

Abstract

Objective: The current study aimed at comparing preventive behavioral mechanisms, behavioral tendencies, and clash between drug users under maintenance treatment and non-users. **Method:** It was a causal-comparative study. All the addicts of Esfahan city who had referred to one of the drug treatment centers constituted the study population. The selected sample consisted of 50 drug users under maintenance treatment and 50 non-users who were selected by convenience sampling method. Gray-Wilson Personality Questionnaire was used for data collection purposes. **Result:** The results showed that there was a significant difference between the two groups in terms of BAS and FFS scales while the difference between the two groups in terms of BIS scale was not reported to be significant. As well, there was a significant difference between the two groups in terms of approach, passive avoidance, fight, and silence. **Conclusion:** The investigation of the neural/ behavioral foundations within the range of substance abuse disorders indicate a difference between this group and the one without the disorder, and it can further our understanding of the neural foundations of these disorders.

Keywords: neurobehavioral mechanisms, addiction, maintenance treatment

On the Comparison of Neurobehavioral Activity Mechanisms between Substance Abuse Sufferers under Maintenance Treatment and Non-Sufferers

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Research on Addiction
Quarterly Journal of Drug
Abuse

Presidency of the I. R. of Iran
Drug Control Headquarters
Department for Research and Education

Vol. 8, No. 30, Summer 2014
<http://www.etiadjohi.ir/>

Introduction

Drug dependence is a recurrent and chronic psychological disorder which comes along motivational disorders and leads to the loss of behavioral control and personality destruction. Today, the range of drug dependence has become so vast in the world that it has turned to chronic and social trauma and has endangered the social security. Throughout the world, the number of drug dependent persons has reached over 190 million people. The number of drug dependent persons with average age of 18 years has been reported to be from 1 to 2 million people according to official statistics. At the same time, 11 million people encounter problems related to substance abuse (Shafiee, Rahgozar & Rahgozar, 2004; Ziahedin, Zarezadeh & Heshmati, 2006). Since substance abuse negatively effects the development and prosperity of society, it is a serious and concerning threat. Drug dependence and drug abuse are known as chronic and recurrent disorders with biological, cultural, psychological, social, behavioral, and spiritual consequences (Bruck & Schpitez, 2002; Valas, 2003: cited in Dabaghi, AsgharNejad Farid, Atef Vahid & Bolhary, 2007). Substance abuse is known as one of the most important common problems throughout the world (Margoline, Beitel, Oliver & Evantes, 2006). Clinical findings have shown that different biological, psychological and social factors are involved in the formation of substance abuse disorders (Besharat, Mirzamani, & PoorHosein, 2001; PoorShahbaz, Shamlou, Jazayeri & Ghazi Tabatabayi, 3005; Dabagh et al, 2007; Majdi, Colder & Stroud, 2009; Franques, Auriacombe & Tignol, 2000). During the last 50 years, a lot of efforts and studies the identification of the relationship between drug abuse and personality structure have been carried out (Bakhshipoor, Alilou & Irani, 2008). These studies suggest that personality traits play an important role in the outbreak and continuity of drug abuse and also in its treatment (Jose, Flor & Francisca, 2007; Kelly et al, 2006). Then, these factors must be taken into account in reviewing the methods of preemption, control and treatment. Jafary & Garry suggested a well-known neuropsychological theory. Garry's neuropsychological theory known as reinforcement sensitivity theory (Sepah Mansour, 2010; Corr & Perkins, 2006) developed the biological model of personality which includes three mental and behavioral systems. He believed that these behavioral and neurological systems form the foundations of individual differences. Accordingly, activities of each one lead to different emotional reactions such as panic and stress. The first system is the behavioral activating system which responds to such stimuli as conditional reward and lack of punishment. Activity and enforcement of this system lead to positive emotions, approach and active avoidance (Gray & McNaughton, 2000). Neural bases of this system whose structure is related to dopaminergic brain paths and cortical, striano, Pulido, and thalamic circles are placed in frontal curtain layer, amygdale and underlying cores (Hewig, Hageman, Seifert, Naumann &

Bartussek, 2006). Sensitivity of this system relegates individual's impulsivity and there are two behavioral components for this system that are approach (active seeking of reward) and active avoidance (presenting a particular behavior to avoid punishment) (Wilson, Garry and Barret, 1990). The second system, is behavioral avoidance system, which responds to the conditional stimuli of punishment and lack of reward and also new stimuli and natural fear stimuli (Garry, Mac Nagton, 1996, 2000). Function of this system leads to the emotional state of stress and behavioral avoidance, passive avoidance, silence, attention enhancement and motivation. Neuro bases in this system whose high activity is related to stress (Kaur, 2002) are placed in the frontal orbit and septum hippocampi and Papz circle (Houing et al, 2006). Two behavioral components of this system include: passive avoidance (avoiding punishment by lack of activity or surrender) and silence (stopping activities which have no rewards) (Wilson et al, 1990). The third system was called fight and flight system. It is structurally related to Amygdale and Hypothalamus and is sensitive to disturbing stimuli. Two behavioral components of this system include the efforts related to resistance-fight and run away or flight. The behavioral components of this system whose activity relates to neuroticism, are fight (defensive aggression) and flight (fast escape from the source of punishment) (Kour, 2002). Based on the theory of neurobehavioral systems, Gray (1994) suggested that psychological disorders are rooted in functional disorders (hyperactivity or underactivity) of one of the systems or their interactions. Since the development of Gray's model, researchers have raised this belief that abnormal sensitivity in systems shows the dispassion and readiness for many different forms of psychological pathology. In the field of substance abuse, attention mostly is focused on the activity of behavioral activator system and the most part of findings about the activity of this system in human beings is developed from the studies related to the neurotransmitter transporter, dopamine. Dopamine's release in dopaminergic pathways of the behavioral activator system is synchronized with the running of the motor programs of this system. Gray (1994) believed that the dopamine's release in the accumbens nucleus has a close relation with the high emotion that is witnessed in alcohol and drug users. This might be an exaggerated explanation of an enjoyment which is experienced in common forms of reinforcement. Highly sensitive people in behavioral activator system are apt to attitudinal behavior and positive experience of situations in which stimuli and reward get along together (Dawe & Lorton, 2004). So it is not strange to say that high sensitivity in behavioral activator system plays a role in the pathology of psychiatric disorders such as alcoholism and drug abuse

Locoston & Dave (2001) and Jorm et al (1999) have confirmed the relationship between behavioral activator system and drug abuse in non-clinical subjects. In another research, Johnson, Turner & Iwata (2003) showed

that high level of responses to reward and motivation from the behavioral activator system is related to alcohol abuse in life. Franken & Mouris (2006) also found out that addicted people compared to the alcohol users and normal people meaningfully had higher scores in measurement scales and subscales of behavioral activator system. In a study on 88 heavy alcohol users, Zisseron & Palfai (2007) showed that response and sensitivity to symptoms of enthusiastic stimuli are related to the activity of behavioral activator system. In Iran, the results of a study by Fahimi, Ali Mahdi, Bakhshipour & Alilou (2011) supported the idea that says the behavioral activator system of substance dependent persons is hyperactive. In a study by Abdi, Bakhshipour & Alilou (2009), high sensitivity of behavioral activator system and attitudinal behaviors were found to be positively related with alcohol and drug abuse. Also, Alimoradi, Hoshiar & Modares Gharavi (2011) and AbdolahZadeh, Hashemi NosratAbadi, Moradi & Farzad (2010) concluded that addicts' behavioral activator systems are more active. According to the above-mentioned points and with reference to the theory of psychopathology based on Gray's theory, it can be stated that possibly irregularity in neurobehavioral systems is a contributory factor in behaviors related to substance abuse and relapse of this disorder. Reviewing and identifying the biological infrastructures in this disorder could help to plan its treatment. So the main research question in the present study is: is there any significant difference between substance users under maintenance Methadone treatment and healthy people in terms of neurobehavioral systems?

Method

This study is a type of comparative-causative research. The subjects of this study include all the substance users of Isfahan who referred to substance abuse treatment centers in autumn and winter of 2010. To compare the degree of sensitivity in their neurobehavioral systems, 50 male addicts who had referred to treatment centers at least for 6 months were selected by convenience sampling method and, then, 50 non-addicted males were also chosen among healthy people. The substance users were divided into 3 groups of opium users (23 people), crystal users (17 people) and crack users (10 people). To increase the internal validity of the plan, inclusion and exclusion criteria were taken into account for the samples of the study before the administration of the questionnaire. Inclusion criteria for the substance users included: more than one year record of substance abuse, a diagnostic criterion for drug dependence without simultaneity or existence of axis 1 or 2 disorders according to the 4th edition of Diagnostic and Statistical Manual of Mental Disorders (DSM4), aged between 17 and 55 years, having at least guidance school literacy, and patient's consent for participating in the study. Exclusion criteria included: simultaneity of the disorders of axis 1 and 2, psychotic disorders, and complete criteria of personality disorder in axis 2. In terms of

mental health and lack of psychological disorders, the control group (normal people) was checked by a structured interview and their sociological characteristics such as age, gender and level of education were matched with the drug dependent group. To conduct the study, all members of the drug dependent group filled a document and answered the questionnaires.

Instrument

1. Gray-Wilson Personality Questionnaire (GWPQ): this questionnaire was developed by Wilson, Burt & Gray in 1989 and evaluates the dominance and sensitivity of neurobehavioral systems and their components and consists of 120 questions. To examine the activity of behavioral activator system, behavioral avoidance system, and fight and flight system, 40 items were taken into account for each one of them. From 40 items related to the activity of behavioral activator system, 20 items are related to the components of approach and 20 items to the components of active avoidance. From 40 items related to the measurement of behavioral avoidance system, 20 items were related to passive avoidance and 20 items were related to the components of silence. Finally, from 40 items related to fight and flight activity, 20 items were related to the component of fight and 20 items were related to the component of flight. On the validity ground of this questionnaire, Wilson, Burt & Gray reported the Cronbach's Alpha coefficients of 0.71, 0.61, 0.58, 0.61, 0.65, 0.65 for men and 0.68, 0.35, 0.59, 0.63, 0.71, 0.71 for women for the component of approach, active avoidance, passive avoidance, silence, fight and flight, respectively which showed the internal consistency of the test. Also, Ashrafi (2006) reported the Cronbach's Alpha coefficients of 0.60, 0.54, 0.61, 0.66, 0.65, and 0.69 for active avoidance, passive avoidance, silence, fight and flight, respectively and in the same order they reported the reliability indexes of these components through split-half method as 0.53, 0.57, 0.52, 0.62, 0.64, and 0.64, respectively.

Results

Table one shows the descriptive statistics of the variables for each group. Multivariate analysis of variance should be used to examine the difference in scores between the groups. However, this analysis has some assumptions. One of these assumptions is the equality matrix of covariance. The results of Box's test showed the satisfaction of this assumption. Another assumption is the equality of error variances.

Table 1: Descriptive statistics of the variables for each group

| <i>Components</i> | <i>Drug dependent</i> | | <i>Normal</i> | |
|-------------------|-----------------------|-----------|---------------|-----------|
| | <i>Mean</i> | <i>SD</i> | <i>Mean</i> | <i>SD</i> |
| Approach | 21.20 | 4.75 | 17.24 | 3.57 |
| Active avoidance | 23.80 | 4.15 | 29.86 | 4.23 |
| Passive avoidance | 16.60 | 5.17 | 12.62 | 4.35 |
| Silence | 16.80 | 6.02 | 14.66 | 4.64 |
| Fight | 18.16 | 7.9 | 12.66 | 6.79 |
| Flight | 17.12 | 4.20 | 17.30 | 3.77 |

The results of Leven's test show the satisfaction of this assumption. So MANOVA was carried out and the results showed a significant difference in linear combinations of components for two groups (Wilks' Lambda =0.50, F=15.220, P<0.001, eta square= 0.49). Then, univariate analysis was run to review the differences in patterns as follows.

Table 2: Univariate test results for identifying differences patterns

| <i>Component s</i> | <i>Mean square</i> | <i>F</i> | <i>Sig.</i> | <i>Eta squared</i> | <i>Observed power</i> |
|------------------------|--------------------|------------|-------------|------------------------|---------------------------|
| Approach | 392.04 | 22.16 0 | 0.0005 | 0.18 | 0.99 |
| Active avoidance | 201149 | 65.26 | 0.0005 | 0.40 | 0.99 |
| Passive avoidance | 1.01 | 0.20 | 0.89 | - | - |
| Silence | 114.49 | 4.95 | 0.07 | - | - |
| Fight | 858.49 | 17.70 | 0.0005 | 0.15 | 0.98 |
| Flight | 0.81 | 0.05 | 0.82 | - | - |

As it is shown in the above table, there is a significant difference between groups in approach, active avoidance and fight.

Discussions and Conclusion

The present study aimed at comparing preventive behavioral mechanisms, behavioral tendencies, and clash between drug users under maintenance treatment and non-users. The results showed that there was a significant difference between the two groups in behavioral activator system. Also, there was a significant difference between the two groups in the subscale of approach. These results are consistent with those of the studies done by Fahimi et al (2011), Jrem et al (1999), Azad Fallah (2000); and Lacston & Daw (2001). Comparing the mean scores between two groups showed that drug dependent group gained higher scores in approach and active avoidance compared to the other group. It can be said that these patients, in their environment, are more sensitive to new stimuli, panic stimuli or in the

situations which are accompanied by punishment or without rewards. Output of behavioral activator system which is activated by the favorable rewarding stimuli includes active seeking of rewarding stimuli without considering the behavioral consequences. In other words, the increase of activity in this system which is the fundamental reason of impulsive traits in patients (Moazen, Azadfalsh & Safi, 2009) causes people to seek for drug as an enjoyable stimulus actively and thoughtlessly and according to their feeling of satisfaction. Low score of drug dependent group in active avoidance component shows that these people seek punishment or foresee it and actively do not avoid it compared to the control group. It means that there is no effort to finish it on the part of them. This condition can lead to a vicious circle for the patient. A patient enters the vicious circle of substance abuse to gain early motivation and get satisfaction. Substance abuse causes a response from dopaminergic system encountering the substance so that other incentives do not make the person's attention get involved. As a consequence, the expectation of joyful excitement and exhilaration in such patients is higher than that in the other group only and only in drug use situations. This is the way that the person utilizes to actively develop the feeling of pleasure (Kalat, 2010). Due to the low level of active avoidance, the negative consequences of substance abuse are also very disturbing for dependent persons and they relapse into substance use to reduce the unfavorable effects of punishment. The difference between the two groups in the present study in terms of behavioral avoidance system was not significant. This result is consistent with the findings obtained by Abdollahzadeh Jedi et al (2010) and Alimoradi et al (2011). They found that there was not a significant difference between two groups of drug dependent persons and normal people in behavioral avoiding system. It seems that the difference in the range of emotional experiences during life and in behavioral activator system was a predictive factor for substance abuse. In the present study, the difference in fight-flight system between groups is more related to fight component. It means that there was no significant difference in the component of flight between the two groups while there was a significant difference in the component of fight between the two groups. Considering the findings, it can be claimed that the drug dependent group used the fight-flight system responses in order to stand against conditional and non-conditional annoying stimuli. Previous studies did not show meaningful differences between drug dependent persons and normal subjects.

The high level of fighting behavior among this group meant defensive aggression. As an explanation for this finding, it can be asserted that the scores of fighting for drug dependent subjects were significantly higher than those of the control group since the drug dependent group was under maintenance treatment and was to stop substance abuse. In fact, patients not only had the tendency towards and temptation for consumption, but they also

were actively trying to control this temptation and resist to it in this stage. As a matter of fact, fighting is the person's quarrel against the influx of tendencies and temptation. Therefore, the scores of this group have been obtained significantly higher than those of the control group. Making this subject clearer, it is suggested that the following studies consider the stages of active consumption and abstinence. As per some studies, the personality aspects of drug dependent persons change over time. Thus, it cannot be absolutely concluded that there is a cause and effect relation for neurobehavioral systems in drug dependent people and this subject requires more studies. Since the sample size of this study was small and just one gender was taken into account, caution should be exercised in generalizing the results of this study to drug dependent people. It is hoped that this ground is be taken into account in the following studies.

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