both the drug psychoactive effects and its health related risks.

## **Methods**

To develop the research sample, a snowballing technique was used. For recruitment purposes of the first study subjects, an internal email was sent by one of us (OC) to all undergraduate, postgraduate and postdoctoral University of London students, explaining the purpose of the research to be carried out and redirecting those students who were willing to share their own ketamine experiences to an ad-hoc website, which was available throughout the research period (2003-5). An advice was made as well via popular announcements and through a network of informants, looking for retrospective accounts of ketamine experience (s). Further study participants were identified from among the already recruited participants' acquaintances. If respondents had both a previous recreational ketamine experience and recollected what they believed to have been an NDE, they were invited to fill in the 'Greyson NDE Scale' (Greyson 1983). This is a validated and standardised 16-item questionnaire, successfully used in previous studies to assess NDE core components in a variety of medical patients (Parnia et. al 2001; Corazza, in press). Those 50 respondents who recollected a ketamine-related NDE and reported as well a minimum score of 7 at the Greyson scale were invited for an interview. Answers to the questionnaire were used as the basis of the open ended interview, which enabled the interviewer to explore themes and topics relevant to participants' individual circumstances. Interviews were tape recorded and transcribed; detailed notes were taken as well. Overall, 125 subjects made at least an initial contact with the researcher and described online their ketamine experience(s). After an initial screening, 60 subjects were invited to fill in the Greyson scale and 10 of them did not reach the cut off score. In those 10 cases, most of the psychoactive experiences reported involved either vivid dreams or complex auditory/visual hallucinations, but did not include any experiences reminding of an NDE. Qualitative results were scrutinized with the means of the content analysis; it was here assumed that words and phrases mentioned most often were those reflecting the most important topics highlighted by the interviewees (Krippendorf, 2004). Answers to open ended questions and communication contents were categorized, classified and systematically analysed. Interviews were always carried out in English, since subjects were either fluent or native English speakers. All participants gave informed written consent to participate to the study. The South Oriental and African Studies, University of London, Ethics Committee granted the study approval.

## **Results**

All participants (see Table 1 for both their background and drug misuse history) had tried ketamine at least once in their lifetime.

(Please insert Table 1 about here)

Interestingly, in 45 (90%) cases, the NDE state occurred either during the first 5 occasions of intake or during the first few experiences after long spells of ketamine-free periods. On further occasions of intake, ketamine was typically perceived as a stimulant. In term of the Greyson NDE Scale (see Table 2), the subjects' perception of time seemed to be altered as typically described during an NDE: 45 (90%) participants reported that everything seemed to be happening at once, or that time lost all its meaning, while 5 (10%) perceived a complete 'absence of time' during the experience.

(Please insert Table 2 about here)

The sense of dissociation from the physical body was experienced by 44 subjects (88%), who claimed that they left their bodies and existed outside it or that they lost awareness of their bodies. Thirteen subjects (26%) clearly described a travel along a tunnel, or through a spiral, with a brilliant light at the end or experienced a more general sense of light, or of flashing lights. Fifteen (30%) participants somewhat met with a 'being', or heard a definite voice of mystical or unearthly nature. An infrequently described feature was the so called 'life review'. Twelve (24%) subjects reported that they were able to either vividly 'review' past events, or felt that their past 'flashed before them, out of control'. Furthermore, 10 (20%) subjects reported that during their experience they were 'aware of things going on elsewhere', as if by extra-sensory perceptions. At the question 'Did you suddenly seem to understand everything?' most interviewees (26; 52%), answered that they achieved 'a total understanding of the universe'. Only 4 (8%) participants approached a sort of 'barrier' or 'a point of no return', which was described as 'the limit between earthly life and the next life'. This could have been an edge, a wall, or a river, amongst other patterns. Thirty-six (72%) respondents experienced an ineffable sense of peace and pleasantness, and 38 (76%) subjects described an 'incredible joy'.

## **Discussion**

It is suggested here that recreational ketamine misuse may be associated with occurrence of NDE states, at least in a self-selected group of misusers. NDEs typically occurred during the first few

occasions of ketamine intake, suggesting that individuals who have developed higher tolerance levels may be at smaller risk. Results here described were elicited from a self-selected, non randomized, limited size sample of ketamine misusers and findings identified may not allow their generalizability. More attention was given to the experiential (qualitative) aspects of the accounts, rather than to a quantitative component. However, present approach may have increased the understanding of the ketamine effects among misusers. All the subjects' accounts dealt with memories of a sometimes remote event, and one could wonder how much ketamine-induced memory disturbances (Morgan et al. 2004a, 2004b) may have biased respondents' recollection of their drug-induced NDE experience. Furthermore, although all the interviewees claimed that the experience was the result of a ketamine monointoxication, most subjects were actually polydrug misusers. Only prospective, double-blind vs placebo, clinical studies with ketamine-naïve human volunteers may assess the possible role of subjects' personality in shaping the subjectively experienced NDE states. On the other hand, prospective studies with ketamine dosages large enough to induce a dissociative state could have raised ethical concerns (Perry et al, 2007). Furthermore, most interviewees were highly educated individuals (46% had either a Master or a PhD degree); this may have overestimated here the real occurrence of NDEs among ketamine users. Further biases may have arisen in relation to some participants not having been interviewed in their native language. On the other hand, the main problem here was indeed given by the somewhat 'ineffability' of the experience, difficult to be translated into any words of any language. Finally, since interviews had not been carried out in close proximity of a recent ketamine intoxication, no toxicological tests were here carried out to back up the interviewees' allegations, and one could not rule out that other drugs (i.e.: cannabis) had not recently been self-administered (Jansen 2001). Future studies should be carried out in larger samples of ketamine misusers, and results should be systematically compared with those emerged in the related field of near-death studies in medical patients.

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**Table 1: Background characteristics and drug misuse history of those 50 interviewees who reported an NDE-related state in association with a ketamine misuse occasion of intake**

Gender	male: 52%; female: 48%
Age range	19-66 years old
Country of origin	UK (15; 30%), continental Europe (Italy, Spain and Germany: 29; 58%); USA (5; 10%) and Japan (1 subject).
Employment level	Most were either in full-time employment (42%) or students (34%).
Civil status	Mostly single: 94%
Educational level	27 (54%) had a BA; 18 (36%) had an MSc; 5 (10%) a PhD.
Presence of a definite religious belief	8 (16%) had a religious (i.e.: Christian: 4 subjects; Jewish: 2; Buddhist: 1; Muslim: 1) belief. Only 2 subjects were practising members of their faith.
History of ketamine intake	All subjects had tried ketamine at least once in their lifetime; 14 (28%) reported having consumed the substance on less than 5 occasions and 7 (14%) between 5 and 10 occasions. Most (58%) were more experienced ketamine users, having taken it on up to 2,000 occasions. Overall, ketamine had been taken on an average of 140 occasions. Typically, ketamine was taken intranasally (62%), but 9 (18%) participants had injected it intramuscularly; 8 (16%) intravenously, and 2 (4%) subjects were used to smoke it. Ketamine typical dosage per occasion of use ranged between 20 and 150 mg. In 15 (30%) cases, ketamine last occasion of use occurred within the last month, but no subjects had taken it within the last week.

Polydrug misuse history	All subjects had previously experienced with both cannabis and MDMA/ecstasy at least once in their lifetime; 17(34%) had tried amphetamines/`speed`; 46 (92%) cocaine; 48 (96%) LSD; 43 (86%) magic mushrooms; and 8 (16%) opiates.
General, qualitative, remarks about the subjects	Most interviewees appeared to be intelligent, smart, and well settled in their environment. Furthermore, they were able to make and maintain meaningful and long term friendly/affective relationships. A few subjects used both ketamine and the other drugs recreationally, whilst clubbing. Conversely, most subjects reported that they had not developed any dependence on ketamine, which had been typically used to increase the users' level of `intellectual creativity`. From the `spiritual` point of view, the ketamine intake itself was described by some as an `enriching` experience.

**Table 2: Greyson Scale results of those 50 interviewees who reported an NDE-related state in association with a ketamine misuse occasion of intake**

(please note that not all subjects answered items 2, 7 and 10 of the scale)

	<b>noyes</b>
1. Did time seem to be speeding up? %	5 45 10 90
2. Were your `visions` accelerated? %	25 14 64 36
3. Did you experience a `life review` of scenes from your past? %	38 12 76 24
4. Did you seem to understand everything? %	24 26 48 52
5. Did you experience a sense of peace and pleasantness? %	14 36 28 72
6. Did you experience feelings of joy? %	12 38 24 76
7. Did you perceive to be in harmony/unity with the universe? %	24 26 48 52

8. Did you have the sensation there was a light at the end of a tunnel and/or did you experience a more general sense of light, or of flashing lights?	37	13
%	74	26
9. Were your senses more vivid?	18	32
%	36	64
10. Did you experience any extra sensory perceptions (ESP)?	30	10
%	75	25
11. Did you seem to perceive what will happen in the future?	42	8
%	84	16
12. Did you either feel separated from (or have you lost awareness of) your own body?	6	44
%	12	88
13. Did you seem to enter some sort of 'another world'?	26	24
%	52	48
14. Did you meet with mystical beings or hear their voices?	35	15
%	70	30
15. Did you meet with deceased ones or religious/spiritual figures?	43	7
%	86	14
16. Did you reach any 'point of no return'?	46	4
%	92	8