Pragmatic Language and Schizophrenia: Interpretation of Metaphors

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Abstract

Background: Schizophrenia is a severe and chronic psychiatric disorder with significant cognitive deficits, which are considered structural markers for the disease. Language disturbances have an important role in patients' social functioning and interpersonal relationships. **Objectives:** Evaluate the capacity to understand pragmatic language in schizophrenic patients, through the comprehension of non-literal meaning in metaphors and the ability to use contextual clues to better understand their meanings. **Methods:** Thirty patients were evaluated using Abbreviated Intelligence Scale (WASI), Interpretation of Metaphors subtest of the Montreal Communication Evaluation Battery (MAC). **Results:** The linear regression model showed that schizophrenic patients presented below average performance in the interpretation of metaphors task, with tendency to concrete interpretations. Variables such as IQ, WASI Vocabulary subtest and years since onset influenced the patients' pragmatic language skills. This relation was not found for family history. Existence of the metaphor in native colloquial language (Portuguese) and being given alternatives to choose from, enhanced patients' performance. Discussion: Results corroborate findings regarding this population's difficulties in the language cognitive domain. Development of interventions aiming comprehension of pragmatic language could help ease patients' social difficulties, especially if started early at onset. Also, better understanding of this deficit can help create rehabilitation strategies.

Introduction

Schizophrenia is a severe, complex and debilitating psychiatric disorder[1]. It is a chronic psychotic illness, relatively common and with multifactorial causes, which's onset occurs usually in early adulthood. Despite being chronic, it can be treated using a combination of antipsychotic medication and psychosocial interventions[1]. According to the DSM-V, it's prevalence is of 0.3-0.7%. The disorder affects more men than women, and gender can also influence the presence of negative symptoms and illness duration, which leads to worst prognosis[2].

Risk of suicide is 4% more common in patients suffering from schizophrenia than in the general population, being of 5% compared to 1%[1]. It has a multifactorial etiology, with genetic and environmental influences[3]. Bear and colleagues suggest that elevated stress in pre-birth, perinatal, early childhood and adolescence periods, as well as marihuana use, can heighten the risk for developing schizophrenia in genetically vulnerable patients[4].

From a biologic perspective, schizophrenic patients show physical neural changes as well as an excessive amount of dopamine in the encephalon, which results in decreased activation of the NMDA receptors in the glutaminergic system[4]. Schizophrenia is currently described as being a psychiatric disorder with neurodevelopmental and neurodegenerative alterations[1]. Considering the social and functional impairments of the disorder, drug and psychotherapy treatments are needed[1].

Several areas of the patient's life such as personal, family, academic and professional are impaired given the severity of the various symptoms, including here the cognitive. Cognitive deficits are considered a structural part of the disorder, since they can be present before, during and after symptoms appear[5]. Schizophrenic patients present a global cognitive shortfall in: overall cognition; memory; langue; executive functions and attention[5]. The above mentioned implicate in functional deficits such as lessened work and leisure autonomy, as well as lower capacity to learn and maintain interpersonal relationships[6].

According Rossetti, Brambilla and Papagno[6], people with schizophrenia often exhibit difficulties comprehending figurative expressions, such as irony, proverbs, metaphors and idioms, with a general proneness to neglect the figurative meaning and to accept the more literal one. This inability is usually referred to as concretism and it constitutes a clinical manifestation of the broader language dysfunction called Formal Thought Disorder. Language

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deficits in schizophrenia affect both general and pragmatic language capacities, thus affecting patients' communication skills[7]. Patients show difficulties in finding words, increased use of neologism, and diminished verbal fluency, as well as difficulty understanding proverbs, metaphors, idiomatic expressions, irony and sarcasm, with an overall predisposition to concrete interpretations[7]. Moreover, deficits in the spheres of language, social cognition and social behavior in children, are found to be associated to familial high-risk of schizophrenia[8].

Several studies have also highlighted the relation between pragmatic language deficits and Theory of Mind, Executive Functions, disturbance of though, divided attention, social cognition and IQ[6,9-11]. Nonetheless, cognitive deficits alone cannot be accounted for the lack of pragmatic language, as it can be defined as a specific domain within cognition, that may or may not be associated with cognitive and social-cognitive deficits[11]. Furthermore, shortfalls in pragmatic language comprehension implicate social withdrawal, difficulty establishing affective relations with others, and with conflict resolution, leading to personal and professional failures[12].

Regarding the neural basis of figurative language comprehension in schizophrenia, many studies have found that schizophrenic patients have distinct language lateralization compared with normal people; this abnormal lateralization is believed to be associated to symptoms presented in this disorder[13].

Considering the importance of language skills, and ability to understand and use pragmatic language to life in society, this study aimed to evaluate the capacity to understand pragmatic language in schizophrenic patients through the comprehension of non-literal meaning in metaphors, and the ability to use contextual clues to better understand their meanings. It also targeted the understanding of which demographic and cognitive variables affect this ability.

Methods

Subjects

In this cross-sectional study described, 30 individuals (21 men, 9 women), M. Age = 38, with Schizophrenia were included. Individuals with a diagnosis of schizophrenia according to *Diagnostic and Statistical Manual of Mental Disorders* (DSM-V) were enrolled on this study[2].

Participants were selected from an ambulatory service specialized in patients with psychotic disorders, in a public hospital in the city of São Paulo, Brazil. During the trial, patients were in use of medication (traditional treatment, using mainly Clozapine).

Exclusion criteria included IQ>65, illiteracy, use of illicit substances, and inability to comprehend consent term. This study was derived from research on diagnosis and stigma of people with schizophrenia and was approved by the Ethics Committee for Research Project Analysis - Hospital das Clínicas da Universidade de São Paulo (CAAE nº 57066316.0.0000.0068)[14].

Cognitive and Pragmatic Language Assessment: For estimated IQ and cognitive measures, Vocabulary and Matrix Reasoning subtests of the Weschler Abbreviated Scale of Intelligence (WASI) were used. To assess pragmatic language ability, the Interpretation of Metaphors subtest of the Montreal Communication Evaluation Battery (MAC) was used.

The Vocabulary (WASI) subtest is composed of 42 words, which the participant is asked to define; it's results make it possible to evaluate the participants' verbal domain. The Matrix Reasoning (WASI) is composed of 35 sets of images, which the participant has to analyze and fill in the blanc with the option that better completes it; it allows to make inferences about the participants' competence in performance-based activities.

The Interpretation of Metaphors (MAC) subtest is composed of 20 metaphors (10 idiomatic expressions and 10 new metaphors). In this task, the participant is instructed to explain the meaning of each sentence, and reply to a multiple-choice question, which consists of three interpretation choices: senseless, literal and correct figurative.

Statistical Analysis

Statistical analysis was done using the Stata® 12 program. A linear regression model was used to establish relations between the participant's performance in the explanation and choice of alternatives for the metaphors and IQ, performance in Vocabulary, years since diagnosis, family history of mental illness.

The linear regression model allowed to identify the impact of one variable (explanatory variable) over another (explained variable), generating a linear function. To define the equation, the Minimum Ordinary Square (MOS) method was used, in which the sum of the error's squares are minimized.

It was a convenience sample and the sample calculation was not made for this specific work.

Results

Of the 30 participants included (M. Age = 38), average schooling was of 12 years, and only one participant did not graduate from high school. 56.7% considered themselves to be of middle class, and the average of years since first diagnosis was of 14.8 years, with the highest being 52 and lowest 2 years. 50% confirmed family history of mental illness (25% schizophrenia and 6.25% bipolar disorder, depression and alcoholism).

Most participants (66.7%) had IQ within the expected range, being the mean score of 95; no above average IQ scores were found. Regarding Vocabulary and Matrix Reasoning (WASI) subtests, participants scored 9 and 9.37, which is expected according to age groups. In the Interpretation of Metaphors (MAC) subtest, the mean score was of 5.9, which represents a border performance, below the expected average considering age group and years of education. Furthermore, 30% exhibited very below average results. The mean of avail of participants regarding explanation of new metaphors was of 72.3% (SD: 15.07) and of idiomatic expressions 75% (SD: 14.68). The same pattern was observed in respect to the multiple-choice questions: the mean of avail was of 85.3% (SD: 17.16) for new metaphors and 95% (SD: 9.87) for idiomatic expressions.

For the explanation of metaphors part, years since diagnosis and IQ impacted patients' performance. For each added year since diagnosis, there was a mean downfall of 0.08 in score; and for each added point IQ point, there was a mean rise of 0.18 in the Interpretation of Metaphors (MAC) score. For the multiple-choice part, years of diagnosis and Vocabulary scores impacted patients' performance. For each year added since diagnosis, there

Table 1. Linear Regression Model for Interpretation of Metaphors (MAC)

Part 1 - Explanation		
Dependent Variable	Coefficient	P-Value
Years of Diagnosis	-0,0803707	0,092
Family History	-1,6898	0,122
IQ	0,1847246	0,047
Vocabulary	0,1743112	0,64
Part 2 – Multiple-choice		
Years of Diagnosis	-0,1036388	0,001
Family History	0,3593772	0,576
IQ	0,0695945	0,201
Vocabulary	0,500403	0,032

was a mean downfall of 0.1 in score; and for each added point in the Vocabulary subtest, there was a mean rise of 0.5 in the Interpretation of Metaphors (MAC) score.

Discussion

Our findings are in agreement with the literature, showing that schizophrenic patients have a below average performance regarding interpretation of metaphors and non-literal expressions[9-11]. By dividing the sentences presented in two groups (new metaphors and idiomatic expressions), it was evident that for both tasks (explanation and multiple-choice), participants scored higher when assessing known metaphors. This finding corroborates previous findings regarding the influence of familiarity in the ability to understand the non-literal meaning of sentences[9]. Also, 90% of participants scored higher in the multiple-choice part, also corroborating previous findings that schizophrenic patients have more ease answering when there are alternatives to choose from[9].

With respect to new metaphors, patients erred more on the side of senseless (61.72%) than literal (38.28%) interpretations; whilst for idiomatic expressions, the opposite occurred, being literal (63.63%) and senseless (36.36%). Although data regarding new metaphors are not in accordance with previous findings regarding concretism, those found for idiomatic expressions evidenced schizophrenic tendencies for literal meanings[11].

Linear regression results indicated that IQ, years since diagnosis and Vocabulary (WASI) scores impacted patients' pragmatic language ability; which is also in accordance with previous findings[11]. Furthermore, 36.7% of participants had deficits in pragmatic language without cognitive deficits, which is also in accordance with previous findings and indicates that although related, pragmatic language deficits are not mere consequences of cognitive deficits, but are a separate specific domain.

These findings shed light to the possibility that patients might benefit from trainings of comprehension of figurative expressions, since aspects such as familiarity and presence of multiple-choice answers helped increase performance. Patients may benefit from cognitive and language interventions, especially in the primary years of the disorder[10]. Nonetheless, future studies are needed for better understanding of the abovementioned deficit and creation of rehabilitation and prevention strategies.

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