Abstract

Background: Ketamine (2-[2-chlorophenyl]-2-[methylamino]-cyclohexanone) is a dissociative anesthetic. It is a non-competitive N-methyl-D-aspartate (NMDA) receptor antagonist which acts on the glutamate system. Ketamine use is of increasing popularity in Hong Kong in the recent 10 years. Regular ketamine use is associated with cognitive dysfunction, mainly memory problems. However, no study has examined decision making ability and the participants recruited in previous studies were predominantly poly-substance users. Our primary aim was to delineate whether ketamine use is associated with impaired neurocognitive functions, including decision making, attention and impulsivity by comparing a group of relatively "pure" regular ketamine users to healthy controls. Our secondary aim was to identify, if any, the differential effect of ketamine on neurocognitive functions by comparing ketamine users with a group of poly-substance users. Moreover, the correlation between the aforementioned neurocognitive domains was examined.

Methods: Forty regular ketamine users and 40 poly-substance users were recruited by consecutive sampling method in the Tuen Mun Substance Abuse Clinic (TMSAC) and non-governmental organisations (NGOs). Forty healthy controls were recruited from various departments of Castle Peak Hospital. A series of cognitive tasks including the Iowa gambling task (IGT); the Wisconsin card sorting test (WCST); the stroop colour

word test (SCWT); the digit vigilance test (DVT); the symbol digit modalities test (SDMT), the forward/backward digit span test (F/BDST) and the Barratt impulsiveness scale (BIS-11) were performed to examine the possible neurocognitive deficits in decision making ability, attention and impulsivity.

Results: Regular ketamine users and poly-substance users demonstrated poorer performance in neurocognitive tasks including IGT, BDST, SDMT, SCWT and BIS-11 as compared to healthy controls. However, ketamine and poly-substance users showed comparable patterns of neurocognitive functions. Significant correlations were found between decision making, attention and impulsivity.

Conclusions: These findings suggest that regular ketamine use is associated with deficits in decision making, selective and switching attention as well as elevated trait and behavioural impulsivity. The differential effect of ketamine on neurocognitive functions remains unclear but our result suggests that ketamine is no less harmful than other substances. Drug users, in general, may be at risk of decision making deficits, impaired attention and elevated impulsivity. Such behaviours may be the cause or consequence of drug use.

Keywords: Attention, Decision making, Impulsivity, Ketamine, Substance abuse