Original Research Article

Neurological soft signs in first episode psychotic disorder - A case control study

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Abstract

Introduction: Neurological signs, are traditionally classified into "Hard" and "Soft" signs. Soft signs are defined as minor, nonlocalizable, objective abnormalities that are thought to reflect damage in connections between subcortical and cortical areas or between cortical areas. In contrast, hard neurological signs can be linked to specific areas of neuroanatomical damage.
Aim: Aim of the study was to assess the prevalence of Neurological soft signs in patients with the first-episode psychotic disorder in comparison with control group.
Materials and methods: 30 patients with a diagnosis of first episode psychotic disorder and same age and sex matched 30 healthy individuals as the control group was selected for the study based on inclusion and exclusion criteria. Neurological soft signs (NSS) were assessed by the original version of Neurological evaluation scale (NES). Results were entered in a self-structured proforma. Psychiatric diagnoses were made by using ICD-10 criteria. Results were statistically analyzed.
Results: There was no significant difference in age, sex and years of education between two groups. On the presence of 2 signs, patient group had 96.7% of prevalence but control group had 56.7% of prevalence which was statistically significant.
Conclusion: This study is in conformation with other studies in reporting significantly higher NSS in first-episode psychotic patients than in controls, and adds substance to the claim that NSS could be a biological marker for schizophrenia and other psychotic disorders.

Key words

Neurological Soft Signs, Schizophrenia, NSS Scoring.

Introduction

In 1988, in their review, Heinrichs and Buchanan ascribes specific functional domains and argues against the notion that the soft signs are nonspecific, and have used the term 'Neurological Signs' throughout their review and named their scale also as a structured instrument for the assessment of "Neurological signs" in Schizophrenia which has 'signs' that are designated as 'soft' elsewhere in the literature [1]. The meaning of soft signs ranges from an ironical comment that "The use of the term 'soft signs' and minimal brain damage is diagnostic of soft thinking "by Ingram TTS to the suggestion that the presence of neurological soft signs may be indicative of being a "gene carrier" for psychosis [2]. The number of signs so far assessed in different studies ranges from 4-108 which may in part reflects the differences in categorization. Further, the availability of multiple structured instruments to assess neurological impairment-The woods scale, the condensed neurological examination (CNE), the modified quantified neurological scale, the Heidelberger scale, the Cambridge Neurological inventory, and the neurological evaluation scale may in part reflect the differences in measurement of these signs.Generally, the results of the assessment of hard signs are described dichotomously as normal or abnormal whereas assessment of soft signs are described in terms of degree of performance decrement rather than by presence or absence of abnormality. The prevalence rates of neurological signs in patients with schizophrenia range from 50 – 65% and 5% in healthy controls**.** The prevalence of neurological soft signs in first-episode psychotic disorder ranges from 20 – 97% and 5 – 50% in healthy controls. The variability in reported prevalence rates is attributed to differences in the definition of neurological impairment and differences in the scales used for assessment. They have been found to be associated with negative symptoms and poorer outcome. There had been no association found in relation to age, gender, and antipsychotic drug intake [3]. With the above findings and a replicated finding of lack of association between obstetric complications and NSS in patients, a possible genetic origin, and phenotypic representation is being attributed to neurological soft signs [4]. Further, it is suggested that neurological soft signs may represent a valid phenotype to be adopted as a biological marker for genetic research.

Materials and methods

This study was conducted at the Department of Psychiatry, Government Dharmapuri Medical College, Dharmapuri, Tamil Nadu. Cases were recruited from the outpatient department of psychiatry and controls were selected from medical wards. The study was conducted from July to September - 2017.The study group was selected from Psychiatry outpatient clinic. The first episode psychotic disorder was defined as patients attending to a psychiatry service with a psychotic episode without past history of any mental disorders. With the well-established view that there is no association between antipsychotic treatment and NSS, the patients on antipsychotics were also included in the study. Thus, patients newly attending the outpatient service during the study period and first episode patients on treatment were included in the study. Thirty patients and controls were selected with the following criteria.

Inclusion criteria

- First episode psychotic patients without past history any mental disorders.
- Age group 16 – 60 years.
- With aminimum requirement of primary education.

Exclusion criteria

- Psychotic patients with past history of any mental disorders.
- Psychotic disorders secondary to general medical condition / Neurological disorders.
- Psychotic disorders secondary to Alcohol / other substance use disorders.

- Psychotic states secondary to other mental disorders e.g. Mood disorders with psychotic symptoms.
- Patients with a history of significant head trauma.
- Psychotic disorders in the presence of subnormal intelligence.
- Uncooperative patients.

Control group

The control group was selected from accompanying persons of patients in the medical wards with following criteria.

Inclusion criteria

- Age group: 16-60 years.
- With a minimum requirement of primary education.

Exclusion criteria

- Individuals with past history of mental disorders.
- Individuals with family history of mental disorders.
- Individuals with a history of alcohol / other substance abuse.
- Individuals with Neurological disorders / general Medical conditions affecting CNS.
- Individuals with a history of head trauma in the recent past resulting in LOC / Amnesia.

Assessment Instruments

- Neurological evaluation scale with its requirements (cards for rhythm tapping and visual integration tests, objects for stereognosis).
- ICD-10 diagnostic criteria for diagnosing psychiatric disorders.
- Self-structured Proforma
- Self-structured anNSS scoring sheets I and II.

Neurological evaluation scale (NES)

The Neurological evaluation scale is a structured scale that presents scores in four subscales – sensory integration, motor coordination, sequencing of complex motor acts and 'others'. Apart from the tests for cerebral dominance, it has 26 discrete items, of which 14 are tested bilaterally. Each item is scored using anchored ratings of 0-normal, 1-mild, but definite impairment, 2-marked impairment except for the snout and suck reflexes which are scored as either 0 or 2. The motor coordination subscale includes tandem walk, rapid alternating movements, finger-thumb opposition, and the finger-nose test.In this study, the score of 2 was taken as positive for NSS.

NSS Scoring Sheet I: It contains individual items and its scorings as per NES. The scores of individuals are marked during the assessment.

NSS Scoring Sheet II: In this, individual items were arranged according to the subscales of NES. The positive scores (score-2) of individuals alone are marked with the individual items after assessment.

Procedures

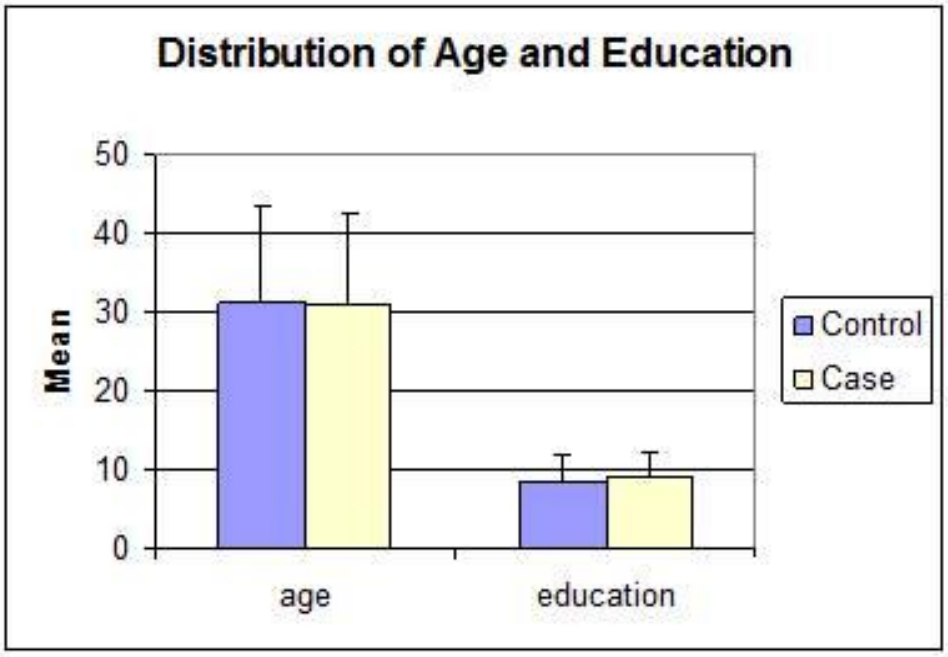
This study was approved by the ethical committee of our Institution. The nature and purpose of the study were explained to all participants and informed consent was obtained. New cases were diagnosed according to ICD 10 criteria. The diagnosis of on- treatment cases was confirmed by reviewing records with a cross-checking with patients and informants. The details of patients were entered in the self-structured Performa. Cards were produced with rhythms for rhythm tapping (A&B) and audio-visual integration tests. For the stereognosis test participants were asked to identify pen caps, coins, eraser, and a cellotape coil. Two items were identified in each hand. The administration of the NES tests took approximately 45 minutes to complete. The positivity of individuals for NSS entered in master chart and data analyzed. For continuous variability (age and years of education) descriptive statistics (mean and standard deviation) was used. For ascertaining the significance of intergroup variability chi-

square test was used. The analysis was made with SPSS software.

Results

The patient group had 19 males and 11 females. The patients had a mean age of 30.2 ± 11.5 years and mean years of education 9± 3.3 years. Out of thirty patients, 10 were drug- naïve patients, 20 were on antipsychotic medication. Most of the medicated patients were on tablets Haloperidol and Trihexyphenidyl. The duration of medication ranged from one to three months (**Graph – 1**).

Graph – 1: Demographic data of patients**.**



Graph – 2: Sex distribution among patients.

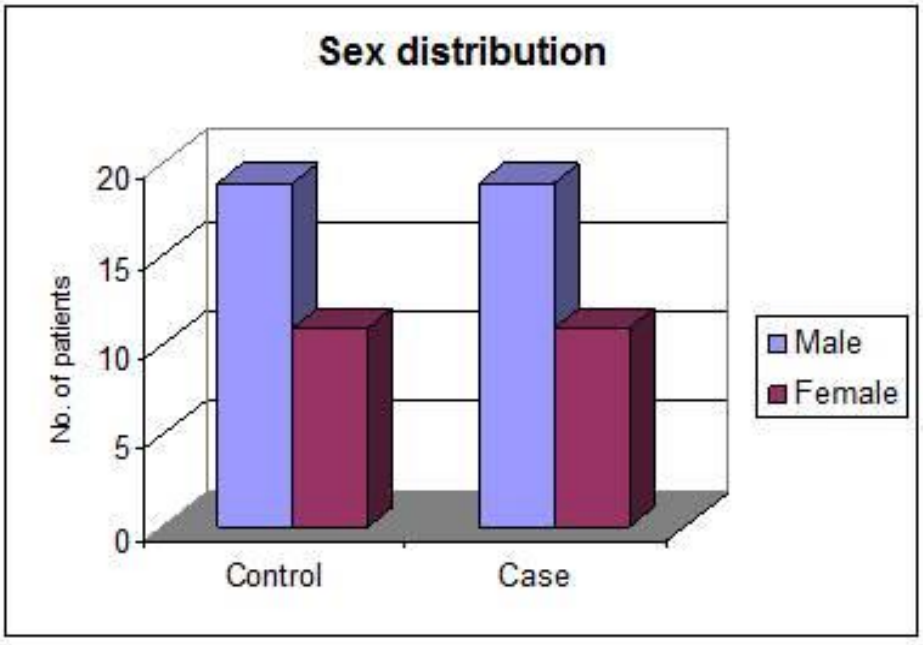


Table - 1: The number and percentage of the subjects with positive score (score 2) against individual items of NES.

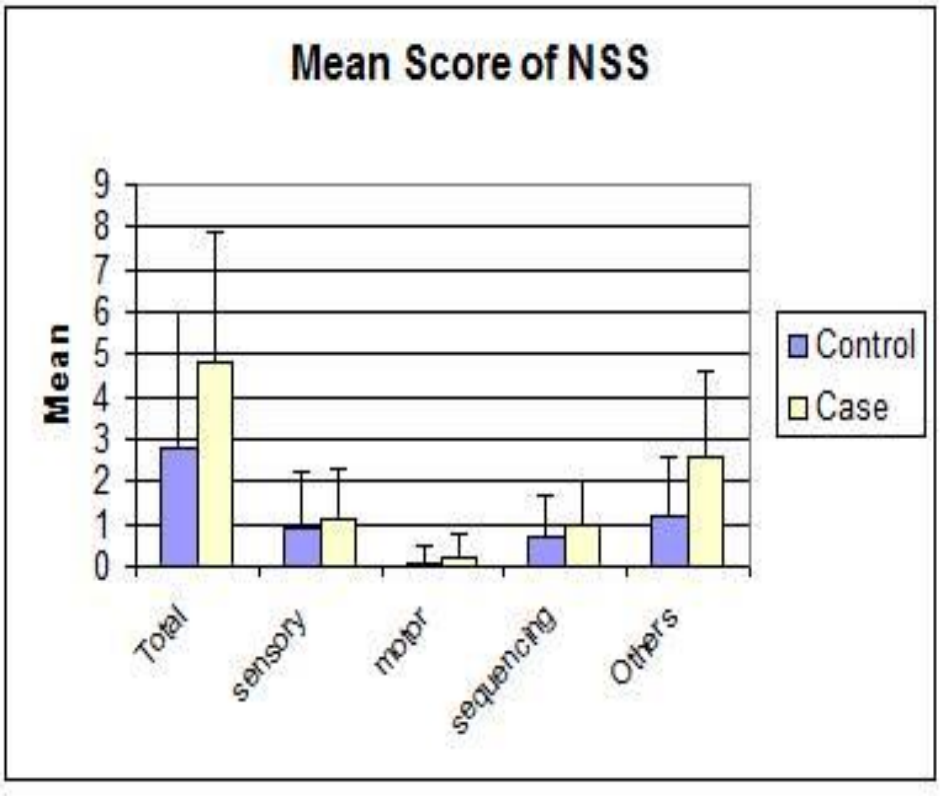
Item	Control (n = 30)		Case (n = 30)	
	N	%	N	%
Sensory integration				
Av integration	7	23.3	11	36.7
Rtsteregnosis	-	-	-	-
Lt stereognosis	-	-	-	-
Rtgraphaesthesia	11	36.7	10	33.3
Lt graphaesthesia	8	26.7	6	20.0
Extinction	0	0.0	1	3.3
Rl confusion	2	6.7	6	20.0
Motor coordination				
Tandemwalk	-	-	-	-
Rt rapid alternating movements	0	0.0	1	3.3
Lt rapid alternating movements	0	0.0	2	6.7
Rt finger thumb opposition	1	3.3	2	6.7
Lt finger thumb opposition	1	3.3	2	6.7
Rtfinger-nose test	-	-	-	-
Lt finger nose test	-	-	-	-
Sequencing of complex motor acts				
Rt fist ring test	1	3.3	0	0.0
Lt fist ring test	0	0.0	2	6.7
Rt fist edge palm	2	6.7	1	3.3
Lt fist edge palm	0	0.0	3	10.0
Ozeretski	9	30.0	15	50.0
Rhythm tapping B	8	26.7	8	26.7
Others				
Rt adventitious overflow	1	3.3	0	0.0
Lt adventitious overflow	0	0.0	2	6.7
Romberg	-	-	-	-
Rt tremor	-	-	-	-
Lt tremor	-	-	-	-
Memory 5mts	5	16.7	6	20.0
Memory 10mts	-	-	-	-
Rhythm tapping test A	9	30.0	11	36.7
Rt mirror movements	3	10.0	1	3.3
Lt mirror movents	2	6.7	2	6.7
Rtsynkinesis*	5	16.7	13	43.3
Lt synkinesis*	4	13.3	12	40.0
Rt convergence	0	0.0	2	6.7
Lt convergence	0	0.0	2	6.7
Rt gaze impersistence	2	6.7	3	10.0
Lt gaze impersistence	1	3.3	4	13.3
Glabellar reflex	1	3.3	4	13.3
Snout reflex	1	3.3	2	6.7

Rt grasp reflex	-	-	-	-
Lt grasp reflex	-	-	-	-
Suck reflex **	1	3.3	11	36.7
* p < 0.05, ** p < 0.01				

Table – 2: Total number of persons and percentage in each group in relation to number of positive signs.

NSS	Control		Case		p-value
	N	%	N	%	
1 & above*	19	63.3	29	96.7	< 0.05
2 & above*	17	56.7	29	96.7	< 0.05

Graph – 3: Comparison of total NES scores and subscale scores between groups.



The control group also had 19 males and 11 females. Their mean age was found to be 31.2 ± 12.3 years. Their mean years of education was 8.6± 3.5 years. Except for one control subject, who had left-handedness, all other subjects in both groups were right-handed individuals (**Graph – 2**).

Neurological soft signs

This table shows the number and percentage of the subjects with a positive score (score 2) against individual items of NES. Out of 41 items, only 3 were found to be statistically significant, which includes right and left synkinesis (P-value - < 0.05), suck reflex (P value<0.01). These three items were more common in the patient group. Ten items were not scored in both groups. They include right and left stereognosis, Tandem walk, right and left fingers nose test, Romberg, right and left tremor, right and left group reflex. These differences on individual items might be due to the small size of sample and the scoring method of positivity in this study (NES score 2).

There was a significant difference in 3 items – right and left synkinesis, suck reflex. These three items were more common in the patient group (**Table – 1**).

When assessed for the presence of one NSS 29 patients (96.7%) had NSS and 19 controls (63.3% had NSS).When assessed for the presence of two NSS the patient group displayed the same results and control group had a slight reduction (n-17, 56.7%).There was a significant difference (P<0.05) at both levels of assessment in which patient group exhibited more prevalence of NSS (96.7%) than thecontrol group (56.7 to 63.3%) (**Table – 2**).

The Total NES scores and 'others' subscale score was higher in cases than in controls.The two groups differed significantly in Total NES scores (P<0.016) and on other's subscale (P<0.003), with higher scores in the patient group (**Graph – 3**).

Discussion

This study assessed the NSS by the original version of Neurological Evaluation scale. The prevalence of NSS in patient group was found to be 96.7% at two levels of assessment. The prevalence of NSS in control group ranged from 56.7% to 63.3% between two levels of assessment. There was a significant difference in the prevalence of NSS at both levels of assessment with more prevalence in patient group. This finding is near similar to that of a study by Browne, et al. [5]. In that study, they have found the presence of at least one NSS (defined as one NES item rated 2) in 97.1% (N=34) patients and presence of two NSS (2 or more NES items rated 2) in 63% patients. There was no control group in this study. With the limitations of selection bias the findings in control group is also on par with the reported findings by Dazzan amd Murray [6]. Notably, the studies showing near similar results like this study- Browne, et al., Shibre, et al. – have used the original version of NES and have adopted the same scoring system in reporting, as of in this study. Those studies reporting dissimilar results Gupta et al, Flynt, et al., have used different scales and have adopted a different scoring method in contrast to this study [7, 8]. The total NES scores were similar to the results of Cigdem, et al., Lawrie, et al. [9, 10]. But they were lower than the results of Carr, et al., and Dazzan, et al. [11, 12]. The 'Others' subscale, the score is similar to the results of Cigdem, et al., and Lawrie, et al. [9, 10]. There was no significant difference in subscale like 'sensory integration, motor coordination, and sequencing of complex motor acts between groups. Bombin, et al. have mentioned that the subscale functional domains lack specificity due to the mixed results from different studies. However, Arango, et al.in their study on Neuropsychological performance by Neurological signs have reported that the 'Others' soft signs subscale was able to correctly classify a greater number of patients and controls to their true group than the other subscales from the NES [13]. Barkus, et al. have found a significant difference in Total NES scores and 'Others' soft signs subscale between high proneness (schizotypy) group and control group. They have not found a significant difference in sensory integration, motor coordination, sequencing of complex motor acts subscales. Upon their results, they have suggested that the other soft signs subscale may be particularly sensitive in identifying those with schizophrenia or a proneness to it.This study also falls in the line with the above-mentioned studies in subscale scores [4, 13].

Conclusion

This study is in conformation with other studies in reporting the presence of significantly higher NSS in patients with first episode psychotic disorder than in controls. Thus, it appears, reaching a consensus may 'soften' the researchers towards the 'hard' ending 'soft' signs. The size of the sample is small which limits the generalization of results. No screening instrument was used for control subjects which might have resulted in selection bias.This study adds substance to the claim that the soft signs

could be a biological marker for schizophrenia and other psychotic disorders.

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