Original Article

Study of Types and Frequency of Motor Symptoms and Socio-Demographic Variables in Drug-Naive Patients of Schizophrenia

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Abstract

Background: Motor abnormalities have long been observed in patients with schizophrenia and antedate the use of neuroleptics. Motor abnormalities may be part of the schizophrenia process and may serve as indicators of vulnerability to the disorder. To understand the types and frequency of motor symptoms in drug-naïve patients with schizophrenia. **Material and Methods:** Drug-free patients with a diagnosis of schizophrenia visiting the OPD in the department of psychiatry were assessed using the francis catatonia Rating Scale and the Abnormal Involuntary Movement Scale. **Results:** Motor symptoms were present in 86% of drug-naïve patients with Schizophrenia. Prevalence of involuntary movements as per criteria, i.e., AIMS Item score >= 1, was 54% and as per stricter Schooler and Kane Criteria (1982) 48% is not very different. **Conclusion:** Motor symptoms are not a meaningless correlate but undoubtedly form an intrinsic part of the entire pathogenic process of Schizophrenia. Motor symptoms also act as predictors and prognostic indicators, so they can serve as tools for the prevention of schizophrenia and improving the disease outcome.

Keywords: motor symptoms, schizophrenia, motor abnormalities.

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Introduction

Schizophrenia is perhaps the most complex and most pervasive of all mental illnesses known to humanity, with a prevalence rate of 1% the world over. It adversely affects the highest and deepest of cognitive functions, which are unique to man. From the very inception of the modern diagnostic scheme for psychotic disorders, abnormalities in motor function have been observed in this condition, but do not seem to have been assigned their due place of significance. That the pathobiology of schizophrenia may extend beyond its diagnostic features to involve broader domains of abnormality, in the manner of systemic diseases, has been considered for as long as the concept of schizophrenia itself. In relation to motor abnormalities, however, the rich clinical descriptions of the preneuroleptic era and their fundamental implications have experienced substantial neglect.[1-4]

Motor abnormalities have long been observed in patients with schizophrenia and antedate the use of neuroleptics. In 1874, Kahlbaum drew attention to a mental illness in which stupor occurred in the absence of disease of the nervous system; he called this illness 'tension insanity' or catatonia.[5] In 1893, in the fourth edition of his textbook, Kraepelin brought together the syndromes of demence precoce, hebephrenia, catatonia, and dementia paranoides and called this group of illnesses 'psychological degeneration processes. Kraepelin regarded disorders of emotion and of volition as important features of schizophrenia. As early as 1911, Bleuler noted that motor deficits are highly prevalent in patients with schizophrenia.[3]

Studies of high-risk populations, including pre-schizophrenic individuals and offspring of patients with schizophrenia, showed late acquisition of motor milestones and poor coordination. These findings suggest that motor abnormalities may be part of the schizophrenia process and may serve as indicators of vulnerability to the disorder. This hypothesis is consistent with Weinberger's model of schizophrenia as a neurodevelopmental disorder in which the primary pathological process occurs during the early years of brain development.[8]

The present study was designed to understand the types and frequency of motor symptoms using BFCRS and AIMS in drug-free schizophrenia patients.

Materials and Methods

The study was conducted in a tertiary care centre. Patients

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visiting the OPD of the Psychiatry department were evaluated, and those giving informed consent were enrolled in the study. The patients were diagnosed using ICD-10 diagnostic criteria, and only those who were drug naïve or were off medication for the past six months were included in the study. Sociodemographic details were collected on a sociodemographic sheet. The patients with a diagnosis of schizophrenia were assessed with busch francis catatonia Rating Scale and the Abnormal Involuntary Movement Scale.

Results

The age group of patients ranged from 15 to 65 years, with 66 percent aged less than 35 years and 34 percent aged 35 or older. Most patients attending OPD had shorter illness duration, and fewer had longer illness duration. Twenty-four percent of patients were ill for less than 1 year, while 26% were ill for 1-3 years. Twenty-two percent and 20 percent had illness for 3-7 and 7-11 years, respectively, while only 8 percent were ill for more than 11 years.

Table 1: Socio demographic characteristic of patients

Age group (years) (Number of patients) Range -15-60, Mean -31.9 years, Standard deviation-12.26	Duration of illness in years (Number of patients)
15-25 (13)	<1 (12)
25-35 (20)	1-3 (13)
35-45 (7)	3-7 (11)
45-55 (7)	7-11 (10)
55-65 (3)	>11 (4)
Total	50

Table 2: Sociographic details of patients

Domicile (Number)	Family history of illness	Literacy	Marital status	Religion
Rural (35)	Present (15)	Literate (22)	Single (25)	Hindu (43)
Urban (15)	Absent (35)	Illiterate (28)	Married (25)	Muslim (7)
Total (50)	50	50	50	50

The patients in the study were mostly from a rural background (70%), while only 30% were from an urban background. 30% of patients had a family history of schizophrenia, while family history was absent in 70% of patients. 44% of patients were literate, while 56% were illiterate. 86% of patients belonged to the Hindu community, while only 14% were from the muslim community. 50% of patients were single, while an equal percentage were married.

Table 3: correlation between age and motor symptoms

Variable 1	Variable 2	Correlation	p-value
Age	BFCRS	-0.344*	<0.05
Age	AIMS	-0.097	>0.05
Age	BFCRS+AIMS	-0.287*	<0.05

*= Significant at 5% level

There is a negative correlation between age and catatonic symptoms, meaning that more motor symptoms are present in the younger age group than in the older age group. There is also a negative correlation between age and total motor symptoms, i.e., catatonic symptoms and abnormal involuntary movement symptoms. No significant correlation was found between age and abnormal involuntary movements.

Table 4: Correlation between duration of illness and motor symptoms

Variable 1	Variable 2	Correlation	p-value
TDI	BFCRS	-0.017	>0.05
TDI	AIMS	0.093	>0.05
TDI	BFCRS+AIMS	0.049	>0.05

Correlation between total duration of illness and individual motor symptoms as well as collectively was not found to be significant.

Table 5: frequency of motor symptoms

Symptoms	Frequency	Percentage	p-value
X1	9	18.00***	<0.001
X2	11	22.00***	<0.001
X3	15	30.00***	<0.001
X4	14	28.00***	<0.001
X5	9	18.00***	<0.001
X6	6	12.00**	<0.01
X7	3	6.00	>0.05
X8	6	12.00**	<0.01
X9	2	4.00	>0.05
X10	7	14.00**	<0.01

X11	3	6.00	>0.05
X12	4	8.00*	<0.05
X13	2	4.00	>0.05
X14	15	30.00***	<0.001
X15	17	34.00***	<0.001
X16	4	8.00*	<0.05
X17	2	4.00	>0.05
X18	3	6.00	>0.05
X19	4	8.00*	<0.05
X20	0	0.00	>0.05
X21	5	10.00*	<0.05
X22	9	18.00***	<0.001
X23	7	14.00**	<0.01
X24	21	42.00***	<0.001
X25	12	24.00***	<0.001
X26	3	6.00	>0.05
X27	1	2.00	>0.05
X28	9	18.00**	<0.001
X29	5	10.00*	<0.05
X30	10	20.00***	<0.001

X1-X23 are items of the Bush Francis Catatonia Rating Scale X1=Excitement, X2=Immobility, X3=Mutism, X4=Staring, X5=Posturing/catalepsy, X6=Grimacing, X7=Echopraxia/ Echolalia, X8=Stereotypy, X9=Mannerisms, X10=Verbigeration, X11=Rigidity, X12=Negativism, X13=Waxy flexibility, X14=Withdrawal, X15=Impulsivity, X16=Automatic obedience, X17=Mitgehen, X18=Gegenhalten, X19=Ambitendency, X20=Grasp reflex, X21=Perseveration, X22=Combativeness, X23=Autonomic abnormality

X24-X30 are items of the Abnormal Involuntary Scale.

X24= Movements of muscles of facial expression, X25=Movements of lips and perioral, X26=Movements of jaw, X27=Movements of tongue, X28= Upper extremity movements, X29=Lower extremity movements, X30=Trunk movements: neck, shoulder, hips

Excitement(9,18%), Immobility(11,22%), Mutism(15,30%), Staring(14, 28%), Posturing/Catalepsy(9,18%), Grimacing (6,12%), Stereotypy(6,12%), Verbigeration (7,14%), Negativisim(4,8%), Withdrawal (15,30%), Impulsivity (17,34%), Automatic obedience (4,8%), Ambitendency (4,8%), Perseveration (5,10%), Combativeness(9,18%), Autonomic abnormality (7,14%), Movements of muscles of facial expression (21,21%), Movements of lips and perioral areas (12,24%), Movements of upper extremity(8,16%), Lower extremity movements(5,10%), Trunk movements i.e. movements of neck, shoulder, hips (10,20%) were found in significant number of patients

NOTE: No star, not significant

*=significant at 5% level

**=significant at 1% level

***=significant at 0.1%level

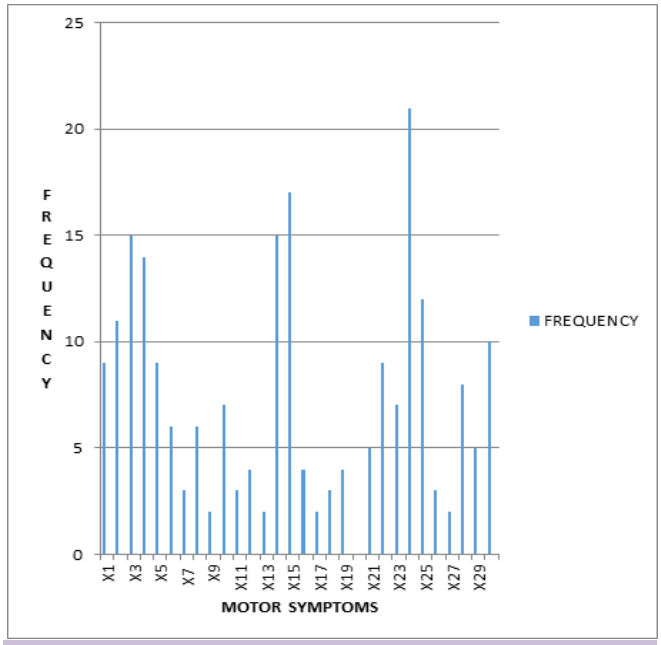

Figure 1: plot of frequency of motor symptoms

Excitement, Immobility, Mutism, staring, Posturing/catalepsy, Withdrawal, and Impulsivity were the most common motor symptoms among patients on the Busch-Francis Catatonia Rating Scale. Movements of muscles of facial expression, Movements of lips and perioral regions, Upper extremity movements, and Trunk movements (neck, shoulder, and hips) were the most common motor symptoms in patients as reported on the Abnormal Involuntary Movement Scale items.

Table 7: frequency of abnormal movements (dyskinesia) in different anatomic areas as per criteria >= 2 aims score on single item

areas	frequency (n)	percentage (%)	p-value
Muscles of facial expression	17	34***	<0.001
Lips and perioral areas	9	18***	<0.001
Jaw	3	6	>0.05
Tongue	1	2	>0.05
Orofacial	19	38***	<0.001
Upper extremity	9	18***	<0.001
Lower extremity	1	2	>0.05

Limbs	10	20***	<0.001
Trunk	8	16**	<0.01
Limbs and trunk	13	26***	<0.001

Discussion

The study was conducted on 50 consecutively registered patients in the Outpatients Department meeting the ICD-10 diagnostic criteria of Schizophrenia who had never received treatment or remained drug-free for 6 months or more to rule out the possibility of side-effects due to drugs. The final study population consisted of 50 patients, both male and female, aged 15-60 years, with no dropouts from the initial study population.

The sample of 50 was a comparable number in comparison to earlier studies done on motor symptoms in drug-naïve patients of schizophrenia by JP Koening et al. 2008, Cortese et al.2005 (39), McCreadie et al. 1996 (extensive study done in India), Fenn et al.1996, Honer et al. 2005, Gupta et al.1995 (26), Chatterjee et al.1995 (89), Fenton et al.1994 (94).[9-13]

In the present study, ICD-10 Criteria were used for the diagnosis of Schizophrenia. Initial studies by Kahlbaum and Kraepelin laid the groundwork for research into mental illness. They signified the importance of motor symptoms in the disorder as they described catatonia, negativism, mannerisms, grimacing, stereotypies, stupor, cycloid psychosis, tension insanity.[14] Leonhard (1959) first studied motor symptoms in cycloid psychosis. Anjan Chatterjee et al. (1995)20 used the Research Diagnostic Criteria (1978) for Schizophrenia while studying motor symptoms. T.C. Manschrek et al. (2004) used DSM-III-R Criteria (APA, 1987) while B.K.Puri et al.(1999), R.G. Mc Creadie et al. (2002), L. Cortese et al.(2005) used DSM-IV Criteria for Schizophrenia (APA, 1994).[15-18] The current study used ICD-10 criteria to enroll patients. R.G. McCreadie et al. (2005)19 used the AIMS scale to evaluate EPS in schizophrenia. Pappa and Dazzen (2009) did a systematic review of 13 studies to signify Spontaneous movement disorders in antipsychotic-naive patients with first-episode psychoses. They found that spontaneous movement disorders were quite common, but have lost their diagnostic importance. The current study is extensive and included both the Abnormal Involuntary Movement Scale (AIMS) and the Francis Catatonia Rating Scale (BFCRS).

In the present study, of the total 50 patients, 58% were male, and 42% were female. In the study by Creadie et al. (2002), 17% were male, and 43% were female. The cases selected for this study were aged 15-60 years. The largest number of patients was in the 25-35 years age group, i.e., 20 (40%), followed by the 15-25 years age group, i.e., 13 (26%). In the present study, no significant association was found between age and abnormal involuntary movements. Negative correlations were found between age and catatonic symptoms and between age and total motor symptoms. Most of the earlier studies have found no association between age and motor symptoms. (Caliguiri M, Lohr (1994), Mc Creadie et al. 1994, Fenton W et al. 1994, Gupta S et al.1995).[13,21-23] But in some studies, such as that of Fenton et al. (2000),[24] age was found to be an important factor contributing to dyskinesia. Rates as high as 40% were found in older people. McCreadie et al,[17] (2002) also found the prevalence of dyskinesia in older people to be high, i.e.38%. In the present study, married and single patients were equally represented, and 70% of cases were from rural areas and 30% from urban areas, as in Bihar, where people predominantly live in villages. 56% of the total subjects were illiterate, and only 44% were literate. 43 (86%) of total patients were Hindus, and the rest, i.e., only 7 (14%), belonged to the Muslim community. In this study, 15 out of 50 patients (30%) were reported to have a family history of psychiatric illness, but the informants could not exactly define them. The maximum number of patients in the present study had a disease duration of 1-3 years. In the present study, no significant association was found between total duration of disease and motor symptoms that is not different from majority of studies (Caliguiri et al.1994, Mc Creadie et al. 1994, Fenton et al. 1994),[22-25] but is in contradiction to the study done by Fenton (2000),[24] according to which rate and severity of involuntary movements appears to rise with increasing chronicity of untreated psychosis.

In the present study, motor symptoms were present in 86% of drug-naïve patients with Schizophrenia, which is quite a substantial figure. Roger's survey in 1985 on chronically ill drug-naïve schizophrenics revealed 71% to have motor symptoms. Catatonic symptoms were present in 37 of 50 patients (74%). Abnormal involuntary movements (>=1 AIMS score) were present in 27 (54%), but according to the stringent Schooler and Kane criteria (1982) (two-item score >= 2 or one-item score >=3), dyskinesia was present in 24 (48%) patients. In studies by Cernovsky et al. (1998), 27% of patients had catatonia, while Stompe et al. (2002) reported it in 10.3% of patients.

Among the Catatonic signs identified by Bush et al. (1996), in the present study, out of all catatonic signs, mutism (15, 30%), withdrawal (15, 30%), impulsivity (17, 34%) were very commonly found while Staring present in 14 (28%) patients, immobility in 22% (11), excitement, posturing, combativeness each in 9 (18%) patients. Negativism was not common, as it was present in only 4 (8%) patients.

Prevalence of involuntary movements as per criteria, i.e., AIMS Item score >= 1, was 54% and as per stricter Schooler and Kane Criteria (1982) 48% is not very different. This prevalence is not very different from studies on drug-naïve schizophrenics by Owens et al. (1982), 28, in which the prevalence of involuntary movements was found to be 51%.

The prevalence of dyskinesia in drug-naïve schizophrenia patients varies over a wide range. McCreadie et al. (1996)29 studied the Indian population and found a prevalence of 38% in drug-naïve schizophrenics. They also reported dyskinesia in 15% of the normal elderly population.

In the present study, orofacial dyskinesia was the most common, occurring in 19 of 50 patients (38%). Fenton et al. 199423 had observed that 32% of drug-naïve patients had orofacial dyskinesia, while Gervin M et al. 199830 reported involuntary orofacial movements in 10% of 49 antipsychotic-naïve patients. B.K. observed a similar finding. Puri et al. (1999),[16] reported orofacial dyskinesia in the maximum number of patients.

However, the percentage was lower, i.e., 11%, and thus it was deduced that abnormal involuntary movements, particularly orofacial dyskinesia, would represent a neuromotor component of schizophrenia. In the present study, 26% patients had trunk and limb dyskinesia, while in the study by B.K. Puri et al., 4% patients had trunk and limb dyskinesia. In the present study, upper extremity dyskinesia was found in 9 out of 50 patients (18%), which was much lower than the studies by Caliguiri et al. and Lohr (199424), which used a sensitive instrumental measure (52%) to detect dyskinetic hand movements.

Since 86% of the neuroleptic-naïve patients of schizophrenia showed either catatonic motor symptoms or abnormal involuntary movements or both, this very observation substantiates the fact that neuromotor disturbances are intrinsic to the psychopathology of schizophrenia and thus should be given an appropriate place in categorical diagnosis as well as a defining dimension for schizophrenia disorder.

A positive correlation was also found between catatonic symptoms and abnormal involuntary movements ($r=+0.280$, $p<0.05$), indicating a shared pathobiology, most likely in the basal ganglia.

Motor symptoms in untreated patients of schizophrenia may be just one manifestation of greater cerebral dysfunction, involving particularly the basal ganglia (striatum: caudate and putamen), frontal cortex and/or brain regions interacting with the basal ganglia and frontal cortex31, thus antipsychotic treatment appears to enhance the appearance of involuntary movements in schizophrenia patients having vulnerability to such movement disorders as an intrinsic component of the disease process.

Negative symptoms and motor symptoms may be a consequence of reduced dopaminergic activity in certain brain regions.[32] Several studies have indicated that hypodopaminergic activity in frontal cortical regions may be responsible for negative symptoms (Lindstrom LH et al., 1985; Bowers MB et al., 1974; Pickar D et al., 1990).[33-35]

Neuroimaging studies of cortical and subcortical regions in patients with schizophrenia patients with schizophrenia have revealed abnormalities that suggest both hypo- and hyperdopaminergic states (Weinberger DR et al. 1986, Wong DF et al. 1986, Gur RE et al. 1995).[36-38]

Moreover, other investigators have suggested models of schizophrenia that account for regionally specific alterations in dopamine neuronal activity that may be in opposite directions (Davis KL et al., Pycock CJ et al., 1980; Weinberger DR et al., 1987).[39-41] Specifically, they have proposed that Schizophrenia may be associated with cortical hypodopaminergic activity, striatal dopamine hypoactivity, as Caliguiri et al. 1993,[21] suggested, and nigrostriatal hypodopaminergic activity may be a "compensatory" homeostatic mechanism for greater mesolimbic dopamine transmission.

Limitations

1. A single researcher has done all the observations, so the chance of bias cannot be ruled out.
2. The present study was cross-sectional and of a small sample size. Therefore, it might have shown some erroneous results. The same research can be carried out with a bigger sample size to get useful results.
3. Some items of catatonia rating scales are similar to items of scales for negative symptoms like mutism and poverty of speech, withdrawal, poor eye contact, and apathy. Whether catatonic signs are psychomotor phenomena or pure motor phenomena is debatable. Why are the grasp reflex and no other Frontal release signs included in the BFCRS? How does the Grasp reflex justify as a catatonic sign?
4. Definition of catatonic symptoms varies from one investigator to another, like according to Bush et al., automatic obedience is exaggerated cooperation, but according to Nothoff et al., exaggerated cooperation is fulfilling even senseless and dangerous tasks on the examiner's request.
5. Stereotypy of catatonic symptoms and repetitive and stereotyped behaviour of the Scale for Assessment of Positive Symptoms are similar.
6. These rating scales for motor disorders are not very sensitive. Estimation of motor symptom severity by AIMS varies across researchers, so the net results vary. So, these should be made more sensitive.

Directions for future research:

1. Motor symptoms are not simply epiphenomena or meaningless correlates but undoubtedly form an intrinsic part of the entire pathogenetic process of Schizophrenia, as proven by the present study and even already by earlier literature, so a large-scale systematic research complemented with new scientific equipment will provide vast inroads into understanding Schizophrenia itself and lead to better management of the disorder.
2. Motor symptoms also act as predictors and prognosticators, so they can serve as tools for the prevention of schizophrenia and improving the disease outcome.
3. Motor symptoms bridge the divide between neurology and psychiatry, and they provide ample evidence for psychological and neurological interplay and interdependence.
4. These data also suggest that any perspective of antipsychotic drugs as the essential cause of neurological dysfunction in schizophrenia and of tardive dyskinesia is incomplete. An alternative perspective is one in which antipsychotic drugs interact with the underlying disease process to precipitate and accentuate intrinsic motor phenomena. So, great insights into the world of psychopharmacology can be provided by motor symptoms in drug-naïve patients with schizophrenia.

Conclusion

50 Consecutive patients, both male and female, took part in this study and were assessed cross-sectionally. They had satisfied the ICD-10 diagnostic guidelines for Schizophrenia. A thorough enquiry about the drug treatment of patients was conducted. If the patients had never been treated or had not taken any psychotropes within 6 6-month period, they were included in the study. They were interviewed for sociodemographic data. To assess motor symptoms, the BFCRS and AIMS scales were administered.

The data were analysed, and the following conclusions were drawn:

1. Motor symptoms were present in 86% of drug-naïve patients with schizophrenia.
2. Catatonic symptoms were present in 74% of drug-naïve patients with schizophrenia.
3. Abnormal involuntary movements were present in present in 54% of patients.
4. Amongst the motor symptoms, orofacial dyskinesia was the most commonly found, i.e., in 38% patients.
5. Impulsivity (34%) was the most common catatonia symptom, followed by withdrawal (30%) and mutism (30%).
6. Positive correlation ($r=+0.280$, $p<0.05$) was found between catatonic symptoms and abnormal involuntary movement symptoms.

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Conflicts of interest
There are no conflicts of interest.

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