Motor ability and attention span among individuals dependent on illicit psychotropic drugs

André Luiz Bertoncini de Souza[1], Júlia Magnus Cintrão[1], Maria Eduarda Merlin da Silva[2], Adriana Coutinho de Azevedo Guimarães[3], Silvia Rosane Parcias[4]

ORIGINAL ARTICLE

ABSTRACT

Psychoactive substances act on the central nervous system producing mental and behavioral changes leading to clinical manifestations associated with drug abuse. **Objective:** To evaluate the motor ability and attention span among individuals dependent on psychotropic drugs, who were in treatment in a psychiatric hospital. **Method**: A single case study, whose unit of analysis was a hospital, assessed the motor skills and attention span of 10 male individuals addicted to illicit psychotropic drugs, with mean age of 31.9 ± 7.07 years and average hospitalization of 23.9 days. The following instruments were used: a structured socio-demographic interview, the Motor Scale for Elderly (EMTI) adapted, and the Trail Making Test (TMT A and B). The average age at first consumption was 15.1 years; and there was a slower performance in the TMT A and B in all age groups. In general motor ability, individuals were classified as follows: two "superior", two "above average", five "average", and one "below average". **Results:** Their temporal organization was the variable with the lowest performance. **Conclusion:** Attention deficits were encountered along with average general motor ability and a strong negative association or correlation between motor performance and attention span.

Keywords: attention, motor activity, substance-related disorders

[1] Studying Physiotherapy at the Universidade do Estado de Santa Catarina - UDESC (Santa Catarina State University (UDESC).
[2] Physiotherapist and Master's Candidate in Nursing at the Universidade Federal de Santa Catarina - UFSC (Santa Catarina Federal University - UFSC).
[3] PhD, Professor in the Physical Education Department at the Santa Catarina State University (UDESC).
[4] PhD, Professor in the Health Sciences Department at the Santa Catarina State University (UDESC).

Mailing address:
Centro de Ciências da Saúde e do Esporte - CEFID
Silvia Rosane Parcias
Rua Pascoal Simone, nº 358 - Coqueiros
CEP 88080-350
Florianópolis - SC
E-mail: autor@provedor.com.br

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INTRODUCTION

The use and abuse of recreational drugs is popularly divided into licit (alcohol and tobacco, especially) and illicit (cannabis, cocaine, glue, LSD, and ecstasy, among others).[1] The use of psychoactive substances can lead to a dependence syndrome, which is characterized as a set of behavioral, cognitive, and physiological phenomena that develops after the repeated use of the substance.[2]

In Brazil, epidemiological data on drug use is scarce and probably does not yet portray the reality due to outdated instruments for collecting information, and also due to the illicit and marginalized character of the use of some substances.[3]

Drugs constitute the most important factor in social, family, and individual disorganization, in addition to the abusive levels already reached in its high social-economic and health costs. The consumption of cocaine generates public health problems, increases violence, brings medical and psychiatric complications, and increases morbidity and mortality rates.[4]

There is an association between the use of psychoactive substances and domestic violence, traffic accidents, and crime.[5] The motor alterations provoked by illicit drugs have received growing attention in recent years as a possible threat to highway traffic safety.[6]

Psychoactive substances act on the central nervous system producing mental and behavioral changes, which lead to clinical manifestations associated with the abuse of drugs. Cocaine dependent subjects tend to show important cognitive alterations, especially in mnemonic functions of attention and execution, such as memory at work, control and selection of an answer (intention), resolution of problems, and decision-making.[7] The consumption of cannabis leads to possible cognitive alterations, such as loss of cognitive flexibility and lack of attention.[8]

Psychoactive substances also produce disturbances in the psychomotor activity. The capacity to organize cognitive functions and to program and self-control psychomotor behavior is damaged in the individual who uses psychoactive substances, for there is a compromising of functions mediated by the prefrontal cortex in these subjects.[9]

Among the objectives of a motor evaluation in patients dependent on illicit drugs the following deserve attention: to offer a coherent and clear description of their performance in the main motor areas, thus making it possible to develop an appropriate treatment plan, in addition to helping with questions such as prognostics and rehabilitation of the possible deficits.

OBJECTIVE

The present study aims to evaluate the motor ability and attention in individuals dependent on illicit psychotropic drugs, who were hospitalized at the *Hospital Psiquiátrico de São José- SC*.

METHOD

The research method is a single case study, such as a hospital organization as an analysis unit. The sample by accessibility was composed of 10 individuals hospitalized in the Chemical Dependence Service Units at the Instituto São José (São José - SC) between March 13 and May 15, 2009. Their age varied between 22 and 44 years and all of them were diagnosed with mental and behavioral disorders due to the use of psychoactive substances.

As inclusion criteria we used: a) period of hospitalization longer than seven days; b) no history of alcohol dependence; c) no psychiatric co-morbidities associated with chemical dependence or any physical or mental alteration that could impede and/or hinder the evaluation.

The data was collected at the Instituto São José, which is an active treatment center for psychiatric diseases and chemical dependence. This institution has two units: the Jellinek Unit, responsible for receiving patients coming from the Unified Health System (SUS), and the Chemical Dependence Unit for private patients. The predominance of hospitalization is for alcohol dependence. During hospitalization, the patient participates in activities such as psychotherapeutic groups, lectures, meetings, relaxation groups, and skill workshops, in addition to sports and leisure activities.

The sample was composed only of males, for the clinic does not receive females from the Unified Health System (SUS), and very few beds were available for paying patients - in addition, the females hospitalized at the time of the study did not fulfill the inclusion criteria.

It was decided to evaluate the patients only after the seventh day of hospitalization to diminish the initial symptoms of the Withdrawal Syndrome period, characterized by physiological and psychological symptoms, which could interfere with the results of the study.

The patients were initially informed of the objectives of the study and signed the free and informed consent form. The study was approved by the Human Research Ethics Committee from the Santa Catarina State University (Process No. 2096/2009).

The evaluation instruments were applied in the following order:

- Interview structured by social-demographic and clinical aspects to identify the characteristics of the sample such as: gender, age, marital status, education, occupation, family income, age when drug use started, and age at the first dependence diagnosis.
- Trail Making Test - TMT - is a neuropsychological battery of tests divided into two parts. In addition to attention, it evaluates mental flexibility, speed of visual processing, and motor function.[10] In TMT A, the individual must draw lines connecting numbered circles consecutively, in ascending order. In TMT B, the subject must draw lines connecting circles with numbers and letters alternately, respecting the numerical and alphabetical order. The evaluation criterion is the time to perform the test, measured in seconds, defining a worse performance as when the time used to conclude the task is longer. The classification is made according to the reference values found in a research by Strauss et al.[11]
- Adapted Motor Scale for the Elderly (EMTI - *Escala Motora Adaptada para o Idoso*): developed by Rosa Neto,[12] is a battery of tests that evaluates General Motor Ability (GMA) in 6 areas: Fine Mobility (MA1), Overall Coordination (MA2), Balance (MA3), Corporal Scheme (MA4), Spatial Organization (MA5), and Temporal Organization (MA6). In each one of these variables a sequence of levels is proposed from 2 to 11, in the form of tests whose difficulty increases gradually. The general motor ability score is calculated for each individual by averaging the test scores for each motor aspect.[12]

In this study, we chose to start at the fifth level as in a previous study due to this population being younger.[13]

A descriptive analysis of the data was made, followed by inferential analysis (95%

confidence) using the SPSS program (version 13.0) in the variables: general motor ability and the time to perform parts A and B of the trail test. Pearson and Spearman correlation tests were chosen depending on the normality of the variables.

RESULTS

The sample was composed of males, hospitalized between 7 and 52 days (average 23.9 days), with an average age of 31.9 ± 7.07 years (ranging from 22 to 44), mostly single, employed, and with 5 to 8 years of education, and with an average monthly income of 2.95 minimum salaries. Table 1 shows the summarized socio-demographic characteristics.

As for the clinical diagnosis, eight were included in the classification of mental and behavioral disorder due to the use of multiple drugs and other psychoactive substances (F19.2), while two individuals were classified as having mental and behavioral disorders due to the use of cocaine (F14.2), according to categorization used by the CID-10.

Most of the sample (n = 8) started using drugs in adolescence, ranging from 11 to 25 years of age, with an average age of 15.1 years. The age of the first chemical dependence diagnosis occurred between 21 and 39 years of age, corresponding to an average age of 27.1 years.

In the TMT attention evaluation, average values for performance time were greater than the corresponding reference values in all the age brackets, in part A as much as part B, which constitutes a poorer performance.

The age bracket of 20 to 29 showed the longest performance time for the TMT part A, which can be justified by the lower than expected performance for that age by one of the subjects in this subgroup. The only subject in the 40 to 49 age bracket was not able to complete part B of the test alleging inability to identify the alphabetical sequence. In Table 2 the average reference values are shown along with those found in this research.

Most patients were classified on their motor ability as "average"; 4 individuals had above average performance, and only one individual was below average. This subject was also the one who took the longest time to perform parts A and B of the TMT.

In the specific evaluated areas, the EMTI results revealed the classification of "above average" in fine mobility as well as in overall coordination, while the other areas showed an "average" classification (Table 3). The lowest average occurred in the temporal organization aspect, with average score of 90 ("average"). The average quotient for general motor ability was 105.5, therefore, "average" level (Figure 1).

The correlation tests between the General Motor Ability and Attention variables were analyzed in the age brackets of 20 to 29 and 30 to 39 years. In the 40 to 49 years range it was not possible to make this correlation for there was only one subject.

The correlation coefficient between GMA and TMT A and between the GMA and TMT B variables in the age brackets of 20 to 29 and 30 to 39 years revealed a negative relationship ($r = -0.787$ and $r = -0.963$) $p < 0.05$ (Table 4).

Table 1. Socio-demographic characteristics

	Frequency (n)	(%)
Marital status		
Single	6	60
Married	3	30
Widowed	1	10
Education (in years)		
5 to 8 years	5	50
9 to 11 years	2	20
12 to 15 years	2	20
More than 15 years	1	10
Employment status		
Employed	6	60
Unemployed	2	20
On disability (due to illness)	2	20
Income (in minimum wage salaries)		
1 to 2	3	30
2 to 3	2	20
3 to 4	3	30
4 to 5	2	20
Total	10	100

DISCUSSION

The present study evaluated attention and motor ability in males, for this gender predominates among psychotropic drug users and dependents.[14-17]

According to Bucher,[18] younger and younger people are starting to use drugs and with increasingly elevated contents of toxic substances. In this study, the average age to start using drugs was 15.1 years, which corroborates the data that indicates the beginning of drug consumption in adolescence.[19] Among cocaine users, one survey found an average similar to ours, of 15 years.[9] The average age was 17.4 years at the drug dependence treatment clinic of the Drug Use Research and Study Center from Rio de Janeiro State University (*Núcleo de Estudos e Pesquisas em Atenção ao uso de Drogas (NEPAD), Universidade do Estado do Rio de Janeiro*).[20] The investigation of drug users hospitalized in the city of Marilia (SP) identified that half of them had started using drugs before the age of 20.[14]

The patients treated at NEPAD were mostly single (62%), and aged an average of 25.7 years, a slightly younger sample than in this study, which had an average age of 31.9 years.[20] In another research, an average of 29.7 years was found for cocaine users.[19]

The average education of the sample in our study was 9.6 years. In a study made by Passos & Camacho[20] in a drug dependence treatment center in Rio de Janeiro, 51.8% of the patients had more than 9 years of schooling. A study with cocaine dependents showed that 25% of the participants had not completed junior high school, 25% had completed junior high school, 8.3% had not completed high school, 37.5% had completed high school, and only one was a university student.[19]

As for occupational activity, it is reported in the literature that most patients have low professional insertion in the work market. In one group of cocaine users, only 14% had a regular job, 78% did not, and 8% were on sick-leave caused by the use of psychoactive substances.[9] In contrast with the studies

Table 2. Average performance time in the Trail Making Test

	Trail Making Test Part A (average in seconds)		Trail Making Test Part B (average in seconds)	
Age Bracket	Reference value	Found value	Reference value	Found value
20-29 (n = 5)	27.4 (± 9.6)	43 (± 38.6)	58.7 (± 5.9)	95.6 (± 58.9)
30-39 (n = 4)	30.2 (± 10.6)	39.8 (± 18.6)	61 (± 23.4)	114.3 (± 25.6)
40-49 (n = 1)	30.7 (± 9.9)	42 (± 0)	64.4 (± 18.9)	*

Scores in the Trail Making test shown in seconds to complete each one of the parts. * This represents the patient who did not complete the test

Table 3. Frequency of the sample's classification

EMTI	f (n)
Superior	2
Above average	2
Average	5
Below average	1

Table 4. Correlation between the GMA and TMT variables

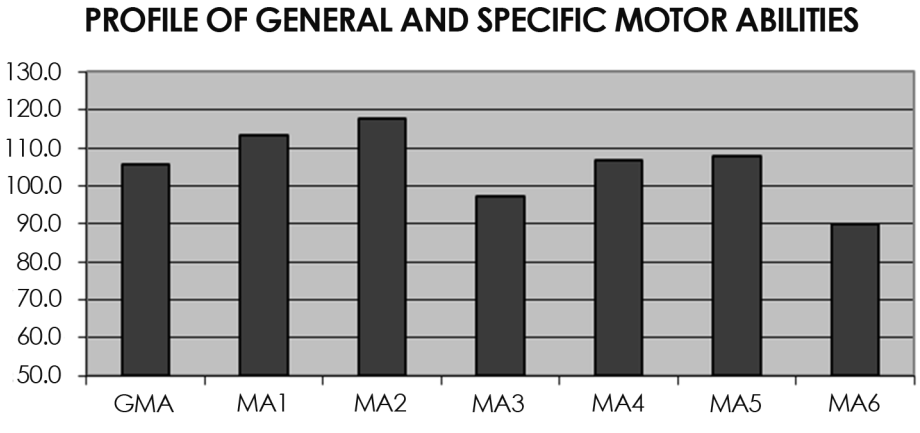
GMA x TMT Correlations			
	Age	TMT A	TMT B
GMA	20-29	-0.900*	-0.787*
	30-39	-0.963*	-0.853*

* Significance

mentioned, in our sample most subjects were employed, two were on sick-leave due to illnesses related to the use of psychoactive substances, and two were unemployed.

The attention evaluation of the patients in this study showed losses when compared to the reference values. The poor performance in the TMT suggests an attention deficit in those individuals, which goes against what was described in a previous study with cocaine dependents, which also revealed a worse performance in tests that evaluated this parameter.[7] Average values very similar to ours were found for part A as well as for part B with the same target-population and using the same instrument as the present study.[19] There is evidence that the prolonged use of psychotropic drugs can cause losses in cognition, especially attention deficit, concentration, learning, memory, visuospatial abilities, and executive and memory functions.[21] The deficits seem to last for long time, and may be irreversible.[22]

In consulted studies that evaluated the motor functions of chemical dependents, the lack of instruments that quantify the motor performance within its different areas is observed. Motor deficits are reported in cannabis users such as losing the capacity to drive a car. In psychiatric scales such as the Brief Psychiatric Rating Scale (BPRS), psychomotor activity is evaluated through clinical manifestations such as restlessness, hyperactivity, agitation, and psychomotor excitation, in addition to events such as dyskinesia and dystonia; however, these are not sensitive or specific parameters pertaining to the motor ability evaluation.[9,23]



GMA: General Motor Ability; MA1: Fine Mobility; MA2: Overall Coordination; MA3: Balance; MA4: Corporal Scheme; MA5: Spatial Organization; MA6: Temporal Organization

Figure 1. Profile of general and specific motor abilities

In specific areas, the motor ability of this sample showed "above average" classification in fine mobility as well as in overall coordination, while the other areas were classified as "average". The lowest average was registered in the temporal organization area. This suggests that the sample studied did not show any impairment in any of the six motor areas evaluated, since the patients were classified as to their general motor ability as "average".

The evaluation of more depressed patients by the same instrument as used in this study reports that in MDD, the motor standard was found to be below average for most patients (56.25%).[13]

In the correlation between the GMA variables and attention it was found that the longer it took to perform the Trail Making Test, the worse was the individual's level of General Motor Ability. The positive correspondence between attention and motor performance in this sample finds support in studies that demonstrate the existence of alterations in the performing and attention functions in motor performance such as gait.[24]

The attention level seems to directly influence motor function. This is evident when we specifically analyze the subject classified as "below average" in general motor ability, who was also the patient who took the longest time to perform the TMT A and B.

Even though this study is a single case study, some aspects referring to its limitations should be mentioned. First there is the absence of analysis of the medication variable. Despite a study[25] that evaluated the motor task (typing) and attention under the effect of a psychopharmaceutical drug, in that case it was Bromazepan in control and test groups, having reported no differences in the gross score and in the performance time, mistakes were made during the motor training in the trial group.

CONCLUSION

The psychotropic drug dependents evaluated showed attention deficit. The general motor ability of most of the patients was within normality. There was a strong negative association between the motor performance and attention, suggesting that the impairment of attention may result in motor loss. We suggest a multiple case study, using different instruments of evaluation, making it possible to compare the data in search of different conclusions.

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