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A Study on Personality and Neuropsychological Aspects of Substance Abusers in Rehabilitation Settings

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Abstract: ***The purpose of this study is to explore the personality and neuropsychological aspects of individuals abusing alcohol, cannabis, opioids and those abusing multiple drugs. A total sample of 30 diagnosed cases of substance abuse in different de addiction centres were taken as sample. A Semi-Structured Socio-Demographic and Clinical Data Sheet was given followed by the NEO-PI (R) Inventory, Tower of London test-Drexel University (TOL ^{DX}) and Wisconsin Card Sorting Test (WCST) for understanding personality, problem solving ability and set shifting capacity respectively. Descriptive statistics (Mean and SD) was done to see the personality variables, the test variables of Wisconsin Card Sorting Test and Tower of London. The study revealed personality pattern and the set-shifting and problem-solving capacity of the individuals with substance abuse in rehabilitation setting.***

Keywords: Drug Abuse, Personality, Neuropsychology, Problem Solving, and Set Shifting Capacity,

1. Introduction

Substance abuse, also known as drug abuse, refers to a maladaptive pattern of use of a substance. Drug abuse and drug dependence represent different ends of the same disease process. Drug abuse is an intense desire to obtain increasing amounts of a particular substance or substances to the exclusion of all other activities. Drug dependence is the body's physical need, or addiction, to a specific agent. Over the long term, this dependence results in physical harm, behavior problems, and association with people who also abuse drugs. Stopping the use of the drug can result in a specific withdrawal symptom. The scope of the problem of substance abuse is suggested by the fact that there are more deaths, illnesses and disabilities from substance abuse than from any other preventable health condition (Milton; 2001).A wide variety of substance can be abused. Cannabis, opioid, alcohol are the commonly abused substances. Cannabis preparations are obtained from the Indian hemb plant cannabis sativa, a hardy, aromatic annual herb. It is the most commonly used illicit drug in the United States and, by most estimates, around the world as well (Kaplan & Sadock; 2009). Substance users often abuse more than one substance. In DSM-IV (TR), a diagnosis of polysubstance dependence is appropriate if, for a period of at least 12 months, a person repeatedly used substance from at least three categories (not including nicotine and caffeine), with related dependence symptoms.

Across substances, individuals with long-term abuse consistently demonstrate neuropsychological impairments of executive (inhibitory) control, working memory planning and decision making, together with neurobiological abnormalities involving fronto-temporal and basal ganglia circuits. In some instances these deficits are dose dependent, implying that they are a direct consequence of prolonged drug exposure. However, co-morbid behavioral, personality and mental health problems are common among drug-using populations and are associated with similar neuropsychological deficits.

The prefrontal cortex has long been thought to play an important role in planning behavior. The frontal lobes comprise more than 30% of the entire complement of cortical cells and are the part of the cortex that is more highly developed in humans than in other primates. Harlow (1868) was the first to argue that frontal-lobe lesions in humans result in a loss of “planning skill”, whilst much later, Bianchi (1922), described a loss in the ability to “coordinate the different elements of a complex activity” in monkeys with large frontal lesions. More contemporary accounts have characterized the role of the frontal cortex in planning behavior using various, similarly descriptive, terms; e. g. “as a general system for sequencing or guiding behavior towards the attainment of an immediate or distant goal” (Jouandet and Gazzaniga, 1979), or as crucial for the “planning of future actions” (for review, see Shallice, 1988). The main functions of pre frontal cortex include (i) focusing attention on relevant information and processes and inhibiting irrelevant ones ("attention and inhibition"); (ii) scheduling processes in complex tasks, which requires the switching of focused attention between tasks ("task management"); (iii) planning a sequence of subtasks to accomplish some goal ("planning"); (iv) updating and checking the contents of working memory to determine the next step in a sequential task ("monitoring"); and (v) coding representations in working memory for time and place of appearance ("coding"). Tasks manifesting each of these executive processes are known to be selectively impaired in patients with prefrontal damage. Of the five executive processes noted, the first two appear to be the most elementary and the most interrelated; for these reasons, we focus on attention and inhibition and task management.

Personality structure of an individual also influences the substance abuse behavior. Research on the area of personality theory contributed five important domains of

personality. They are Openness - appreciation for art, emotion, adventure, unusual ideas, imagination, curiosity, and variety of experience, Conscientiousness - a tendency to show self-discipline, act dutifully, and aim for achievement; planned rather than spontaneous behavior, Extraversion - energy, positive emotions, urgency, and the tendency to seek stimulation and the company of others, Agreeableness - a tendency to be compassionate and cooperative rather than suspicious and antagonistic towards others and Neuroticism - a tendency to experience unpleasant emotions easily, such as anger, anxiety, depression, or vulnerability; sometimes called emotional instability.

Individuals with Frontal lobe dysfunction or deficits may result in disturbed personality characteristics. Studies reveal that prolonged substance abuse may cause diffusion in behavior and which directly affect the personality characteristics of individuals. Cognitive deficits associated with the chronic abuse of drugs have important theoretical and clinical significance. Such deficits change the underlying cortical, sub cortical and neuromodulatory mechanisms that underpin cognition and interfere directly with rehabilitative programs. Several studies have documented cognitive deficits associated with chronic substance abuse including declines in attention, memory, motor functioning, language and executive functions (Ardila, Rosselli, & Strumwasser, 1991; Hoff et al., 1996; Horner, 1997; and Selby & Azrin, 1998).

The purpose of this study is to understand the personality profiles and the neuropsychological functioning of persons abusing alcohol, cannabis, opioids and those abusing multiple drugs in rehabilitation setting.

2. Method

Participants
30 subjects were taken for the study. The sample comprised of diagnosed cases of substance abuse in residential settings. Out of 30 inpatients, 7 were alcoholic abusers, 7 cannabis, 9 opioid and 7 poly substance abusers.

Material and Procedures
In the Semi-Structured Socio-Demographic and Clinical Data Case History focussing on age of onset of substance abuse, duration, relapse if any, medical complications if any, mode of onset, course, progress and history of present illness and treatment history were considered for the study group. This also included Mental Status Examination details were focussed on general appearance and behaviour, cognitive functions, speech, thought, mood, perception, presents of other pathology and insight.

The Revised NEO Personality Inventory (NEO PI-R) is a concise measure of five major dimensions, or domains of personality and some of the more important traits or facets that define each domain. Together, the 5 domain scales and 30 facet scales of the NEO PI-R allow a comprehensive assessment of adult personality. It is a well researched scale to measure the facets of Neuroticism (N), Extraversion (E), Openness (O), Agreeableness (A) and Conscientiousness(C).NEO PI-R may be administrated individually or in groups, individual testing is used in this particular study.

Wisconsin Card Sorting Test (WCST), The WCST can be considered a measure of 'executive function', requiring the ability to develop and maintain an appropriate problem-solving strategy across changing stimulus conditions in order to achieve a future goal (Luria, 1973; Shallice, 1982). Set-shifting represents the ability to switch attention from one aspect of a stimulus to another in an ongoing task, in accordance with changing reinforcement contingencies.

The Tower of London- Drexel University (TOL ^{DX}) is an individually administered neuropsychological instrument designed to assess higher-order problem-solving – specifically executive planning abilities – in children and adults. It requires subjects to rearrange a set of beads on pegs to match the appearance of another set, within the confines of the game rules. The aim is to solve each problem in the minimum possible number of moves. The outcome measures from this task include 'number of perfect solutions', and latency data for reaction and thinking times. Executive planning involves the delineation, organization, and integration of behaviours needed to operationalize an intended or achieve a goal .the process of planning requires the ability to conceptualize change (anticipate or look ahead), respond objectively, generate and select alternatives and sustain attention (Lezak; 1995).

For the administration purpose the technical manual was used. It is an individual administrated neuropsychological test.

3. Procedure

Rapport was established with the individual participants. One to one data collection (individual testing) was carried out for the study. The sample was selected following the inclusion and exclusion criteria. The technique of purposive sampling was used. All the subjects were chosen from an institutional set up, from EPIC; Madhyamgram, Kestapur Hope Foundation, and Mood Nursing home, Kolkata. India. Informed consent from all the participants was taken before data collection, keeping the anonymity of the subjects intact. The Clinical data sheet was given first followed by the personality Questionnaire-NEO PI-R. Neuropsychological tests-WCST and TOL were administered. Data was collected and statistical analysis was done using the Statistical Package for Social Sciences, Windows Version 13 (SPSS 13).

4. Result

Data was analyzed using Descriptive statistical techniques Mean, SD and Range. Table 1 presents the mean, slandered deviation and ranges of the study variable on personality domains. mean score indicate Neuroticism among this group found to be high (26) with SD (5.2889) Extraversion mean (27) which is found to average range SD(4.65894) , openness domain mean score is (22) which is low and SD (4.16002), agreeableness mean score is (23); and consciousness mean score is (26) both found to be very low.

Table 2 represents the mean SD of sample on WCST. Standard scores of 84 or below or T scores of 39 or below are considered to be in the impaired range. WCST test revealed that the people with drug abuse have impaired set shifting capacity. Investigation has reported that indices of perseveration on the WCST show modest correlations with measures of attention/working memory and episodic memory. The perseverated response may reveal an inability to relinquish the old category for the new one, or the inability to see a new possibility.

Table 3 shows the scores of TOL test, the Total Correct Score (TCS) and Total Move Score (TMS) of the individuals in the rehabilitation center were found to be high which indicate poor planning ability and Organize task in a better way. The Total Initial Time (TIT) and Total Executive Time (TET) of sample were found to be slower which indicates this group tends to have Deficits in their executive functioning.

Table 1: Mean and Standard Deviation of Personality variables of Study Group

Variables	N	Minimum	Maximum	Mean	Std. Deviation
Neuroticism (N)	30	16.00	39.00	26.6000	5.28890
Extraversion (E)	30	14.00	39.00	27.1333	4.65894
Openness (O)	30	15.00	33.00	22.7333	4.16002
Agreeableness (A)	30	13.00	31.00	23.0333	3.62447
Conscientiousness (C)	30	19.00	44.00	26.4667	5.41857

Table 2: Mean and Standard Deviation of WCST variables of Study group

WCST Variables	N	Minimum	Maximum	Mean	Std. Deviation
Percentage of error (PE)	30	3.00	33.00	7.0000	9.36612
Percentage of Peseverative Response (PPR)	30	3.00	9.00	3.2000	1.09545
Conceptual Level Responses (CLR)	30	5.00	95.00	35.5000	32.01158
No.of Categories Completed (NOCC)	30	5.00	95.00	47.8333	41.03580
TC1(Trials to Complete 1st Category	30	3.00	100.00	37.7667	41.03126
Failure to Maintain Set (FMS)	30	3.00	100.00	59.3667	40.74435
Percentage of Perseverative Error (PPE)	30	3.00	100.00	32.9000	37.08829

Table 3: Mean and Standard Deviation of TOL variables of participants

TOL Variables	N	Minimum	Maximum	Mean	Std. Deviation
Total Correct Scores (TCS)	30	1.00	97.00	32.8667	28.16789
Total Move Score (TMS)	30	1.00	96.00	44.9000	30.04634
Total Initial Time (TIT)	30	12.00	91.00	58.3333	20.76525
Total Executive Time (TET)	30	1.00	95.00	39.3667	25.11557
Total Rule Violation (TRV)	30	1.00	66.00	45.2667	21.51653
Total Time (TT)	30	1.00	89.00	38.7000	25.95905
Total Time Violation (TTV)	30	.00	66.00	57.1667	21.29608

5. Discussion

Personality researchers have recently converged on the five–factor model as an adequate representation of the structure of personality traits. NEO-PI (R) inventory was a questionnaire designed to measure the factors and some of the traits that define them (McCrae, 1991). Much like the earlier findings (Cohen, Ross, Bagby, Farvolden & Kenndy, 2004; Fisher, Elias & Ritz, 1998; Trull & Sher, 1994), the present study revealed that individuals with substance abuse who are in rehabilitative setup have high Neuroticism this may be due to the emotional instability of these individuals, which is further evident from the clinical sheet details. They are more likely to interpret ordinary situations as threatening, and minor frustrations as hopelessly difficult. Their negative emotional reactions tend to persist for unusually long periods of time, which means they are often in a bad mood. These problems in emotional regulation can diminish a neurotic's ability to think clearly, make decisions, and cope effectively with stress.

The present study showed very low extraversion scores for substance abusers in the residential setup this suggests that they lack exuberance, energy and activity levels of extraverts. They tend to be quiet, low-key, deliberate, and less involved in the social world. This finding is contradictory to the study done by Dubey, Arora, Gupta, and Kumar (2010) who demonstrated that substance abusers had significantly scored higher on Extraversion as compared to non-substance abusers. Very low in agreeableness which indicates that they are suspicious and antagonistic toward others, Disagreeable individuals place self-interest above getting along with others. They are generally unconcerned with others' well-being, and are less likely to extend themselves for other people. Sometimes their skepticism about others' motives causes them to be suspicious, unfriendly, and uncooperative. This further corroborates with their low Openness scores. low scores in the domain of conscientiousness. This may be due to their tendency to show less self-discipline, a lack to act dutifully, and lack of need for achievement. Moreover, they have a problem in regulating and controlling their impulses.This implies that substance abusers had a lower opinion of their abilities and admits that they were often unprepared and inept. They were not driven to succeed. They reported lack of ambition and aimlessness. They had low self discipline and poor self-control. They were more unorganized and unreliable.

The WCST test results revealed that subjects have impaired set shifting capacity. They have shown greater preservative responses. They could not change the existing set, thereby unable to utilize the feedback given. This reflects their poor feedback utilization capacity as they continued giving the same response even when the feedback was negative. The present study findings are correlate to the existing literature. Grant Contoregg and London (2010) in their study examined the performance of drug abusers on a neuropsychological test that required evaluation of long-term outcomes in the presence of a complex set of mixed reward/punishment contingencies (the Gambling Task) and control for generalized deficits related to choice and planning (WCST), they found no difference in the set-shifting capacity between the study groups.

Study findings based on the scores of the Tower of London (TOL) test indicate that the Total Correct Score (TCS) of the individuals in the rehabilitation center were found to be low .This indicates that the substance abusers in the rehabilitation center have a poor planning capacity and can't organize tasks in a better way. Executive planning involves the delineation, organization and integration of behaviours needed to operationalize an intent or achieve a goal. The process of planning requires the ability to conceptualize change (anticipate or look ahead), respond objectively, generate and select alternatives, and sustain attention (Lezak, 1995).

The total move score of the study was found to be high. This signifies that they have poor executive planning skills .The study explains that the Total Initial Time (TIT) of the study group is low, which indicates that they have a poor executive functioning. The total execution time (TET) of the group was found to be slow. Participants scored high Total Rule Violation (TRV) which indicates that low efficiencies in terms of executive plan and problem solving skills. Deficits in planning functions were consistently reported in three studies of opiate addicts, in which neuropsychological tests with considerable loading on planning cognitive components were used (Ornstein et al., 2000; Briun et al., 2001; Lee and Pau, 2002). In the study of Ornstein et al. (2000) and in the study of Briun et al., (2001), heroin addicts were not able to solve problems of the Tower of London Test effectively

This study able to provide personality profile, set shifting capacity and planning and problem solving capacity among substance abuses in de adition centres, and deficits in these areas and also provide light into trend that individuals abusing different substances tend to have high anxiety, aggression, impulsivity, difficulty controlling and regulating their impulses. Also gives a growing trend in poor neuropsychological functions, (in terms of set-shifting capacity, feedback utilization, planning and problem-solving) among individuals with substance abuse.

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