Insight into Schizophrenia: A comparative study between patients and family members

Shyamanta Das*; **Dipesh Bhagabati**, Uddip Talukdar*****
*Department of Psychiatry, Silchar Medical College Hospital, Silchar, Assam, ** Department of Psychiatry, Gauhati Medical College Hospital, Assam,*** Department of Psychiatry, Himalayan Institute of Medical Sciences, Jolly-Grant, Dehradun, Uttaranchal,

ABSTRACT

Background: Despite the recognition of the role that sociocultural factors play in the process of acquiring insight, recent research on this issue is scare. Aim of the present study was to compare patients' insight with family members' insight.

Method: 50 patients with schizophrenia (International Statistical Classification of Diseases and Related Health Problems – Tenth Revision – ICD-10) undergoing treatment and members of their families were interviewed using the Schedule for Assessment of Insight (SAI). It was a cross-sectional study.

Results: Family members performed better than patients in the total and partial SAI scores [total: 11 to 6.7 (p < 0.0001); adherence: 3.84 to 2.7 (p < 0.0001); recognition of illness: 4.54 to 2.84 (p < 0.0001); relabeling of psychotic phenomena: 2.62 to 1.16 (p < 0.0001)]. However, when the scores were correlated for each patient-family member pair, the partial scores had positive correlations (adherence r = 0.07191; recognition of illness r = 0.1632; relabeling of psychotic phenomena r = 0.2052).

Conclusion: There was a positive correlation between the scores of family members and patients regarding adherence, recognition of illness and the ability to relabel psychotic phenomena as abnormal. This might be understood as a stronger influence of sociocultural factors in these dimensions. The fact that family members were not assessed for the presence of psychopathology is a limitation of this study.

Keywords: Schizophrenia. Awareness. Self concept. Family relations. Social environment.

INTRODUCTION

Insight is ability to understand the true cause and meaning of a situation (such as a set of symptoms). Impaired insight is diminished ability to understand the objective reality of a situation [1].

A lack of insight was the most prevalent symptom of schizophrenia found in two seminal international studies, the International Pilot Study of Schizophrenia (IPSS)[2] and the Classification of Chronic Hospitalized Schizophrenics (CCHS). In addition, lack of insight has been included among the 12 symptoms that have the highest power to discriminate schizophrenia from other psychoses and depression[3]. It has been shown that patients with better insight are more likely to present better adherence to treatment[4, 5]. Lack of insight has been correlated with worse outcome[6], more admissions[6], worse psychosocial functioning[7, 8], reduced success rates in outpatient treatment of relapses[9], and longer interval between the onset of symptoms and the seeking of treatment[10].

The relationship between insight and psychopathology is controversial. Some authors have proposed that insight

Correspondence:
Dr. Shyamanta Das
Department of Psychiatry,
Silchar Medical College Hospital, Silchar, Assam, India
E-Mail: drshyamantadas@gmail.com

is independent of psychopathology[11, 12] while others have found a negative correlation between insight and the general measures of psychopathology[13].

The concept of insight is much larger than just knowing whether one is ill or not, and if so, having a sensible view regarding treatment. It is a quality that has been highly valued by most mental health clinicians because a strong link is assumed between having insight and better quality of life[14]. Although, in psychiatry, we concentrate mostly upon the narrow meaning of insight with regard to mental illness, we need to retain this broader concept. Therefore attempts in defining and measuring insight are potentially of practical importance[15].

In recent years, sophisticated instruments for quantifying insight have been developed, in which different aspects of insight can be considered independently. Within each of these realms, insight is not an all-or-nothing phenomenon[16]. A conflict about the nature of psychiatric symptoms and disorders can arise between the interviewer and the patient. Also, insight has to be assessed against the background of knowledge of, and beliefs about, mental disorder; it is not the same as complete agreement with the views of the doctor [17].

The recent resurgence of interest in insight has had its share of criticism. Medical anthropologists have criticized the concept of insight for failing to recognize that people can have various culturally shaped frameworks to explain their illnesses, all possibly valid. From this point of view, the concept of insight is 'eurocentric and essentially arrogant' [18] as it dictates that patients should apart from agreeing that they are mentally ill and requiring treatment, also agree to re-construct their experiences within the terms and concepts of western psychiatry.

In recent years, there has been consensus that insight is a multi-faceted phenomenon. There is also recognition of the need to operationalize the concept for clinical practice and to devise scales to measure it. There are differences in the number of dimensions of insight being studied even among those not looking at the social and cultural aspects. The latter aspects have not received sufficient attention[15]. The scarcity of studies on the social and cultural influences on insight arises in spite of the large number of works on the role played by those factors in the onset, diagnosis, treatment and prognosis of schizophrenia[19, 20, 21].

According to Johnson and Orrell (1995)[22], psychotic patients disagree with their doctors as to their symptoms and illness not only because they are ill, but also because they have a different concept of their experience, which is molded by their sociocultural context. There are standardized ways of thought and action for reporting the experiencing of illness that are guided by the local culture. Patients use these standards, which may differ from the physicians' standards and from those of patients from different cultures. Cultural influences on the self-evaluation of mental illness are found when groups of psychotic patients from different cultures are studied and compared. In addition to the different conceptions of mental illness, there are other important sociocultural factors. White *et al.* (2000)[23] found a strong association between the size of the primary group (family and close friends) and insight. They stated, as also postulated by Breier and Strauss (1984)[24], that broader social contact exerts a normalizing function on the individual that leads to better insight.

Another sociocultural factor that could interfere in the evaluation of mental illness by patients could be stigma, which would be stronger in some specific cultures[22]. There is evidence that patients' denial of their illness could buffer the impact of the stigma on patients' self-appraisal[25].

Aim of the study

The objective of this study was to:

Compare patients' insight with family members' insight.

Methods

Sample: 50 patients and 50 respective family members were selected from those attending Psychiatry Department of a General Hospital.

The inclusion criteria were:

Patients –

1. Diagnosis of schizophrenia according to the criteria of the International Statistical Classification of Diseases and Related Health Problems, Tenth Revision (ICD – 10).

2. Only patients giving Informed Consent.

Family members –

1. Availability of family members to accompany the patients to the interview and for application of the scale. Family members (related by blood/ marriage) are key relatives having a relationship

of parent/ sibling/ spouse/ off-spring with the patient. Relatives are the primary caregivers identified as the family member who provides the most support and/ or assistance.

2. Only family members giving Informed Consent.

Patients who could not be interviewed because of mutism, negativism or psychomotor agitation were excluded.

Interview and Instrument

Demographic and clinical data were gathered and the diagnostic inclusion criteria were assessed according to the ICD – 10 criteria. The evaluation of insight was carried out using the Schedule for Assessment of Insight (SAI), for each participant (patient and family member) separately. The interviews were carried out over four months, between August, 2006, and November, 2006. Patients and family members were interviewed on the same days.

The Schedule for Assessment of Insight (SAI) in Psychosis was published in 1992[13] (David *et al.*), in which, apart from the recognition of mental illness and compliance with treatment, the ability to relabel unusual mental events as pathological was also included. The SAI comprises three subscales that measure distinct components of insight, namely adherence to treatment, recognition of illness and ability to relabel psychotic phenomena as abnormal. The sum of the scores of the subscales yields a total score of up to 14 points.

Five demographic variables were recorded for patients and family members: gender, age, marital status, religion and number of years of education. Seven clinical variables were recorded for patients only. These were presence, number and duration of previous hospitalizations, duration of illness, family history of schizophrenia, suicide attempts and age at onset of illness.

Student's t test, Welch t test and Mann Whitney U test were used to compare means between the two groups. The chi-squared test and two-way ANOVA were used to compare category variables, and correlations were performed using the Spearman correlation test.

Results

The demographic and clinical characteristics of the two groups are presented in Table 1.

It is evident from the table that there are significant differences between the demography of patients and family members, namely in the gender, age and marital status. Multivariate analysis was done to find the significance of these variations in the SAI scores. Two-way ANOVA was done in the categories of gender and age group. Marital status was not included for the test as it is dependent upon the age. From the marital status table we find that there are an increase number of married persons in the family member group and that group has

Table 1. Demographic and clinical characteristics of the sample of patients and family members				
Demographic characteristics	patients (n = 50)	family members (n = 50)	χ^2/tt test	p
Gender % (n)				
Male	44 (22)	66 (33)	4.040	0.0444
Female	56 (28)	34 (17)		
Age in years (95% CI)	34.4 (31.290 – 37.510)	42.34 (37.724 – 46.956)	2.558	0.0137
Marital status % (n)				
Single	44 (22)	26 (13)	9.085	0.0106
Married	48 (24)	74 (37)		
Widowed/Separated	8 (4)	-		
Religion % (n)				
Hindu	80 (40)	80 (40)	0.00	1.00
Islam	18 (9)	18 (9)		
Christian	2 (1)	2 (1)		
Years of education (95% CI)	9.26 (7.996 – 10.524)	8.68 (7.252 – 10.108)	0.6722	0.5046
Clinical characteristics				
Previous hospitalization % (n)	56 (28)			
Number of previous hospitalizations,‡ mean (95% CI)	1.89 (1.493 – 2.293)			
Time spent hospitalized over lifetime in weeks,‡ mean (95% CI)	6.35 (4.766 – 7.948)			
Duration of illness in years, mean (95% CI)	9.28 (7.328 – 11.232)			
Family history of schizophrenia % (n)	20 (10)			
Patients who attempted Suicide % (n)	26 (13)			
Age at onset of illness in years, mean (95% CI)	25.12 (22.171 – 28.069)			

‡ Refers to patients who had already been hospitalized; CI = confidence interval.

high age compared to the patients. From the ANOVA, it is concluded that a significant difference exists between patients and family members in the SAI scores but the interaction statistics shows that gender does not influence that difference. So, gender as a related factor for SAI score can be discarded according to the test. Age was another demographic variable that was found significantly varying between patients and family members and to test the influence of age on the SAI scores another ANOVA was performed. The age was divided into 7 equal groups and made into a category variable for ease of calculation.

This again shows that the interaction between age and SAI scores of patients and family members is non-significant and hence age does not influence the SAI scores.

Five patients had been admitted to the psychiatry ward and the other 45 were under outpatient treatment at the time of the interview.

The mean SAI score was 6.7 (95% CI: 5.897 to 7.503) for the patients and 11 (95% CI: 10.384 to 11.616) for the family members.

Family members performed better in the total and partial SAI scores, as shown in Table 2.

However, when the scores were correlated for each patient-family member pair, the partial scores had a positive correlation (Table 3), though the correlation coefficient was low.

Discussion

Family members scored significantly higher in all the components of the scale, namely adherence (3.84 versus 2.7), recognition of illness (4.54 versus 2.84) and relabeling of psychotic phenomena (2.62 versus 1.16) as well as in the overall score (11 versus 6.7) than patients. These differences were statistically

Table 2. Mean and 95% confidence interval of total and partial scores for the Schedule for Assessment of Insight in 50 patients with schizophrenia and 50 family members				
	Patients	Family members	t	p
Adherence (95% CI)	2.7 (2.354 – 3.046)	3.84 (3.684 – 3.996)	5.947	p < 0.0001
Recognition of illness (95% CI)	2.84 (2.325 – 3.355)	4.54 (4.209 – 4.871)	6.097	p < 0.0001
Relabeling of psychotic phenomena (95% CI)	1.16 (0.8649 – 1.455)	2.62 (2.276 – 2.964)	7.685	p < 0.0001
Total (95% CI)	6.7 (5.897 – 7.503)	11 (10.384 – 11.616)	9.402	p < 0.0001

Note: Maximum scores for adherence and relabeling of psychotic phenomena = 4, and for recognition of illness = 6. CI = confidence interval.

The desired position of the Table 2 is in Results section after the line "Family members performed better in the total and partial SAI scores, as shown in Table 2."

Table 3. Correlation of the components of insight between 50 patients with schizophrenia and 50 family members (Spearman Rho test)				
	Adherence (P)	Recognition of illness (P)	Relabeling of psychotic phenomena (P)	Total (P)
Adherence (F)	0.07191			
Recognition of illness (F)		0.1632		
Relabeling of psychotic phenomena (F)			0.2052	
Total (F)				0.1365

Note: (F) = family members, (P) = patients.

significant (p < 0.0001). This may be due to the influence of psychopathology.

In confirmation with findings of the present study, Sanz et al. (1998)[26] showed that there is an inverse correlation between insight, the severity of psychopathology and positive affective disturbance.

David et al. (1992)[13] found that the 'total insight score' in their study had a moderate inverse correlation with the Present State Examination[27] total score, which was an indication of the global severity of the illness.

In contrast to findings of the present study, McEvoy et al. (1989a)[28] reported that insight as measured by the Insight and Treatment Attitudes Questionnaire (ITAQ) did not correlate with either the severity of acute

psychopathology or the changes in psychopathology with treatment. They speculated whether the mechanisms underlying the production of positive symptoms and disturbed insight were independent and whether the latter was more resistant to the effective use of neuroleptic medication.

The present study also exhibited positive correlation between the scores of family members and patients in adherence to treatment (r = 0.07191), recognition of illness (r = 0.1632) and ability to relabel psychotic phenomena as abnormal (r = 0.2052). Although these correlations were not statistically significant (adherence, p = 0.6197; recognition of illness, p = 0.2576 and relabeling of psychotic phenomena, p = 0.1529). The positive correlation can possibly be understood as the effect of stronger influence of cultural factors on these components of insight.

According to Kirmayer and Corin (1998)[29], the individual's capacity for self-knowledge stems mainly from social processes, involving the observation of others and the acquisition of ways to describe oneself that are specific to the culture that the individual comes from. Therefore, insight is not a mere act of the patient's self-perception that he or she is ill, but rather a construction that depends on the sociocultural context.

Johnson and Orrell (1995)[22] stated that different dimensions of insight are influenced in different ways by psychosocial factors. The ability to relabel psychotic phenomena as abnormal is influenced more by psychopathological factors than by sociocultural ones. Recognition of illness is the variable most affected by the latter factors. This has also been suggested by Gigante and Castel (2004)[30].

Both David et al. (1992)[13] and McEvoy et al. (1989c) [31] found that, as a group, involuntary (that is compulsorily admitted) patients have less insight.

Moreover, compliance with prescribed treatment is a much more complex phenomenon affected by social factors and beliefs about health and sickness[32].

David et al. (1992)[13] found that treatment compliance was not strongly related to the ability to recognize one's own delusions and hallucinations and to relabel them as abnormal.

It is interesting that patients may comply with treatment; even though they do not believe themselves to be ill, if the social milieu is conducive[31, 33]. Startup (1996)[34] suggested that a relationship between cognitive deficits and insight might only exist among some subpopulations of patients and that there might be stronger influence of psychological and sociocultural factors among those whose cognitive functions but not insight are preserved.

Anthony S. David, Professor of Cognitive Neuropsychiatry, Institute of Psychiatry, King's College, London, working on insight with colleagues at the Christian Medical College and Hospital, Vellore, consider the cultural factor is very interesting. What is regarded as a symptom of an illness isn't simply a matter of biology and physiology. There are cultural and social aspects to it as well. This is true especially of psychiatric disorders. They feel that the biomedical explanation is not the only explanation and are currently trying to understand a more diverse culture gives people a more flexible approach to understanding illness. Some people argue that lack of "insight" is not a brain disorder. It is simply a sensible approach, given the stigma attached to mental disorders. They wonder why anyone would want to admit that they have such a problem. They would only be shunned. Maybe if the person explains the hallucinations, mystical or religious beliefs, and so on, rather than label it a medical condition, some of the stigma would be avoided and self-esteem preserved, and yet there is awareness that something is different. It may be easier for them to accept help. So, David and colleagues are looking at the cultural as well as biological aspects.

Limitations

Family members were not assessed for personality traits and neuropsychological deficits that could have influenced their ability to recognize schizophrenia symptoms among their relatives. With regard to the possibility of generalizing the results of this study, there was a selection bias, considering that the sample was recruited within a clinical setting. Demographic and clinical characteristics may influence study findings.

Conclusion

Since patients and members of their families share the same cultural environment, the significant difference

regarding their insight can possibly be better explained by disease factors. Different degrees of insight, namely adherence to treatment, recognition of illness and ability to relabel psychotic phenomena as abnormal, seem to be strongly influenced by sociocultural factors.

REFERENCES

1. Sadock BJ and Sadock VA (2003) Signs and Symptoms in Psychiatry. In:Synopsis of Psychiatry. Lippincott Williams & Wilkins, Philadelphia.
2. World Health Organization (1973) Report of the International Pilot Study of Schizophrenia. Geneva: World Health Organization.
3. Carpenter WT, Strauss JS, Bartko JJ (1973) Flexible system for the diagnosis of schizophrenia: report from the WHO International Pilot Study of Schizophrenia. Science 182, 1275-8.
4. Buchanan A (1992) A two-year prospective study of treatment compliance in patients with schizophrenia. Psychological Medicine 22, 787-97.
5. Cuffel BJ, Alford J, Fischer EP, Owen RR (1996) Awareness of illness in schizophrenia and outpatient treatment adherence. Journal of Nervous and Mental Disease 184, 653-9.
6. Amador XF, Strauss DH, Yale S, Flaum MM, Endicott J, Gorman JM (1993) Assessment of insight in psychosis. American Journal of Psychiatry 150, 873-9.
7. Amador XF, Flaum M, Andreasen NC, et al. (1994) Awareness of illness in schizophrenia and schizoaffective and mood disorders. Archives of General Psychiatry 51, 826-36.
8. Lysaker PH, Bell MD, Bryson GJ, Kaplan E (1998) Insight and interpersonal function in schizophrenia. Journal of Nervous and Mental Disease 186, 432-6.
9. Heinrichs DW, Cohen BP, Carpenter WT (1985) Early insight and the management of schizophrenic decompensation. Journal of Nervous and Mental Disease 173, 133-8.
10. Drake RJ, Haley CJ, Akhtar S, Lewis SW (2000) Causes and consequences of duration of untreated psychosis in schizophrenia. British Journal of Psychiatry 177, 511-5.
11. McEvoy JP, Freter S, Merritt M, Apperson LJ (1993) Insight about psychosis among outpatients with schizophrenia. Hosp Community Psychiatry 44, 883-4.
12. Cuesta MJ, Peralta V (1994) Lack of insight in schizophrenia. Schizophrenia Bulletin 20, 359-66.
13. David AS, Buchanan A, Reed A and Almeida O (1992) The assessment of insight in psychosis. British Journal of Psychiatry 161, 599-602.
14. McGorry PD and McConville SB (1999) Insight in psychosis: an elusive target. Comprehensive Psychiatry 40, 131-42.
15. Sims A (2003) Insight. Symptoms in the Mind. Saunders: An Imprint of Elsevier. Philadelphia, Pennsylvania.
16. Kirkpatrick B and Tek C (2005) Schizophrenia: Clinical Features and Psychopathology Concepts. In: Comprehensive Textbook of Psychiatry. Lippincott Williams & Wilkins, Philadelphia Bebbington PE (1995) The context of compliance. International Clinical Psychopharmacology 9 (Suppl. 5), 45-50.
17. Gelder M, Mayou R and Cowen P (2001) Signs and symptoms of mental disorder. In: Shorter Oxford Textbook of Psychiatry, pp.26-27. New Delhi: Oxford University Press
18. Perkins, R. & Moodley, P. (1993) The arrogance of insight? Psychiatric Bulletin, 17, 233-234.
19. Fabrega H (1989) On the significance of an anthropological approach to schizophrenia. Psychiatry 52, 45-65.
20. Salokangas RK (1997) Living situation, social network and outcome in schizophrenia: a five-year prospective follow-up study. Acta Psychiatrica Scandinavica 96, 459-68.
21. Redko C (1998) Cultura, esquizofrenia e experiencia. In: Shirakawa I, Chaves AC, Mari JJ, editors. O desafio da esquizofrenia. Sao Paulo: Lemos Editorial.
22. Johnson S and Orrell M (1995) Insight and psychosis: a social perspective. Psychological Medicine 25, 515-20.
23. White R, Bebbington P, Pearson J, Johnson S, Ellis D (2000) The social context of insight in schizophrenia. Soc Psychiatry Psychiatr Epidemiol 35, 500-7.
24. Breier A, Strauss JS (1984) The role of social relationships in the recovery from psychotic disorders. American Journal of Psychiatry 141, 949-55.
25. Lai YM, Hong CP, Chee CY (2001) Stigma of mental illness. Singapore Medical Journal 42, 111-4.
26. Sanz M, Constable G, Lopez-Ibor I, Kemp R and David AS (1998) A comparative study of insight scales and their relationship to psychopathological and clinical variables. Psychological Medicine 28, 437-46.
27. Wing JK, Cooper JE and Sartorius N (1974) Measurement and Classification of Psychiatric Symptoms. Cambridge: Cambridge University Press.
28. McEvoy JP, Apperson LJ, Appelbaum PS (1989a) Insight in schizophrenia: its relationship to acute psychopathology. Journal of Nervous and Mental Disease 177, 43-7.
29. Kirmayer LJ and Corin E (1998) Inside knowledge – cultural construction of insight in psychosis. In: Amador XF and David AS, editors. Insight and Psychosis. New York: Oxford University Press.
30. Gigante AD and Castel S (2004) Insight into schizophrenia: a comparative study between patients and family members. Sao Paulo Medical Journal 122, 146-51.
31. McEvoy JP, Applebaum PS, Apperson LJ (1989c) Why must some schizophrenic patients be involuntarily committed? The role of insight. Comprehensive Psychiatry 30, 13-17.
32. Bebbington PE (1995) The context of compliance. International Clinical Psychopharmacology 9 (Suppl. 5), 45-50.
33. McEvoy JP, Freter S, Everett G (1989b) Insight and the clinical outcome in schizophrenia. Journal of Nervous and Mental Disease 177, 48-51.
34. Startup M (1996) Insight and cognitive deficits in schizophrenia: evidence for a curvilinear relationship. Psychological Medicine 26, 1277-81.

Appendices
SCHEDULE FOR ASSESSMENT OF INSIGHT (SAI)*

1a. Does patient accept (includes passive acceptance) treatment (medication and/or admission and/or other physical and psychological therapies)?
Often = 2 (may rarely question need for treatment)
Sometimes = 1 (may occasionally question need for treatment)
Never = 0 (ask why)
If 1 or 2, proceed to 1b.

1b. Does patient ask for treatment unprompted?
Often = 2 (excludes inappropriate requests for medication, etc)
Sometimes = 1 (rate here if forgetfulness/disorganization leads to occasional requests only)
Never = 0 (accepts treatment after prompting)

2a. Ask patient: "Do you think you have an illness?" or "Do you think there is something wrong with you?" (mental, physical, unspecified)
Often = 2 (thought present most of the day, most days)
Sometimes = 1 (thought present occasionally)
Never = 0 (ask why doctors/others think he/she does)
If 1 or 2, proceed to 2b.

2b. Ask patient: "Do you think you have a mental/psychiatric illness?"
Often = 2 (thought present most of the day, most days)
Sometimes = 1 (thought present occasionally, minimum once per day)
Never = 0
If 1 or 2, proceed to 2c.

2c. Ask patient: "How do you explain your illness?"
Reasonable account given based on plausible mechanisms (appropriate given patient's social, cultural, and educational background, eg, excess stress, chemical imbalance, family history, etc) = 2
Confused account given, repetition of overheard explanation without

adequate understanding or "don't know" = 1
Delusional explanation = 0

3a. Ask patient: "Do you think the belief that…. (insert specific delusion) is not really true/happening ?" or "Do you think that ….. (insert specific hallucination) is not really true/happening ?"
Often = 2 (thought present most of the day, most days)
Sometimes = 1 (thought present occasionally, minimum once per day)
Never = 0
If 1 or 2 present, proceed to 3b.

3b. Ask patient: "How do you explain these phenomena (the belief that …. hearing that voice/seeing that image, etc) ?"
Part of my illness = 2
Reaction to outside event/s (eg, tiredness, stress, etc) = 1
Attributed to outside forces (may be delusional) = 0
Maximum score = 14.

*Sajatovic, M. & Ramirez, L.F. (2003) Rating Scales in Mental Health, pp. 222-223. Hudson: Lexi-Comp.

STATISTICS

The study population consisted of 50 patients of psychosis and 50 of their relatives. In those 50 pairs of patients and their respective relatives the distribution of various demographic factors are depicted in the following table.

	Patient	Relative	Remarks	
Gender				
Male	22	33	Fisher's test P=0.04	
Female	28	17		
Marital status				
H	2	2	Chi-statistic = 9.279	
M	22	35	Df =3	
S	22	13	P = 0.0258	
W	4	0		
Religion				
Christian	1	1	Comparison not done as both groups had equal numbers.	
Hindu	38	38		
Islam	9	9		
M	2	2		
Age (mean years)				
	34.4 (+10.93)	42.34 (+16.23)	Welch's apprx. t = 2.87 df = 85 P = 0.0052	Welch t test was performed as the SEMs were significantly different between the groups.
Edu (mean years)				
	9.26 (+4.44)	8.68 (+5.02)	Mann Whitney U Statistic = 1198.5 U` = 1301.5 P = 0.725	

Comparison between patient and family members group in the subscales and total scores of SAI. Mean of SAI scores were compared by non-parametric test for mean difference. The groups failed normality test and Mann Whitney U test was done to compare the groups. The table shows significant differences between the scores among patient and their relatives in all subscales and also in the total score. Significance level were very high for all the tests (p<0.0001).

Two-way ANOVA table for Patient-Family member and Gender variables. Treatment group is Patient-Family member and Blocks are gender					
	Sum of Squares	df	Mean Square	F	P-value
Patient-Family member (P-F)	423.18	1	423.18	65.61	<0.0001
Gender	1.34	1	1.34	0.21	0.6491
P-F * Gender	0.02	1	0.02	0.00	0.9572
Error	619.15	96	6.45		
Total	1043.69	99			

SAI scores (Adherence subscale)				
	2.7 (+1.22)	3.84 (+0.59)	MU statistic = 596.0 U`= 1904.04 P < 0.0001	Mann Whitney U statistic was performed as the groups failed normality test.
SAI scores (Recognition subscale)				
	2.84 (+1.81)	4.54 (+1.16)	MU statistic = 517.00 U`= 1983.0 P < 0.0001	-do
SAI scores (Relabelling subscale)				
	1.16 (+1.04)	2.62 (+1.21)	MU statistic = 596.0 U`= 1904.04 P < 0.0001	-do-
SAI Total Scores				
	6.7 (+2.82)	11 (+2.17)	MU statistic = 272.50 U`= 2227.5 P < 0.0001	-do-

From the ANOVA table it is concluded that a significant difference exists between the Patient and Family members in the SAI scores but the Interaction statistics shows that Gender does not influence that difference. So, gender as a related factor for SAI score can be discarded according to the test.

Age was another demographic variable that was found significantly varying between the patient and family members and to test the influence of age on the SAI scores another ANOVA was performed. The age was divided into 7 equal groups and made into a category variable for ease of calculation

It is evident from the first table that there are significant differences between the demography of patients and family members, namely in the gender, age and marital status. Multivariate analysis was done to find the significance of these variations in the SAI scores. Two-way ANOVA was done in the categories of gender and age-group. Marital status was not included for the test as it is dependent upon the age. From the Marital status table we find that there is an increase number of married persons in the family member group and that group has high age compared to the patients. The following table

Two-way ANOVA table for Patient-Family member and Gender variables. Treatment group is Patient-Family member and Blocks are gender					
	Sum of Squares	df	Mean Square	F	P-value
Patient-Family member (P-F)	368.97	1	368.97	60.24	<0.0001
Age	47.10	6	7.84	1.28	0.2742
P-F * Age group	44.54	6	7.42	1.21	0.3080
Error	526.73	86	6.12		
Total	937.34	99			

This table again shows that the interaction between age and SAI scores of patient and family members is non-significant and hence age do not influence the SAI scores.

The following table states the correlation of the subscales of SAI to each other and also each other between patient and family members.

Correlations: Spearman's rho
Correlations

		PT_ADH	PT_RECOG	PT_RELAB	PT_TOTAL	FM_ADH	FM_RECOG	FM_RELAB	FM_TOTAL
PT_ADH	Correlation Coefficient	1.000	.111	.199	.544	.072	.135	-.071	-.004
	Sig. (2-tailed)	.	.444	.165	.000	.620	.350	.623	.980
	N	50	50	50	50	50	50	50	50
PT_RECOG	Correlation Coefficient	.111	1.000	.318	.807	-.031	.163	.099	.098
	Sig. (2-tailed)	.444	.	.025	.000	.832	.258	.495	.497
	N	50	50	50	50	50	50	50	50
PT_RELAB	Correlation Coefficient	.199	.318	1.000	.649	.115	.145	.205	.244
	Sig. (2-tailed)	.165	.025	.	.000	.426	.316	.153	.088
	N	50	50	50	50	50	50	50	50
PT_TOTAL	Correlation Coefficient	.544	.807	.649	1.000	.021	.189	.111	.136
	Sig. (2-tailed)	.000	.000	.000	.	.888	.190	.441	.345
	N	50	50	50	50	50	50	50	50
FM_ADH	Correlation Coefficient	.072	-.031	.115	.021	1.000	.151	.109	.371
	Sig. (2-tailed)	.620	.832	.426	.888	.	.295	.452	.008
	N	50	50	50	50	50	50	50	50
FM_RECOG	Correlation Coefficient	.135	.163	.145	.189	.151	1.000	.403	.634
	Sig. (2-tailed)	.350	.258	.316	.190	.295	.	.004	.000
	N	50	50	50	50	50	50	50	50
FM_RELAB	Correlation Coefficient	-.071	.099	.205	.111	.109	.403	1.000	.903
	Sig. (2-tailed)	.623	.495	.153	.441	.452	.004	.	.000
	N	50	50	50	50	50	50	50	50
FM_TOTAL	Correlation Coefficient	-.004	.098	.244	.136	.371	.634	.903	1.000
	Sig. (2-tailed)	.980	.497	.088	.345	.008	.000	.000	.
	N	50	50	50	50	50	50	50	50

** Correlation is significant at the .01 level (2-tailed).
* Correlation is significant at the .05 level (2-tailed).

From the correlation table we can see that none of the scores of SAI and its subscales of patients haves any correlation with the same of family members (the blue shaded part of the table). However, there is significant correlation of One Subscale score to another and also to the total score in both patient and family member groups.

SAI subscales scores adherence was similarly subjected to ANOVA test keeping Gender and Age-group as the dependent variables. In both the ANOVA test the difference in the score was significant in patient and family members, but that was not for the gender. The interaction between the variables was found insignificant.

Two-way ANOVA table for Patient-Family member and Gender variables for **Adherence Subscale**. Treatment group is Patient-Family member and Blocks are gender

	Sum of Squares	df	Mean Square	F	P-value
Patient-Family member (P-F)	28.15	1	28.15	31.35	<0.0001
Gender	1.01	1	1.01	1.12	0.2921
P-F * Gender	0.00	1	0.00	0.00	0.9841
Error	86.21	96	0.90		
Total	115.37	99			

Two-way ANOVA table for Patient-Family member and Gender variables for **Adherence Subscale**. Treatment group is Patient-Family member and Blocks are age groups

	Sum of Squares	df	Mean Square	F	P-value
Patient-Family member (P-F)	24.64	1	24.64	29.47	<0.0001
Age	7.85	6	1.31	1.56	0.1675
P-F * Age group	6.96	6	1.16	1.39	0.2292
Error	71.90	86	0.84		
Total	111.34	99			

Two-way ANOVA table for Patient-Family member and Gender variables for **Recognition Subscale**. Treatment group is Patient-Family member and Blocks are gender

	Sum of Squares	df	Mean Square	F	P-value
Patient-Family member (P-F)	64.82	1	64.82	27.61	<0.0001
Gender	1.31	1	1.31	0.56	0.4571
P-F * Gender	0.40	1	0.40	0.17	0.6798
Error	225.36	96			
Total	291.88	99			

Two-way ANOVA table for Patient-Family member and Gender variables for **Recognition Subscale**. Treatment group is Patient-Family member and Blocks are age groups

	Sum of Squares	df	Mean Square	F	P-value
Patient-Family member (P-F)	64.58	1	64.58	29.02	<0.0001
Age	16.14	6	2.69	1.21	0.3098
P-F * Age group	20.16	6	3.36	1.51	0.1846
Error	191.41	86	2.23		
Total	292.28	99			

Two-way ANOVA table for Patient-Family member and Gender variables for **Relabelling** Subscale. Treatment group is Patient-Family member and Blocks are gender

	Sum of Squares	df	Mean Square	F	P-value
Patient-Family member (P-F)	52.05	1	52.05	40.68	<0.0001
Gender	0.98	1	0.98	0.76	0.3844
P-F * Gender	0.62	1	0.62	0.49	0.4868
Error	122.86	96			
Total	176.47	99			

Two-way ANOVA table for Patient-Family member and Gender variables for **Relabeling** Subscale. Treatment group is Patient-Family member and Blocks are age groups

	Sum of Squares	df	Mean Square	F	P-value
Patient-Family member (P-F)	38.55	1	38.55	28.29	<0.0001
Age	3.20	6	0.53	0.39	0.8830
P-F * Age group	4.46	6	0.74	0.54	0.7726
Error	117.18	86			
Total	163.38	99			