PROCESSING SPEED DIFFERENCES BETWEEN SCHIZOPHRENIA AND SCHIZOAFFECTIVE DISORDER: A PILOT STUDY

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SUMMARY

We aimed to compare processing speed (PS) and its subcomponents in schizophrenia (SC) and schizoaffective disorder (SA). Thirty-five patients were divided into two groups (SC=18; SA=17). PS tasks from the MATRICS Consensus Cognitive Battery Central/South America version were used. Additional PS subcomponents were analyzed (i.e., behavioral execution, response processing, and accuracy). SA obtained significant higher scores than SC in response processing, verbal fluency and the PS general domain. Our results indicate that PS is a potential cognitive marker to differentiate between SC and SA. Further research with larger samples must be conducted.

Key words: processing speed – schizophrenia - schizoaffective disorder

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INTRODUCTION

Schizophrenia (SC) and schizoaffective disorder (SA) are psychotic disorders associated to behavioral, affective and cognitive disturbances (APA 2013). A core feature of both disorders is cognitive impairment, particularly in processing speed, attention, memory and executive functions (Mesholam-Gately et al. 2009). However, inconsistencies regarding the comparison of the cognitive profile between both disorders have been reported (Bora et al. 2009, Malhi et al. 2008).

Processing speed (PS) is operationalized as the number of hits achieved during a time-limited task (Knowles et al. 2015). Although this approach has been widely used in cognitive research, alternative assessment methods have emerged. Cella and Wykes (2013) proposed a refined analysis of PS, by deconstructing the process into three subcomponents: behavioral execution (BE), response processing (RP) and accuracy (AC). These authors define BE as the time used to execute the motor response; RP corresponds to the time needed to cognitively plan and solve the task; and AC involves the number of errors.

It has been widely reported that SC patients display PS impairments (Knowles et al. 2010). Conversely, less is known about the performance of SA patients in PS tasks. Moreover, an analysis of PS and its subcomponents may bring complementary information about the cognitive profile of both conditions. Thus, the aim of the present study was to analyze and compare PS and its subcomponents in SC and SA patients.

SUBJECTS AND METHODS

The study was approved by the Ethics and Research Committee of the Instituto Nacional de Psiquiatría "Ramón de la Fuente Muñiz" in Mexico. Thirty-five participants were recruited and divided into two groups: SC (n=18) and SA (n=17). The DSM-5 (APA 2013) and the MINI Neuropsychiatric International Interview, Spanish version (Ferrando et al. 2000) were used as diagnostic instruments. Patients were included in the study if they were under pharmacological treatment and clinically stable (PANSS score <90). All participants signed an informed consent letter.

To assess and analyze PS subcomponents, the MATRICS Cognitive Consensus Battery (MCCB) subtests for PS domain were used (Nuechterlein et al. 2008). Thus, Trail Making Test-A (TMT-A), Symbol Coding (SC), and Verbal Fluency (VF) tests were included, along with the Continuous Performance Test - Identical Pairs (CPT-IP).

Patients who fulfilled inclusion criteria were invited to participate. The assessment lasted two hours approximately. Regarding the analysis of PS subcomponents, BE was obtained with CPT-IP's reaction times; RP was considered as the seconds taken to complete the TMT-A; and AC accounted for the number of executed errors in all tasks (i.e., TMT-A, BACS-SC, VF, and CPT-IP). Standard PS scores from all tests were computed according to the MCCB guidelines.

Comparisons of demographic and clinical data were performed using t test and chi square. If statistical differences were found in any of these variables, an ANCOVA would be used to adjust such differences in the comparison model. The f value was calculated to obtain the effect sizes.

RESULTS

Demographic data showed no differences between groups in age (SC=37.2+6.3; SA=35.1+8.1), years of education (SC=12.7+2.9; SA=13.7+2.8) and illness duration (SC=9.6+7.3; SA=8.8+8.8 years). However, significant differences were observed in gender, since SC were predominantly male and SA mainly female (p<0.05). Regarding pharmacological treatment, all patients were taking antipsychotics; most of them were taking atypical medication (N=23); half was under antidepressant treatment (N=17), and a third part was taking benzodiazepines (N=12).

Table 1 shows PS group analyses. An ANCOVA was performed including gender as covariable. Significant differences between groups were observed in RP, VF standard score and MCCB's PS Global Score. All differences showed large effect sizes (f>0.40) whereas SA performed better than SC.

DISCUSSION

The present study aimed to analyze and compare PS and its subcomponents in SC and SA patients. Demographic data showed significant differences in gender since SC were predominantly male, whereas SA were mostly female. This finding is consistent with epidemiological data, which have shown that SA is more prevalent in females and SC is slightly more frequent in males (APA 2013).

PS subcomponent analyses revealed statistical differences between groups in RP, whereas SA performed significantly better than SC. Interestingly, SA obtained significantly higher VF standard scores than SC. According to Cella and Wykes (2013), RP may represent the most "cognitive" PS subcomponent, since it is implicated in the amount and relevance of the information the cognitive system must process. Moreover, this subcomponent corresponds to the "sequencing and shifting" PS factor described by Knowles et al. (2012), since an analog TMT-A task was grouped into it. According to these authors, PS can be clustered into two additional factors: psychomotor speed and verbal fluency. All three factors showed to be independent but intricately interrelated. Taking both approaches into account, our findings may indicate that SA performance in RP reflects a more efficient cognitive processing ability. Such efficiency may be related to an enhanced competence to access the semantic store, which is necessary to successfully achieve the VF task. Thus, SA better performance in VF may be due to a less impaired cognitive processing ability.

It must be highlighted that the differences found between groups are consistent with the MCCB standard scores, since SA obtained significant higher scores than SC in the PS domain. Our findings support the utility of MCCB to assess cognitive impairment in schizophrenia spectrum disorders. A more profound analysis of the data obtained with such instrument may allow differentiate the cognitive profile of different psychotic disorders.

Table 1. Comparison of PS performance between groups

	Schizophrenia M (SD)	Schizoaffective disorder M (SD)	F	p	f - value
BE					
CPT-IP 2 digits	582.4 (95.9)	557 (115.8)	0.931	0.342	0.336
CPT-IP 3 digits	583.4 (114.2)	599.4 (101.8)	0.001	0.981	0.011
CPT-IP 4 digits	617.1 (122.1)	638.1 (180.3)	0.071	0.792	0.093
RP					
TMT-A	58.9 (17.2)	49.1 (18.5)	4.831	*0.035*	0.766
AC					
TMT-A	0.2 (0.4)	0.1 (0.2)	0.269	0.608	0.181
BACS-SC	0.1 (0.5)	0.5 (1.2)	2.353	0.135	0.534
VF	0.7 (0.8)	0.6 (0.9)	0.976	0.331	0.344
CPT-IP 2 digits	1.6 (2.6)	0.8 (1.1)	2.485	0.125	0.549
CPT-IP 3 digits	3.1 (2.7)	2.4 (1.4)	1.529	0.225	0.431
CPT-IP 4 digits	6.8 (3.4)	11 (22.8)	0.177	0.677	0.147
MCCB T Scores					
TMT-A	24.8 (9.7)	31.1 (12.6)	4.628	*0.039*	0.749
BACS-SC	44.7 (9.9)	42.9 (9.4)	0.075	0.786	0.095
VF	39.3 (7.8)	46 (8.6)	4.509	*0.042*	0.740
PS Global Score	27.2 (9.6)	34.8 (9.5)	2.887	*0.023*	0.592

M = Mean;   SD = Standard deviation;   PS = Processing Speed;   BE = Behavioral execution;   RP = Response processing;
AC = Accuracy;   CPT-IP = Continuous Performance Test – Identical Pairs;   TMT-A = Trail Making Test – A;
BACS-SC = Brief Assessment of Cognition for Schizophrenia – Symbol Coding;   VF = Verbal Fluency;
MCCB = MATRICS Consensus Cognitive Battery

The present study has some limitations that should be addressed in the future. The sample size was small due to SA low prevalence, which is approximately 0.3% (APA 2013). Further studies must recruit larger samples to support our findings. Another limitation was the pharmacological treatment. Psychotic conditions tend to be controlled with antipsychotics along with other psychotropic medication due to their clinical complexity and heterogeneity. Thus, we do not know to which extent the medication could have influenced the patients' performance.

CONCLUSIONS

The results of the present study showed that SA performed significantly better than SC in RP, VF, as well as in the PS Global Score of MCCB. These findings indicate that SA may be less impaired than SC regarding their cognitive processing abilities. Thus, PS could be a potential cognitive marker of schizophrenia spectrum disorders due to its sensitivity to discriminate between SA and SC. However, our results are preliminary and further research must be conducted.

Contribution of individual authors:

Alejandra Mondragón-Maya: Conceptualization, funding acquisition, methodology, writing original draft.

Yvonne Flores-Medina: Formal analysis, validation, writing original draft.

Daniela Ramos-Mastache: Investigation, review and editing draft.

Mauricio Rosel Vales & José Luis Olivares Neumann: Review and editing draft.

Raúl Escamilla-Orozco: Supervision, review and editing draft.

Ricardo Saracco-Álvarez: Investigation, supervision, review and editing draft.

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