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## A study of improvement in language dysfunction among patients with psychosis from a tertiary care centre from North India

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**Abstract**

**Background:** Language dysfunction is an objective clinical marker of brain dysfunction in psychosis which encompasses conditions like schizophrenia, schizoaffective disorder and bipolar affective disorder with psychotic symptoms.

**Aim:** To study the improvement in language dysfunction with treatment among patients of psychosis over a period of 12 weeks using the Clinical Language Disorder Rating Scale (CLANG).

**Methodology:** 60 patients with psychosis who attended the inpatient services of psychiatry department of a tertiary care center from North India in the period from January 2022 to October 2023 were evaluated for the presence of language dysfunction using a valid tool called CLANG at baseline, 4 weeks and 12 weeks after taking approval from the Institutional Ethical Committee and with the informed consent of the patients and/or their caregivers. Data set for 60 patients regarding the sociodemographic-clinical profiles and language dysfunction were analysed using descriptive and inferential statistics as appropriate.

**Results:** When mild, moderate and severe dysfunction were combined, all patients were found to have some language dysfunction. The CLANG domains most affected in our patients at baseline were referential failures (65%), discourse failures (46.67%), poverty of speech (38.33%), lack of details (33.33%), abnormal prosody (28.33%), aprosodic speech (21.67%), excess details (21.67%) and lack of semantic association (18.33%). The factors which were maximally improved over 12 weeks were referential failures (50%), discourse failures (30%), poverty of speech (25%), lack of details (21.67%) and abnormal prosody (18.33%).

**Conclusion:** It is evident from our study that language dysfunction is an important component of psychosis. Hence our study revalidates the neural basis of psychosis.

**Keywords:** Language; Psychosis; Schizophrenia; Clinical language disorder rating scale; North India.

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## Introduction

Language is a fundamental experience of human experience that undergoes profound disruption in psychotic disorders like schizophrenia and bipolar affective disorder with psychotic symptoms. According to researchers, Schizophrenia is the price that “Homo sapiens” have to pay for language [1].

The earliest attempt to study the abnormal nature of verbal impairments in schizophrenia. Was made in the early 20<sup>th</sup> century by [2]. Almost four decades later in 1979, Nancy Andreasen found out that several aspects of language were abnormal in patients with schizophrenia, viz. comprehension, attentional shifts in the sentences, pragmatics, semantic organization, referential failures, paucity of speech and fluency [3,4].

According to researchers, language impairment is one of the core phenomenological characteristics of patients with schizophrenia and it has been proposed that there must be some deficits in the neural organization of language in schizophrenic patients [5].

Compared to classical psychotic symptoms (such as delusions and hallucinations), language dysfunction can be directly observed and it is not dependent upon the subjective report of abnormal experiences on part of the patient which is in contrast to delusions and hallucinations the evaluation of which relies heavily on subjective report by the patients. Consequently, language dysfunction is now being regarded as a more objective and informative clinical marker of brain dysfunction in psychosis [3-5].

Various international studies that have examined speech samples of schizophrenia patients, have reported problems at multiple levels of language processing i.e. lexical, syntactic, semantic and discourse levels [6-11].

## Need for the study

As reported by previous studies, there is a dearth of Indian studies in the domain of language dysfunction in psychosis [12].

In a review of Indian studies in the domain of language and schizophrenia by Sultan et al. it was concluded that the number of studies done in India is very meagre and when compared to international studies, there is a strong need for revival of research in this area [13]. Furthermore, there are virtually no studies that have attempted to study the course and progress of language dysfunction in psychosis.

Through the current study, we envisage to take a step further toward better understanding of the multifaceted nature of language dysfunction in psychosis and also to evaluate their improvement at follow ups.

**Aim:** To evaluate the language dysfunction among patients of psychosis

## Objectives

To examine the presence of disintegration of the components of language in untreated cases of psychosis using Clinical Language disorder rating scale (CLANG) [14] at baseline, 4 weeks and 12 weeks.

To see the improvement in CLANG domains among our pa-

tients with treatment over 12 weeks follow up period.

## Materials and methods

**Setting:** Department of Psychiatry at a tertiary care centre from North India.

**Study design:** A short- term prospective study.

Approval of the institutional ethics committee for our study was taken in the month of December 2021

## Study duration

The duration for recruitment of patients from inpatient services-January 2022 to October 2023 (almost 22 months)

The duration for short term follow-up from baseline-12 weeks (which was completed till January 2024.

## Phases of assessment of patients

**First assessment:** Baseline.

**Second assessment:** At 4 weeks from baseline.

**Final assessment:** At 12 weeks from baseline.

## Protocol for recruitment and phases of our study

In the period from 1<sup>st</sup> January 2022 to 30<sup>th</sup> October 2023, there were a total of 303 admissions to the psychiatric ward under a broad diagnosis of psychosis including schizophrenia. Out of these 303, 88 patients were those patients who had never received any prior treatment before coming to us.

By purposive sampling, we chose 60 patients for our study (those patients were selected who had good findings after fulfilling the inclusion and exclusion criteria).

**Sample size:** A total of 60 patients of psychosis.

## Inclusion criteria

- Males and females
- Age 18 to 60 years
- Psychosis diagnosed using ICD 10 criteria [15].
- Patients who had never received any psychiatric treatment prior to admission to our department.

## Exclusion criteria

- Subnormal intelligence
- Presence of comorbid substance use disorder
- Non psychotic mood disorder
- History of learning disabilities
- History of expressive speech disorder
- Hearing impairment
- Stress related speech disorder like emotional numbness in Post-Traumatic Stress Disorder (PTSD)
- Presence of catatonic symptoms such as mutism and stupor

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- Aphasia/dysphasia secondary to laryngeal or cerebral dysfunction

- Those who refused to be a part of our study (for any reason).

### Description of CLANG in brief

It is a simple rating instrument which is based on modern psycholinguistic framework. This scale was validated in an extensive sample of 204 Hong Kong Chinese schizophrenic patients. It consists of 17 observer rated items anchored on a four-point severity scale, i.e., 0, 1, 2 and 3 (0 = Normal, 1 = Mild, no more than 10% of the time, 2 = Moderate, regular occurrence 10 to 50% of the time, 3 = Severe, pervasive, more than 50% of the time) Rating is based on verbal output during a period of conversation with the patient (lasting at least 15 minutes). Factor analysis done by Chen et al. (1966) revealed three major domains of language disorder captured by the scale: the semantic level, the syntactic level and the production level. The internal consistency of the CLANG and the relative contribution of individual items as found out by applying Cronbach's alpha coefficient, proved that the internal reliability of the subscales is high (alpha coefficient for semantics subscale 0.76), for syntax subscale 0.80, and for production subscale 0.72. The intra-class correlation coefficient for the syntax subscale is 0.93, for the semantics subscale is 0.83 and for the production subscale is 0.88. Thus, CLANG is a reliable, valid and informative instrument for the clinical assessment of language disorder in schizophrenia [14].

### Description of 17 items of the CLANG scale

**Excess phonetic association:** Abnormal association based on phonetic similarity (punning and clang associations).

**Abnormal syntactic structure:** Violations of ordinary rules of grammar leading to incomprehensible speech.

**Excessive syntactic constraints:** Excessive application of rigid grammatical structure to speech output, producing language that is "formal" and lack of flexibility of ordinary spoken language.

**Lack of semantic association:** Lack of normal semantic association between ideas expressed successively

**Referential failures:** Unclear links which leave excessive ambiguity as to which expressions refers back (or forth) to which items in preceding and subsequent speech.

**Discourse failures (loss of schematic organization):** Lack of the normal organization in which speech units, (eg. One or two sentences or above) progresses from one context to the other in a gradual and prepared manner.

**Excessive details:** Details given grossly in excess of that required in the given context.

**Lack of details:** Details given (though judged to be probably appropriate in meaning) grossly inadequate to context.

**Aprosodic speech:** Flat monotonous speech without appropriate inflection and emotional quality.

**Abnormal prosody:** Bizarre quality of voice, eg., high pitch, mechanical etc.

**Pragmatic disorder:** Speech content reflects defective knowledge of the world (judged to be independent of delusion-

al ideas, i.e., of personal significance etc).

**Dysfluency:** Stuttering, false starts, hesitations.

**Dysarthria:** Articulation difficulties. Poverty of speech Reduced overall speech output.

**Pressure of speech:** Increased speech of word production as if a rapid internal production process paces speech.

**Neologisms:** Construction of idiosyncratic new words for personal use.

**Paraphasic error:** Substitution of word by words with similar meaning (but inappropriate and less precise).

### Ethical considerations

Before starting the study, approval for this study was obtained from the Institutional Ethics Committee.

Written informed consent was obtained from the patients and /or their relatives after asking them to go through the patient information sheet printed in the local languages commonly used (Hindi) and a verbal explanation by the interviewer

The nature and purpose of the study was explained to them and also the need to cooperate for follow ups at least at 4 weeks and at 12 weeks and to provide us their contact address and phone numbers.

Confidentiality of the information provided was maintained.

No beneficial treatment was withheld and treatment was not altered in any way to facilitate intake into the study.

### How data collection was done

Starting from January 2022, we aimed at enrolling patients fulfilling the inclusion and exclusion criteria for our study and his/her diagnosis based on ICD 10 was confirmed by consultant psychiatrist of the level of professor. Diagnosis of schizophrenia was not essential for inclusion into the study, rather expression of verbal or written speech were given more importance in our patients of untreated psychosis. Thus, out of 60 patients, we had 26 patients with diagnosis of schizophrenia rest of them were having diagnoses other than schizophrenia as mentioned vide infra in (Table 1) of our observations. For each patient, we took informed consent in the local language of the patient. The sociodemographic profile sheet was filled up as per the information given by the patient as well as at least one reliable informant staying with the patient for most part of his/her life. The socio demographic profile sheet covered parameters like name, age, sex, marital status, mother tongue, education, occupation, duration of untreated psychosis, diagnosis, age of onset and family history of psychiatric illness and treatment. For the purpose of establishing psychiatric diagnoses, we used ICD 10. All the 60 patients were then subjected to the administration of CLANG scale for the assessment of their language. For the purpose of eliciting a sufficient speech sample, we engaged the patient in conversation for at least 15 minutes under a standardized condition. The patient was asked to speak spontaneously for at least 3 to 5 minutes or write a paragraph on any of the following topics of their preference like my family, festivals of India, education system, status of India Pakistan relationship or any other topic of their choice. We kept in mind that we subjected the patients to open-ended questions rather than closed-ended ones which helped us elicit a sufficient speech sample in order to be able to apply the scale efficiently for lan-

guage assessment. In some cases, we even showed the patients pictures and asked them to speak on it. The speech samples of the patients were audiotaped as well as video recorded. Later on, they were meticulously scrutinized for the presence of language dysfunction as defined in the CLANG scale.

They were then given appointments and their contact address and phone numbers were noted. A day prior to their respective appointment, the patient's family was cordially reminded telephonically to ensure their scheduled follow up (first follow up at week 4 and second follow up at week 12 respectively). These were again evaluated for status of their language abnormalities at both the follow ups to see and note the degree of improvement in language abnormalities with treatment in this short prospective period of 12 weeks. The results /observations were noted down at each assessment for all 60 patients. Fortunately, we are able to evaluate all 60 patients without any attrition at week 4 and week 12 albeit with a delay of one or two days.

The results were noted down for all 60 patients.

### Outcome parameters

1. The presence of disintegration of the components of language in diagnosed and untreated acute psychosis patients using CLANG.

2. The degree of improvement in language abnormalities with antipsychotics first at 4weeks and then at 12 weeks.

### Statistical analysis

The data analysis was done using SPSS 20.0 version. In descriptive statistics, we used simple measures like frequency and percentage for ordinal and nominal variables for the sociodemographic and clinical profiles of the patients. For inferential statistics, we used one way Analysis of Variance (ANOVA). The p-value of 0.05 has been considered to be statistically significant and a p value of 0.005 to be highly significant.

### Results

(Table 1) of our results shows the sociodemographic and clinical parameters like age, gender, occupation, education, marital status, age of onset of psychosis, family history, diagnosis, duration of untreated psychosis and psychopharmacological treatment administered to the patients in our study.

73.33% of our psychotic patients were in the age group of 21 to 30 years. The mean age was 25.4 years. The mean age of onset of psychosis in our patients was 23.9 years. Diagnosis-wise, 43.33% of our patients had a diagnosis of schizophrenia. Patients with Schizoaffective disorder and acute and transient psychotic disorder were 11.67% each, 5% had persistent delusional disorder, 3.33% had other nonorganic psychotic disorder, 10% had severe depressive episodes with psychotic symptoms and 15% had bipolar affective disorder with psychotic symptoms.

(Table 2) depicts the distribution of language dysfunction in our patients using CLANG Scale at baseline. When mild, moderate and severe language disturbances in the patients were clubbed together, the most commonly affected language domains were referential failures (65%). The second most common language disturbance in our study was discourse failures (46.67%). As regards prosody related language disturbances, abnormal prosody (28.33%) and aprosodic speech (21.67%)

were seen in our patients. Abnormal syntax was seen in 16.67% of our patients. None of our patients had dysarthria or paraphasic error. Lack of semantic association was seen in 18.34% of our patients. Neologisms was seen in 6.67% of our patients.

(Table 3) is a comprehensive reflection of language dysfunction among our patients from the point of entry to subsequent two follow ups. It shows the progressive improvement in each specific domain of CLANG in our patients from baseline to subsequent follow ups at week 4 and week 12. We found that all the CLANG domains showed improvement with treatment albeit to different extents. The factors that completely improved were excessive syntactic constraints, pragmatics disorder and neologisms. The improvement was more between 0 to 4 weeks for excessive phonetic association, abnormal syntax and excess syntactic constraints as well as lack of semantic association whereas referential failures, discourse failures, excess details and poverty of speech showed more improvement from week 4 to week 12.

Interestingly, neologisms, pragmatics disorder and excess syntactic constraints responded quite effectively and earlier compared to other domains.

(Table 4) shows the percentage improvement in CLANG domains in our patients over 12 weeks after their natural course of treatment. For the sake of understanding, we have only taken baseline and second follow up (at 12 weeks) i.e. between point of entry to point of exit, a span of 12 weeks which is considered a duration in our short term follow up study. This table depicts which language disturbance is improved and to what extent compared to which does not and we found that referential failures (50%) and discourse failures (30%) followed by poverty of speech (25%) and lack of details (21.67%) showed maximum level of improvement. The distribution was found to be significant for referential failures (p value 0.0001), discourse failures (p value 0.002), lack of details (p value 0.0001) and poverty of speech (p value 0.003).

(Graph 1) of our results depicts the CLANG factors maximally improved over 12 weeks with treatment.

### Discussion

The present study is relevant as it aims to evaluate the language dysfunction in patients of psychosis which is a core phenomenon of the disorder. Also, few Indian studies have previously reported a dearth of Indian studies in this area [12,13].

The primary objective of our study was to do an in-depth evaluation of the disintegration of components of language in patients with untreated psychosis and the secondary objective was to see the improvement in CLANG domains with treatment in the subjects.

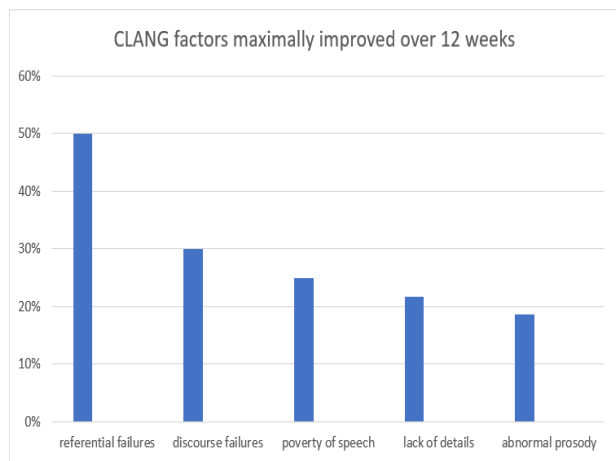
As we chose to take only inpatients into our study, it was possible for us to do a detailed evaluation, which is most of the times not possible in an outpatient setting. Our study is in conformity with few previous studies which have also attempted to study language dysfunction in psychotic inpatients only [8,16-18].

We chose to include drug naïve patients only for greater chances of getting undiluted and robust findings for language dysfunction. Our evaluation is supported by most previously conducted most notable studies that also included only drug naïve psychotic patients [11,18].



**Table 1:** The sociodemographic and clinical parameters like age, gender, occupation, education, marital status, age of onset of psychosis, family history, diagnosis, duration of untreated psychosis and psychopharmacological treatment being administered among the patients in our study.

Sociodemographic / clinical parameter		No. of patients n (%)
Age at time of first admission to hospital	21-30 years	44(73.33%)
	31-40 years	13(21.7%)
	41-50 years	3(5%)
Mean age at time of first admission to hospital	<b>25.4years</b>	
Gender	Male	38 (63.33%)
	Female	22(36.67%)
Education	Secondary	41 (68.3%)
	Higher secondary	9 (15%)
	Graduate	10(16.67%)
Occupation	Unemployed	22(36.67%)
	Semiskilled laborer	22 (36.67%)
	Skilled laborer	8 (13.33%)
	Clerk/farmer/shopkeeper	2(3.33%)
	Semi-professional	6(10%)
Marital status	Single	17(28.33%)
	Married	30(50%)
	Separated	9(15%)
	divorced	4(6.67%)
Age of onset of psychosis	21-30 years	41(68.33%)
	31-40 years	19(31.67%)
Mean age of onset of psychosis	23.9 years	
Diagnosis	Schizophrenia	26(43.33%)
	Schizoaffective disorder	7(11.67%)
	Persistent delusional disorder	3(5%)
	Acute and transient psychotic disorders	7(11.67%)
	Other nonorganic psychotic disorders	2(3.33%)
	Severe depressive episode with psychotic symptoms	6(10%)
	Bipolar affective disorder with psychotic symptoms	9(15%)
Duration of untreated psychosis (in months)	<12	5(8.33%)
	12-24	40(66.67%)
	24-36	9(15%)
	36-48	6(10%)
Mean DUP in months	30±0.86	
Psychopharmacological Treatment being administered	Antipsychotic	38(63.33%)
	Antipsychotic+Mood Stabilizer+Benzodiazepines	7(11.67%)
	Antidepressant+ Benzodiazepines	6(10%)
	Antidepressant+Mood Stabilizer+Benzodiazepines	9(15%)



**Graph 1:** CLANG factors maximally improved over 12 weeks in our patients

**Comparison of socio-demographic and clinical parameters between previous studies and our study**

As per (Table 1) of our results which shows the socio-demographic and clinical profiles of the patients, 73.33% of our patients were in the age group of 21 to 30 years and the mean age was 25.4 years, which is notably the usual age of presentation in psychotic patients. On comparing with other studies, we found that the age wise distribution of patients ranged from 23.9 years in the study by to 52.10 years [18,19].

Thus the findings of our study are more in tune with the natural course of age of onset of psychosis.

As far as the gender wise distribution is concerned, males were predominant (68.33%). Few previous studies by Tavano et al. and Murphy et al. have shown the percentage of males to range from 42.3% to 55% [20,21].

68.33% of our patients had studied up to secondary education. Few previous remarkable studies had their patients with clearly higher mean levels of education compared to our patients [8,14].

All our patients were Hindi-speaking (100%). Most of the previous studies on language dysfunction were done on English-speaking people, as reported by Tavano et al. who did their study in Italian-speaking patients for the first time [20].

Regarding the clinical parameters, the age of onset of psychosis for most of the patients was found to be between 21 to 30 years (68.33%) and the mean age of onset was 23.9 years. A previous Italian study found the mean age of onset to be 27.40 years in schizophrenic patients [20].

Diagnosis-wise, most of our patients belonged to schizophrenia (n=26) (43.33%). A total of seven of them had schizoaffective disorder (11.67%), 7 had acute and transient psychotic disorder (11.67%), 3 had persistent delusional disorder (5%), 2 had other non-organic psychotic disorder (3.33%), 6 had severe depressive episodes with psychotic symptoms (10%) and 9 had bipolar affective disorder with psychotic symptoms (15%). On comparison with previous studies, we found that almost all of them also had a spectrum of psychotic patients notable among them being by Andreasen et al. 1979 which had 113 patients (32 manics, 36 depressives and 45 schizophrenic patients), by Chaika (1989) which had 14 schizophrenics and 8 manics, by Chen et al. which had 204 schizophrenic patients [3,14,22].

**Table 2:** Distribution of language dysfunction in our patients using CLANG Scale at baseline.

CLANG domain	Score as per CLANG	No. of patients N (%) at baseline
Excess phonetic association	Normal	52(86.67%)
	Mild	4(6.67%)
	Moderate	4(6.67%)
	Severe	0
Abnormal syntax	Normal	50(83.33%)
	Mild	5(8.33%)
	Moderate	5(8.33%)
	Severe	0
Excess syntactic constraints	Normal	57(95%)
	Mild	2(3.33%)
	Moderate	1(1.67%)
	Severe	0
Lack of semantic association	Normal	49(81.67%)
	Mild	3(5%)
	Moderate	7(11.67%)
	Severe	1(1.67%)
Referential failures	Normal	21(35%)
	Mild	12(20%)
	Moderate	23(38.33%)
	Severe	4(6.67%)
Discourse failure	Normal	32(53.33%)
	Mild	11(18.33%)
	Moderate	15(25%)
	Severe	2(3.33%)
Excess details	Normal	47(78.33%)
	Mild	5(8.33%)
	Moderate	8(13.33%)
	Severe	0
Lack of details	Normal	40(66.67%)
	Mild	10(16.67%)
	Moderate	7 (11.67%)
	Severe	3(5%)
Aprosodic speech	Normal	47(78.33%)
	Mild	8(13.33%)
	Moderate	5(8.33%)
	Severe	0

Abnormal prosody	Normal	43(71.67%)
	Mild	12(20%)
	Moderate	5(8.33%)
	Severe	0
Pragmatics disorder	Normal	58(96.67%)
	Mild	1(1.67%)
	Moderate	1(1.67%)
	Severe	0
Dysfluency	Normal	52(86.67%)
	Mild	5(8.33%)
	Moderate	3(5%)
	Severe	0
Dysarthria	Normal	60(100%)
	Mild	0
	Moderate	0
	Severe	0
Poverty of speech	Normal	37(61.67%)
	Mild	12(20%)
	Moderate	11(18.33%)
	Severe	0
Pressure of speech	Normal	54(90%)
	Mild	3(5%)
	Moderate	2(3.33%)
	Severe	1(1.67%)
Neologisms	Normal	56(93.33%)
	Mild	2(3.33%)
	Moderate	2(3.33%)
	Severe	0
Paraphasic error	Normal	60(100%)
	Mild	0
	Moderate	0
	Severe	0

**Table 3:** Progressive improvement in each domain(s) of CLANG in our patients from baseline to subsequent follow ups at week 4 and week 12.

CLANG domain	Number of patients showing language dysfunction (mild, moderate, severe combined)							
	Baseline N (out of 60)	%	4 weeks N (out of 60)	%	12 weeks N (out of 60)	%	F value	P value
Excess phonetic association	8	13.33	5	8.33	2	3.33	1.58	0.21,NS
Abnormal syntax	10	16.67	5	8.33	3	5	3.22	<b>0.065,NS</b>
excessive syntactic constraints	3	5	1	1.67	0	0	1.95	0.14,NS
Lack of semantic association	11	18.33	7	11.67	4	6.67	1.95	0.14,NS
Referential failures	39	65	30	50	9	15	32.15	<b>0.0001,S</b>
Discourse failure	28	46.67	19	31.67	10	16.67	6.63	<b>0.002,S</b>
Excess details	13	21.67	7	11.67	4	6.67	2.83	0.064,NS
Lack of details	21	35	16	26.67	8	13.33	8.39	<b>0.0001,S</b>
Aprosodic speech	9	15	7	11.67	2	3.33	1.98	0.14,NS
Abnormal prosody	17	28.33	10	16.67	6	10	2.79	0.067,NS
Pragmatics disorder	2	3.33	1	1.67	0	0	0.58	0.56,NS
Dysfluency	8	13.33	3	5	1	3.33	1.95	0.14,NS

Dysarthria	0	0	0	0	0	0	....	....
Poverty of speech	23	38.33	15	25	8	13.33	6.09	<b>0.003,S</b>
Pressure of speech	6	10	4	6.67	1	3.33	0.52	0.59,NS
Neologisms	4	6.67	1	3.33	0	0	1.19	0.30,NS
Paraphasic errors	0	0	0	0	0	0	.....	.....

**Table 4:** Percentage improvement in individual CLANG domains with treatment over 12 weeks.

CLANG domain	% of patients with language dysfunction at baseline	% of patients with language dysfunction at 12 weeks	Improvement Over 12 weeks
Excess phonetic association	13.33	3.33	10%
Abnormal syntax	16.67	5	11.67%
excessive syntactic constraints	5	0	5%
Lack of semantic association	18.33	6.67	11.67%
Referential failures	65	15	50%
Discourse failure	46.67	16.67	30%
Excess details	21.67	6.67	15%
Lack of details	35	13.33	21.67%
Aprosodic speech	15	3.33	11.67
Abnormal prosody	28.33	10	18.33
Pragmatics disorder	3.33	0	3.33
Dysfluency	13.33	3.33	10
Dysarthria	0	0	0
Poverty of speech	38.33	13.33	25
Pressure of speech	10	3.33	6.67
Neologisms	6.67	0	6.67
Paraphasic errors	0	0	0

The mean Duration of Untreated Psychosis (DUP) in our study was 30±0.86 months. It is well known that DUP has a significant impact on recovery in psychosis. However, we could not come across any specific study in relation to DUP and language impairment making any comparison difficult.

#### Comparison of language dysfunction between previous studies and our study

In our study, language dysfunction was the central focus in 60 patients of untreated psychosis.

It has been long recognized that most disorders of thought can be only be deduced from the speech of the patient but evaluating the language impairment in as many as more than 15 domains is a huge and complex task [9]. A plethora of instruments have been used by various researchers in evaluating language impairment in patients of psychosis/Schizophrenia previously including Scale for Thought, language and communication by Andreasen and Grove, Thought and language index by [8,23]. Most scales or transcribed interviews could study only two or three domains whereas a comprehensive instrument like CLANG scale has enabled us to objectively measure the 17 different domains of language. Notably, Nelli and Crow also used CLANG in their patients [11].

(Table 2) of our results show the language dysfunction among our patients in detail. All the patients had some level of language dysfunction. When mild, moderate and severe language disturbances in the patients were clubbed together, the

most commonly affected language domains were referential failures (65%).

Various other researchers like Hoffman et al have reported problems with reference in language samples of their patients [8,9,24].

The second most common language disturbance in our study was discourse failures (46.67%). This is in keeping with a notable study which said that, in schizophrenia, discourse planning is impaired [24]. Chaika, who studied a single psychotic patient found that her deviant language coincided with her psychotic episodes and otherwise she spoke normally for weeks at a time. The abnormalities that observed were mainly discourse failure and syntactic constraints [25]. These abnormalities have also been noted in our study. In another study, proposed that individuals with schizophrenia often commit errors in which they stray from 'normal path control' while speaking and claimed that the disordered discourse of schizophrenics often did not reach its end goal because of 'grammatical errors [26]. These errors include neologisms which we have also noted in 6.67% of our patients [26].

As regards prosody related language disturbances, abnormal prosody (28.33%) and aprosodic speech (21.67%) were seen in our patients. On comparison with previous studies in this domain, we found that in previous studies also prosody related problems are seen in language of schizophrenic patients [27-30].

Abnormal syntax was seen in 16.67% of our patients. This is in keeping with an Italian study which showed that patients with schizophrenia presented with a significant reduction in syntactic diversity indices with respect to healthy controls [20]. This is in keeping with a number of other studies as well [5,11,14].

Andreasen commented that the syntax of schizophrenic speech is generally normal, even when the semantics and discourse organization have completely broken down. Researchers have demonstrated that schizophrenia is accompanied by a reduction in syntactic complexity and an impairment in syntactic comprehension [16,31]. These results were replicated by few researchers who found greater syntactic simplification in patients with negative symptoms than in those with positive symptoms [17,32]. The same research group further found that syntactic complexity diminishes as the chronic patient's condition deteriorates [32].

None of our patients had dysarthria or paraphasic error.

Lack of semantic association was seen in 18.34% of our patients. Previously few researchers have mentioned semantic abnormalities in their patients [33,34]. Few researchers have found a pattern of relatively preserved syntax combined with more obviously impaired semantics, especially higher-order semantics [35].

As reported by various studies, abnormalities in semantic association are commonly proposed to be central to cognitive abnormalities in schizophrenia, with deficits reported on a wide

variety of semantic processing tasks [14,36].

### Course and progress of improvement of language dysfunction in our study

Most studies in the domains of evaluation of language dysfunction have hardly mentioned their course and progress over a period of time which is primarily because most of these studies were single time cross sectional assessments except a few like one by Andreasen and Grove in 1986, which evaluated 100 psychotic patients from four different subgroups over a period of 6 months. However, they failed to comment clearly on the degree of improvement in language dysfunction [8].

As evident from (Table 3) of our study, it can be observed that most of the CLANG scores showed improvement with treatment over 12 weeks. The improvement was more between 0 to 4 weeks for excessive phonetic association, abnormal syntax and excess syntactic constraints as well as lack of semantic association whereas referential failures, discourse failures, excess details and poverty of speech showed more improvement from week 4 to week 12. None of the patients showed any problems with dysarthria or paraphasic errors. Interestingly, neologisms, pragmatics disorder and excess syntactic constraints responded quite effectively and earlier compared to other domains.

As can be seen from (Table 4 and graph 1) of our study, progressive improvement of language abnormalities in our patients over 12 weeks after their natural course of treatment in our short term follow up study showed that referential failures (50%) and discourse failures (30%) followed by poverty of speech (25%), lack of details (21.67%) and abnormal prosody (18.33%). The distribution was found to be significant for referential failures (p value 0.0001), discourse failures (p value 0.002), lack of details (p value 0.0001) and poverty of speech (p value 0.003).

### Conclusion

We can proudly say that our study is one of the most thoughtful example of illustrating short term (12 weeks) observation and follow ups for natural course of language dysfunction subjected to psychopharmacological intervention without any comparative studies in literature.

Indeed so far, most of the literature included studies investigating language dimensions in English-speaking people with very few exceptions [20,37].

As reported by a review on studies on language and schizophrenia, there are inconsistencies found in and across the studies done in India that need to be addressed [12]. This makes our study all the more relevant in the sea of psychiatric research in the domain of language dysfunction in psychosis.

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