Psychomotor Disorders in Schizophrenia: A Systematic Review

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Abstract: Schizophrenia is a frequent psychiatric disorder, including semiotics is complex. In our day, it constitutes a varied clinical picture characterized by altered several spheres, including the purely psychiatric field (positive and negative symptoms), psychomotor aspect that is overwhelmed by mild neurological soft signs, the latter confirming an abnormality underlying neurological, cognitive component and socio-cultural dimension. The aim of this review was to discuss the psychomotor disorder in schizophrenia and place of neurological soft signs in this axis. In this systematic review we present the analysis of forty-two articles published from 2000 to 2015, on psychomotor disorders, neurological soft signs (NSS) and cognitive alterations in schizophrenia. The results suggest that psychomotor disorders including NSS are the one of the factors related to schizophrenia that helps the clinician trained in this to complete his diagnosis and thus to set up a treatment plan for every patient as a whole. Conclusion: Catatonic, stereotyping, psychomotor slowing, achieving combined movements, cognitive impairment, maintaining the autonomy and NSS are the axes be taken into consideration in the diagnosis and multidisciplinary treatment of schizophrenia.

Key words: Schizophrenia • Psychomotor Disorder • Neurological Soft Signs • Catatonia-Stereotyping • Psychomotor Coordination • Psychomotor Slowing

INTRODUCTION

Young adults’ psychosis is characterized by a variety of psychic symptoms diversely associated according to each case, dominated by an inconsistency, ambivalence, some hallucinations and delusions badly systemized. Those disorders evaluate often into a psychotic dissociation with profound disorganization, deficit aspect of the personality. It affects about 0.7% of the world population. It is present in all attitudes and in all cultures [1].

The relation between the hallucinations and the outsourcing of sounds is made in a schizophrenic mind; those experiments were made considering both positive and negative symptoms of schizophrenia. This study confirms the hypothesis that patients with positive symptoms are less able than controls to inhibit the top down information that guides the detriment of attention from the bottom up, which could be responsible for the poor allocation the ambiguous sensory material [2].

Psychomotor disorders in schizophrenia are often linked to cognitive dysfunction [3]. With the results of the experimental study that was conducted by these authors, it should be emphasized that the adenosine A2A dysfunction causes an astrocyte-neuron communication resulting disruption homeostasis glutamate (In the context of schizophrenia). This is especially psychomotor and cognitive impairment. Cognitive disorders conventionally associated with schizophrenia are Perception, attention, motor skills, vigilance and execution of motor functions, memory, abstraction and planning functions [4-8]. This study aims to treat a systematic review of the psychomotor disorders in schizophrenia and their relationship with the cognitive impairments and the neurological soft signs.
MATERIALS AND METHODS

The studies that we have been able to address are originated from different search engines such as Science Direct, EBSCO, Pub Med, NCBI, Knowledge and Springer Link. This search yielded 45 articles. Duplicate articles, were excluded. After duplicate exclusion, we had a total of 42 articles. Overall, these studies address the causes of schizophrenia, Pathophysiological aspects, neurological soft signs (NSS), symptomatology positive and negative, Psychomotor symptoms and disorders in schizophrenia and therapeutic management of schizophrenia. Theoretical model of reference studies. These studies are based on old models psychomotor as measuring instruments that are Positive and Negative Syndrome Scale (PANSS), Scale for Assessment of Positive Symptoms (SAPS) and Scale for Assessment of Negative Symptoms (SANS).

RESULTS AND DISCUSSION

Causes of Schizophrenia: Among the explanatory theories of schizophrenia, the psychological vision in which schizophrenia has been described as a brain disease favored by psychological and environmental factors such as the course of pregnancy (The mother suffering from a viral infection or fever), a fragile narcissistic basis, a poor social adjustment. The risk factors of schizophrenia are seasonal birth, physical abuse, maternal viral infection, blood pressure, oxygen deficiency, neurological problems, epilepsy, depression, Lower birth weight, Substances abuses, suicide attempt, sleeping disturbance, Paternal age, heredity, childhood abuse [9].

About other causes of schizophrenia, the abuse of Methamphetamine (MA) plays a direct role in the etiology of schizophrenia and highlights brain abnormalities caused by this substance, what sets a clear reason among others that can trigger the schizophrenia [10].

Gold, 84% of the causes of schizophrenia are social problems, problems related to interpersonal and psychological relationship [11].

The Pathophysiological Aspects of Schizophrenia: We found that they focused on the pathophysiological aspect of schizophrenia which remains, to our day, ambiguous. Just Two Researches based on the effect of neuroleptics on the ability of controlling power achieving specific psychomotor scales with this pathology and complexity with psychomotor disorders, those troubles constitute a hint between the side effects of neuroleptics and the treated side by the same pharmacological type, such as catatonia. The first compared the effect of Haloperidol and Risperidone, the group of patients treated with Haloperidol showed psychomotor and cognitive impairment compared with patients receiving atypical antipsychotic medications (Risperidone) [12]. The second confirms the first and shows that atypical and conventional antipsychotics appear to have different effects on psychomotor slowing in these schizophrenic inpatients [13].

The importance of schizophrenic motor symptoms has been interpreted as an integral part of schizophrenia in the classical neuroleptics literature. More recently, various motor symptoms have been reported in patients with first episode drug free and others whom at risk of psychosis, which means that the psychomotor disorders can be among the risks of predisposition to schizophrenia [14] as they may be among the side effects of neuroleptics [15].

Neurological Soft Signs: We have 10 studies that address this axis (Table 1).

Although NSS are intrinsic to schizophrenia, their level varies with the clinical course. Thus, the NSS may correspond to both the size and the genetic disease process and may be considered as possible predictors of outcomes [16-17]. About Schizophrenia’s soft neurological signs evolutions, the NSS scores decrease in the clinical course of schizophrenia with remission of psychopathological symptoms; and an indication that this effect is more pronounced in patients with relapsing-remitting than in those with non-remitting schizophrenia [18]. The NSS are classified as common neurodevelopmental disorders in children and adolescents than among them more than adults [19].

The presence of NSS in Schizophrenia is confirmed; Lend further support to previously reported difficulties in movement control in this disorder is important. According to the present results, schizophrenia seems to be characterized by both quantitative and qualitative NSS expression [20].

The results of fMRI studies indicate that NSS was associated with atrophy of inferior frontal gyrus, bilateral putamen, cerebellum and the superior temporal gyrus.
Table 1: Neurological Soft Signs in schizophrenia

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Sample</th>
<th>Results</th>
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</thead>
<tbody>
<tr>
<td>1. Fawzi, et al.</td>
<td>-50 POC-SZ.</td>
<td>-Scores of soft neurological signs in patients were significantly higher compared with comparison subjects.</td>
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<td></td>
<td>-50 Healthy controls</td>
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<td>2. Silke et al.</td>
<td>-787 Schizophrenic patients including teenagers.</td>
<td>-NSS lower scores in the clinical course of schizophrenia. This effect is more pronounced in patients with relapsing-remitting than in those with non-remitting schizophrenia.</td>
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<td>3. Corinne et al.</td>
<td>-16 people with a transition to psychosis. -37 without transition.</td>
<td>- No significant difference between those at risk and individuals in first psychotic episode.</td>
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<tr>
<td>4. Shibre et al.</td>
<td>-200 SZ: 170 M, 30 F, (aged 15–49 years)</td>
<td>- Excess NSS abnormality in cases with schizophrenia compared to healthy controls.</td>
</tr>
<tr>
<td>5. Mechri et al.</td>
<td>-French study: 69 Schizophrenic patients and 108 Healthy controls. -Tunisian study: 66 SP and 60 Healthy controls.</td>
<td>- Confirmation of the high scores of NSS in patients with schizophrenia and in their biological relatives, independently of their respective geographic origins.</td>
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<td>6. Biswas et al.</td>
<td>-15 COS -20 AdOS -20 AOS</td>
<td>- The NSS scores were seen in highest (100%) number of COS. - AdOS (90%) patients and then the AOS (55%) patients.</td>
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<tr>
<td>7. Mouchet-Mages et al.</td>
<td>-52 Schizophrenic patients.</td>
<td>- Structural alteration in the Cerebello-Thalamo-Prefrontal network is associated with neurological soft signs in schizophrenia, a candidate network for cognitive dysmetria.</td>
</tr>
<tr>
<td>8. Hirjak et al.</td>
<td>-28 Patients with recent onset schizophrenia (7 F, 21M).</td>
<td>- Significant quantitative relationships between NSS and regional cortical thickness in the network of anatomical connections responsible for bodily movement.</td>
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<tr>
<td>9. Hirjak et al.</td>
<td>-26 Patients with recent onset schizophrenia. -26 Asperger-syndrome. -26 Healthy controls.</td>
<td>- Significant differences among the three groups were found in NSS total score. - Patients with recent onset schizophrenia and Asperger-syndrome seem to be characterized by both quantitative and qualitative NSS expression.</td>
</tr>
<tr>
<td>10. Akin et al.</td>
<td>-84 Patients with recent onset schizophrenia.</td>
<td>- The signs were generally associated with disease severity. - Motor-sequencing scores remained relatively unchanged across the 12 months course of the disease regardless of the level of response to treatment.</td>
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FMRI: (Functional magnetic resonance imaging), F: Female, M: Male, COS: (patients with age of onset of illness at <14 years), AdOS: (Patients with age of onset >14 years but <18 years), AOS: (Patients with age of onset >18 years), SZ: having characteristics of schizophrenia, POC: Psychiatric Outpatients Clinic

The conceptualization of NSS is a manifestation of the "Ponto-thalamic-prefrontal" as brain network model of schizophrenia and related psychotic disorder [21, 22]. It exist significant quantitative relationships between NSS and regional cortical thickness in the network of anatomical connections responsible for bodily movement that comprise. The majority of the cortical thickness changes match the topography of alterations previously reported in neuroimaging studies on NSS and schizophrenia. In addition, the cortical thickness might not only serve as a highly sensitive metric but also as a potential indicator of a distinct process in schizophrenia patients with NSS [23].

The NSS is already present before the transition to psychosis in the same extent as after the transition provides additional support to the hypothesis of neurological development of schizophrenic psychoses. In addition, the individuals also suffer from a kind of neurodevelopmental disability. The NSS are among the risk factors for susceptibility to schizophrenia [21]. On the other hand, NSS has always a tendency to be among the factors of susceptibility to schizophrenia [24] as well as side effect to neuroleptics as they can be a risk factor for a poorer response to treatment [25].

A socio-cultural perspective, a study provides a confirmation in two distinct samples of the high scores of NSS in patients with schizophrenia and in their biological relatives, independently of their respective geographic origins. These results were found despite differences between the two studied populations concerning ethnic (Caucasian in the French sample/ Arab or Berber in the Tunisian sample) [26]. Their sociodemographic profile
Table 2: Psychomotor disorder in schizophrenia.

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<tr>
<th>Study</th>
<th>Sample</th>
<th>Results</th>
</tr>
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<tbody>
<tr>
<td>1. Marco et al. [3]</td>
<td>- Mice (SZ-astrocyte dysfunction).</td>
<td>- Decreased working memory; this was accompanied by a disturbance in the homeostasis of glutamate.</td>
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<td></td>
<td>- Psychomotor slowing and cognitive phenotypes in mice.</td>
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<td>3. Pirloga et al. [39]</td>
<td>- 81 Schizophrenic patients.</td>
<td>- 56 assault situation (69.14%).</td>
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<td>- 6 suicide cases (7.40%).</td>
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<td>- 30 cases of alcohol abuse (37.04%).</td>
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<td></td>
<td>- 20 patients smoke (24.69).</td>
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<td>4. Koen et al. [36]</td>
<td>- 36 PROS.</td>
<td>- PROS were significantly slower than HC.</td>
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<td></td>
<td>- 33 HC.</td>
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<td></td>
<td>- Difficulty in the initiation of motor actions as soon as they encounter a slight increase in complexity.</td>
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<td>5. Kotlicka-Antczak et al. [24]</td>
<td>- 50 Schizophrenic patients, 30 Healthy controls.</td>
<td>- Psychomotor development delays are associated with negative symptoms.</td>
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<tr>
<td>6. Roussel et al. [35]</td>
<td>- 16 Schizophrenic patients (38 years), 16 Healthy controls.</td>
<td>- A significant slowdown on psychomotor reaction time test.</td>
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HSP: Hospitalized Schizophrenic Patients.

Psychomotor Disorder in Schizophrenia: There are 7 studies that address this phenomenon. (Table 2: Psychomotor disorder in schizophrenia).

If the finding of a predominantly pharmacological treatment is an improvement in symptom of schizophrenia side, reducing the clinical signs of the disease such as hallucinations and delusions as demonstrated [30], it is however more difficult to treat disorders of coordination, spatial organization and social adaptation, executive and cognitive disorders, very heterogeneous from one subject to the other [31]. They affect the acquisition capabilities and expression abilities psychosocial issues as manifested by difficulties in taking regular treatment and adapt to its environment [32]. They also affect the functional abilities of patients [33] which results in the restriction of their autonomy, the poverty of their relational network, difficulties in performing the basic activities of daily living or unsatisfactory professional operation.

Is there a link between psychomotor slowing and stereotyping and do they represent a set of catatonic symptoms? In this context, one study that grouped these three parameters (Psychomotor slowing, stereotyping and catatonic symptoms), showed that all measures of stereotyping, psychomotor slowdown reflects lower returns in hospitalized patients with schizophrenia compared with their homologous health. This study concluded that in the case of elimination of weakness in information processing abilities that can be classified as cognitive, psychomotor slowing and stereotyping are two different symptoms which can derives from the same group (Catatonic features ). However, several authors...
have spoken of these parameters separately; a study confirmed that atypical and conventional antipsychotics appear to have different effects on psychomotor slowing in these schizophrenic inpatients. The groups were comparable in terms of sex, education level, average doses and duration of the disease [34]. On the other hand the slowed performance on the various psychomotor measures has been demonstrated independent of medication and has also been found to be associated with negative symptoms and, to a lesser extent, with positive and depressive symptoms. Importantly, performance on the psychomotor tasks proved related to the patients' social, clinical and functional outcomes [35]. Since 1874 catatonia is a psychomotor disorder, it is a disorganization marking of schizophrenia [36]. Another study confirms the presence of a slowdown in schizophrenia and the performance of the profile indicates that the slowdown is due to disturbance in attention and visual processes [37].

**Early Schizophrenia’s Soft Neurological Signs:** A study showed that new-onset beyond schizophrenia patients were significantly slower than healthy subjects, matched controls in the initiation of motor actions as soon as they encounter a slight increasing complexity, for example, more line segments or unknown figures, forced departure points, corresponding figures symbol or planning a motor sequence. In general, the slowdown has occurred only in the initiation phase. Contrary to the assumption of Koen et al. [38], the slowdown was absent in the implementation phase. Apparently the cognitive process that supports the motor control, such as the selection of purpose, planning and inhibition of the reaction are already deficient in patients with recent-onset schizophrenia.

In another experimental study, we have shown that soft neurological signs were present in a more significant way in patients with early schizophrenia than in healthy subjects [39]. Using a tracking levels of soft neurological signs in patients with decreased closely matched twins tens scores are not affected and discordant monozygotic twins for schizophrenia, the results clearly confirm the general conclusion of the increased scores of soft neurological signs in schizophrenia. They are among the most consistent neurobiological characteristics of schizophrenia [40]. Antisocial behavior and psychomotor agitation increases the level of distress and severity of the disease, leading to brain abnormalities in schizophrenia. Other research will compare this sample of patients with others where psychomotor agitation was controlled by new pharmacological forms of antipsychotics [41] about psychomotor development of the child and the early onset of schizophrenia psychomotor development delays are associated with negative symptoms [24].

**Transfer in the Therapeutic Management of Schizophrenia:** In the research we have been able to address, only one study spoke of the patient-therapist relationship and transfer. This study is based on Psychoanalytic psychotherapy of patients with schizophrenic psychosis. The latter is traditionally based on the establishment of a positive transfer as well as an interpretative work and container [42]. Authors described f a formal program “Psychose Aider Comprendre Traiter (PACTT)”, using this program encourage patients, the acquisition of knowledge about their disease and its treatment seems improved and the therapeutic alliance with the healthcare team. In addition, this program improved quality of life for patients with schizophrenia. The success of the program is based primarily on the installation of positive transfer that led to the wellbeing of patients.

**CONCLUSIONS**

From the data presented above, there are several aspects of schizophrenia (Psychiatry, psychology, psychoanalysis, neurology). We denote that schizophrenia is better and better described with a clarification of the relationship between the brain and motor behavior. Science sheds new light on the genetic and environmental bases.

Studies on psychomotor today brought similar results for their value as a marker trait associated with schizophrenia. Their presence is overwhelmed by psychomotor slowing, stereotyping and implementation difficulties of combined movements.

Soft neurological signs are also a marker axis of schizophrenia. Their presence is both a confirmation of the predisposition to schizophrenia but also plays an important role in the side effects of neuroleptics.

We propose to take into account the psychomotor disorders in the diagnosis and the treatment of schizophrenia including psychomotor retardation, agitation and mild neurological soft signs.

This can form a central idea of the research on early diagnosis of these disorders to determine the nature of their presence. This can only be achieved through psychomotor assessments based on specific psychomotor scales in schizophrenia, validated and adapted to the population evaluated with a rating of both qualitative as well as semi-quantitative.
Furthermore, longitudinal studies are needed to further clarify the deficiencies in the motor circuit of schizophrenia in different stages of development and the brothers and sisters who are not affected in an intercultural sphere.

REFERENCES


