Cognitive consequences of drug abuser: comparison with abuse of stimulants and opioid with regard to attention and working memory

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Received January 8, 2010; revised February 6, 2010; accepted March 13, 2010

Abstract

Existence of disharmony in sustaining attention and working memory in stimulants abusers and opioids abusers in Iran is observable. The performance of three group of people included 30 normal person, 27 opioids addict, and 26 stimulant addicts in Paced visual Serial Addition Test (PVSAT) as a measure of sustaining attention and working memory was assessed in this research. Significant difference were observed in sustaining attention, and working memory between three groups of control (whom never use drugs) and experiments (those are addicted to opioids or stimulants); but there were no significant between two groups of addicted subjects which use opioids or stimulants.

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Keywords: stimulants, opioids, sustaining attention, working memory, PVSAT.

1. Introduction

There is a consensus that all drugs create a disharmony in the neuropsychological network, causing a decrease of activity in areas responsible for short-term memory, attention, and executive functioning with the possible exception of heroin. It is worth pointing out the effort made in many of these studies to relate quantity and chronicity measures of drug use with the magnitude of the neuropsychological impairments. Due to the absence of a more profound knowledge about the cause–effect relationships in the area of the neuropsychology of drug dependence, and the considerable methodological difficulties associated to longitudinal studies, these chronicity and severity-related measures can provide important support for the hypothesis that drugs generate neuropsychological alterations, and not the other way around. Brain Imaging Techniques on the other hand reveal that changes in brain function differ between drugs, but neuropsychological assessments show similar results or no changes in function. (Lundqvist, 2005).
1.1. Methamphetamine

Neuroimaging studies have demonstrated that methamphetamine user exhibits various abnormalities in brain function relative to healthy controls. These include alterations in frontal, temporal, and subcortical brain metabolism (Gouzoulis-Mayfrank et al., 1999, Iyo et al., 1997 and Volkow et al., 2001a), changes in brain metabolites suggestive of neuronal injury in the basal ganglia and frontal cortex (Ernst et al., 2000), and decreased density of dopaminergic neurons in the caudate and putamen (McCann et al., 1998, Sekine et al., 2001 and Volkow et al., 2001b). Few studies have explicitly attempted to examine the cognitive functioning of methamphetamine users, recent investigations have documented deficits in learning, delayed recall, processing speed, and working memory (Rippeth et al., 2004 and Simon et al., 2000).

1.2. Cannabis

Qualitative analyses of the cognitive consequences of cannabis use made by Hall et al. (1999) conclude, focusing on: acute effects that, cannabis induces loss of internal control and cognitive impairment, especially of attention and memory, for the duration of intoxication. Further, according to Hall et al. (1999), the major health and psychological effects of chronic heavy cannabis use, especially daily use over many years, remain uncertain. On the available evidence, the major probable adverse chronic effects on cognition appear to be development of a cannabis dependence syndrome, characterized by an inability to abstain from or to control cannabis use; subtle forms of cognitive impairment, most particularly of attention and memory, which persist while the user remains chronically intoxicated, and may or may not be reversible after prolonged abstinence from cannabis.

Both neuropsychological assessment studies and studies based on brain imaging techniques indicate that deficits in attention, memory and executive functioning. Acute neuropsychological effects (within 12–24 h) of cannabis use include deficits in attention, executive functioning, and short-term memory (O'Leary et al., 2002 and Pope et al., 1995). Some studies indicate long-term effects (after 24 h–28 days) on short-memory and attention (Bolla et al., 2002, Eldreth et al., 2004, Pope et al., 2001 and Schwartz et al., 1989).

1.3. Opioid

Pau et al. (2002) examined the impact of heroin on frontal executive functioning in three cognitive domains, namely attention, impulse control, and mental flexibility and abstract reasoning. The findings indicate that heroin addiction has a negative effect on impulse control, while attention and mental flexibility/abstract reasoning ability were not affected.

Davis et al. (2002) examined cognitive functioning in people with a current or past history of opiate abuse using a range of neuropsychological tests. The findings in the study suggest subtle impulse control difficulty as a result of 5 years of heroin use. Other appeared to be unaffected. Most neuropsychological and electroencephalographic studies of drug abusers showed less profound brain dysfunction in chronic opiate addicts compared to chronic psychostimulant users (Hill and Mikhail, 1979, Costa and Bauer, 1997, Rogers et al., 1999, Arzumanov, 2001 and Bauer, 2002). But some neuropsychological deficits in opiate abusers were also reported. Medicated heroin addicts usually demonstrate impairment on psychomotor speed and attention tests, which may be in part attributed to sedative medication effects (Darke et al., 2000, Specka et al., 2000, Briun et al., 2001, Davis et al., 2002 and Mintzer and Stitzer, 2002). A proportion of opiate addicts exhibits broader cognitive impairment in comparison to other patients, and this fact is usually interpreted as a premorbid or concomitant brain damage in some heroin addicts (Hill and Mikhail, 1979, Briun et al., 2002 and Davis et al., 2002).

2. Materials and methods

2.1. Subjects

Among the 83 participating in this study, 30 normal men, 27 men opioids addicted and 26 men who were addicted to stimulant were present. All the patients abused drug at least 6 months. Thirty healthy male volunteers with no history of drug abuse were chosen to match the drug abuse groups as closely as possible for years of education but our opioids addicts were younger than the other one.
2.2. Procedure

Assessing of the performance of three groups of people in Paced visual Serial Addition Test (PVSAT) as a measure of sustaining attention and working memory was the purpose of this study. In this task a random series of digit presented on monitor of computer and the participant is to add the last digit presented to the preceding digit and verbalize the answer. The space at which the digits are presented differs for two trials. In trial 1 the digits are presented at the rate of 2 seconds and in trial 2 at 3 seconds.

3. Results

One-way ANOVA was used to investigate differences in three groups. And t-test was used to investigate difference for two groups. Significant difference were observed in sustaining attention, and working memory between three groups of control (whom never use opioids) and experiments (those are addicted to opioids or stimulants) in trial 2 but not in trial 1; and there were significant difference between two groups of addicted subjects which use opioids or stimulants in trial 1 but not in trial 2. The average of age, education, and the scores of two trials of the task are presented in Table 1.

4. Discussion

This Study results about comparison of stimulant addict and normal group are similar to earlier studies but about opioid addicts are completely different. Because earlier studies showed that stimulants decreases sustaining attention and working memory, etc but opioids haven’t any effects on attention and working memory. Absolutely it is because of abusing a new drug in Iran named Crak which procure from heroin attend heroin and opium that needs more study.

Acknowledgment

Special thanks to Mr. Ashkan Nooraftkan Roohi, Dr. Davood Ramezani and Dr Gharekhani for their helpfulness.

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