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Relationship between Alexithymia, Depression and the Negative Symptoms in Schizophrenia with and without Deficit Syndrome

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SUMMARY

Objective: The aim of this study was to compare schizophrenia patients with and without Deficit Syndrome (DS) with respect to alexithymia, depression and negative symptoms and to investigate the relationship between these variables.

Method: A total of 210 schizophrenia patients who joined the study were grouped on the basis of the Schedule for the Deficit Syndrome (SDS). Each patient was evaluated using the Positive and Negative Syndrome Scale (PANSS), the Calgary Depression Scale for Schizophrenia (CDSS), the Toronto Alexithymia Scale (TAS) and the UKU - Side Effect Rating Scale (UKU-SERS).

Results: The DS group had higher alexithymia scores that were not related to the negative symptoms. The prevalence of depression was significantly lower in the same group. Positive symptoms in the DS group were negatively correlated with the two TAS subscales of difficulty describing and identifying feelings. The negative symptoms scores of all the patients with and without DS correlated positively with the mean score on the TAS subscales. The severity of depressive and the negative symptoms predicted alexithymic symptoms.

Conclusion: Lack of a correlation between the negative symptoms and alexithymic symptoms in DS suggested that the respective symptoms represented different independent phenomena in schizophrenia. A future study might explore the relationship between alexithymia and negative symptoms in association with cognitive functioning.

Keywords: Schizophrenia, deficit syndrome, depression, alexithymia

INTRODUCTION

Schizophrenia is a severe psychiatric disorder that starts early, lasts a lifetime and results in serious problems in the quality of life and functionality (Kaplan and Saddock 2004, Soygür and Erkoç 2007). Given its inception, course and clinical presentations, schizophrenia is no longer viewed as a homogeneous disease. The heterogeneity of its symptoms have been widely accepted (Tiryaki et al. 2009, Kimhy et al. 2006, Ahmed et al. 2018, Dickinson et al. 2017). Demonstration of subtypes of schizophrenia with differing symptom clusters has facilitated the understanding of the disease (Soygür and Erkoç 2007, Dickinson et al. 2017). A prime example is the grouping of the positive and negative symptoms. Negative symptoms are presented by affect flattening, poor cognition, lack of interest and motivation, apathy, social isolation and lack of attention. Positive symptoms, on the other hand, include odd feelings, delusions, hallucinations and confused thoughts (Tiryaki et al. 2009). There has not been a change in the definition of the negative and positive symptoms until now.

The distinction of positive and negative symptoms with the same name was done by Andreasen et al. (1990), while Tim Crow (1985) used the terms Type 1 and Type 2. Carpenter et

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al. (1994) proposed the term Deficit Syndrome (DS) for the primary and persistent symptoms, which they argued would aid the understanding of the psychopathologies specific to schizophrenia. Presence of the primary and the persistent negative symptoms is referred to as the Deficit Syndrome (DS) and the disorder without the DS is argued to be a different disorder (Mucci et al. 2017).

Diagnosis of DS in patients with the primary and persistent negative symptoms has served to reduce the heterogeneity of schizophrenia. Global predominance of the negative symptoms has put emphasis on the importance of these symptoms (Rabinowitz et al. 2012). It has been argued that the negative symptoms, as compared to the positive symptoms, have more damaging effects on the quality of life and functionality (Barabassy et al. 2018).

It is known that the negative and cognitive symptoms of schizophrenia cannot be satisfactorily treated with the currently available antipsychotic agents (Barabassy et al. 2018). Even during clinical remission, the negative symptoms in DS persist and do not improve with medication (Mucci et al. 2017). Fusar-Poli et al. (2015) have shown that new antipsychotics, despite some positive effects, fail to pass the clinical threshold for significant improvement of the symptoms. Aleman et al. (2017) have reviewed the recent developments in DS treatment. They have claimed that antipsychotics have limited effect on the negative symptoms and that electromagnetic neurostimulation may have positive effects. It was found in studies on the relationship between the negative symptoms and cognitive functionality that there is cognitive decline in DS (Yu et al. 2015, Fervaha et al. 2016, Bora et al. 2017).

Alexithymia, meaning inability to express feelings, is a concept contributed to psychiatry by Sifneos (1973). Although initially observed in psychosomatic diseases, it was later found to be comorbid with different psychiatric illnesses (Şaşıoğlu et al. 2013). Alexithymia is seen in schizophrenia and is usually associated with a severe course of the disorder (Ospina et al. 2019). Alexithymia is purported to have two dimensions related to cognition and affect; the cognitive dimension being associated with difficulties in defining, expressing and interpreting feelings while the affect dimension reflects the deficits in emotional stimulation and power of imagination.

Investigation on the relationship of alexithymia, somatization and negative affect demonstrated that the cognition related type II alexithymia was a stronger predictor of somatic symptoms than the both affect and cognition related type I alexithymia (Bailey and Henry 2007). It also has been claimed that alexithymia is correlated with the negative symptoms and is a risk factor for developing psychosis (van der Velde et al. 2015). Investigation of the relationship between alexithymia and cognitive functions in schizophrenia has shown that alexithymic symptoms are related to the difficulties in cognitive functioning and alogia (Henry et al. 2010). Another study reported that whereas difficulty in defining feelings and externally oriented thinking was related to neurocognitive decline, alexithymia did not correlate with the positive or negative symptoms (Fogley et al. 2014).

In this study it has been aimed to compare sociodemographic characteristics, positive and negative symptoms, depressive symptoms, medication side effects and alexithymia in schizophrenia patients with and without DS. The relationship between alexithymia, depressive symptoms and negative symptoms were also investigated. We assumed that the relationship of the alexithymic symptoms with the depressive and the negative symptoms will facilitate the understanding of DS in schizophrenia.

METHOD

Participants

This study was conducted in the Schizophrenia Polyclinic of the Erenköy Psychiatric and Neurological Diseases Training and Research Hospital between February and July of 2011. A total of 240 patients between the ages of 18 and 65 consecutively consulting the polyclinics and diagnosed with schizophrenia on the SCID-I for DSM-IV criteria were admitted to the study after a minimally1-year regular follow up and volunteering to participate. The exclusion criteria consisted of head trauma resulting in the loss of consciousness, any neurological or general disease that could affect the mental condition, mental retardation and psychoactive agent dependence or abuse in the past three months.

Participant Evaluation

All participating patients and their relations were informed about the study and the volunteers who signed the informed consent form were included in the study. The sociodemographic and the clinical evaluation forms including the Positive and Negative Syndrome Scale (PANSS), the Calgary Depression Scale for Schizophrenia (CDSS), the Toronto Alexithymia Scale (TAS) and the UKU (Udvalg for Klinikse Undersogelser) - Side Effect Rating Scale (UKU-SERS) were completed during the one-to-one interview with the patient in the presence of the family member. The patients were divided into groups with and without DS on the basis of scoring on the Schedule for Deficit Syndrome, and information received from the family members on whether the negative symptoms were primary and persistent. Although starting with 240 patients, the study evaluated the

data on 210 patients as 20 patients failed to complete the follow up procedure and 10 did not accord with the study causing lack of trust in the information provided.

Data Acquisition

The Sociodemographic Form

This semi-structured interview schedule was used to assess sociodemographic information including age, gender, education level, marital status, the place of habitation (city, town or village), employment status, social security status, history of tobacco smoking and clinical/medical history on ECT (Electroconvulsive Therapy) treatment, previous hospitalization, duration of illness, therapies and additional drug use.

The Schedule for Deficit Syndrome

The schedule was developed by Kirkpatrick et al. (1993) to diagnose DS in schizophrenia patients. The reliability and validity study of the Turkish language version was done by Çıtak et al. (2006). The four different criteria that have to be met for the diagnosis of DS on the schedule are: (1) A diagnosis of schizophrenia is required. (2) For every negative symptom a score between 0 and 4 is assigned. Çıtak et al. (2006) have defined those symptoms as "restricted affect, diminished emotional range, poverty of speech, curbing of interest, diminished sense of purpose, diminished social drive". For a DS diagnosis the patient needs to score 2 or higher on 2 out 6 symptoms. (3) The negative symptoms have to be primary and not symptoms secondary to anxiety, drug side effects, psychotic symptoms and depression. (4) The negative symptoms have to be persistent.

While collecting data for the schedule, interviews should be conducted with both the patient and patient's family member. During the interviews questions about psychopathology should be asked together with the questions about the patient's employment history and social functionality (Kirkpatrick et al. 1993).

The Positive and Negative Syndrome Scale (PANSS)

The PANSS developed by Kay et al. (1987) is a semi-structured interview scale consisting of 30 items with a seven-point severity scale, including 7 items for the positive symptoms, 7 items for the negative symptoms and 16 items for general psychopathology. The reliability and validity study of the Turkish language version was determined by Kostakoğlu et al. (1999).

The Calgary Depression Scale for Schizophrenia (CDSS)

The CDSS was developed by Addington et al. (1994). This scale is easy to use and is completed by the interviewer. The reliability and validity study for the Turkish language version was carried out by Aydemir et al. (2000) that has nine Likert type scale items each with four possible answers. The items relate to the symptoms of depressive mood, hopelessness, self-depreciation, guilty ideas of reference, pathological guilt, morning depression, waking up early, suicide and observed depression (Aydemir et al. 2002).

The UKU - Side Effect Rating Scale (UKU - SERS)

The UKU-SERS was developed by Lingjaerde et al. (1987) to measure the clinical side effects of psychotropic drugs taken for treatment at predetermined doses. It consists of four subscales that measure psychological, neurological, autonomic and other side effects. Each one of the 48 items can be marked in four different ways between 0 for no effect and 3 for severe side effect.

The Toronto Alexithymia Scale (TAS)

This self-report Likert-type scale, developed by Bagby et al. (1994a, b) consists of 20 items, each evaluated with a score of 1 to 5, the possible answers being "never", "rarely", "sometimes", "often" and "always". Out of the 20 items, those numbered 4, 5, 10, 18 and 19 are asked in reverse. A high score shows high level of alexithymia. The TAS-A items 1, 3, 6, 7, 9, 13 and 14 constitute the subscale on difficulty identifying feelings; the TAS-B items 2, 4, 11, 12, 17 constitute the subscale on the difficulty of expressing feelings; and the TAS-C items 5, 8, 10, 15, 16, 18, 19 and 20 constitute the subscale that measures externally oriented thinking. The reliability and validity study of the Turkish language version by Güleç et al. (2009) reported a cut-off threshold score of 61.

Statistical Analysis

The data was statistically evaluated using the software package Statistical Package for the Social Sciences - 16 (SPSS-16). The Student t-test was used for numerical variables, while the chi-square test and the Fisher's Exact Test were used for categorical variables. All tests were two-tailed and a p value of <0.05 was accepted for statistical significance.

RESULTS

The Participants

Among the 210 patients who completed the study 23.8% (n=50) were diagnosed with DS and 76.2% (n=160) were without DS. The groups with and without DS did not differ significantly with respect to gender (χ^2=1.75, p=0.187) (Table 1a) and the mean age in years (t=-0.354, p=0.724) (Table 1b).

Table 1a. Sociodemographic Characteristics of Schizophrenia Patients with and without DS

		With D (n=50)	Without DS (n=160)	χ^2	p
Gender	Female	24 (48.0%)	60 (37.5%)	-1.75	0.187
Marital Status	Single	39 (78.0%)	90 (56.3%)	3.51	0.034
	Married	4 (8.0%)	42 (26.3%)		
	Widowed-separated	7 (14.0%)	28 (17.5%)		
Employment Status	Unemployed-on disability	49 (98.0%)	118 (73.8%)		0.000*
	Working-student	1 (2.0%)	42 (26.3%)		
Social Support	None	11 (22.0%)	34 (21.3%)	0.013	0.910
Birth Season	Winter	8 (16.0%)	46 (28.8%)	29.342	0.000
	Spring	12 (24.0%)	43 (26.9%)		
	Summer	20 (40.0%)	29 (18.1%)		
	Autumn	10 (20.0%)	42 (26.3%)		
Economic status	Good	3 (6.0%)	30 (18.8%)	6.266	0.044
	Middle	19 (38.0%)	66 (41.3%)		
	Poor	28 (56.0%)	64 (40.0%)		

*Fisher's Exact Test. DS: Deficit Syndrome. p<0.05 level of significance

Table 1b. Sociodemographic Characteristics of Schizophrenia with and without DS

	With DS Mean±SD*	Without DS Mean±SD*	t	p
Age	37.1±11.46	37.66±9.09	-0.354	0.724
Years of Education	6.24±2.86	8.93±3.64	-5.410	0.000

*: standard deviation, t: Student's t test, DS: Deficit Syndrome, p<0.05 level of significance

The two groups differed significantly on the basis of marital status (χ^2=3.51, p=0.034) with the percentage of married patients being higher in the group without DS (Table 1a).

The two groups differed when compared on professional functionality, with the percentage of those working in the group without DS being significantly higher (Fisher's Exact Test; p=0.000) (Table 1a).

When the season of birth was looked at the group with DS had a significantly higher percentage of individuals born in the summer months (χ^2=29.342, p=0.000) (Table 1a).

The economic status of the group with DS was found to be significantly lower than that of the group without DS (χ^2=6.266, p=0.044) (Table 1a).

When the years spent at school were compared the group with DS was found to have significantly shorter duration of education (t=-5.410, p=0.000) (Table 1b).

Comparison of the Clinical Variables

When the groups with and without DS were compared with regard to the number of legal issues, the group with DS was found to have significantly fewer issues (Fisher's Exact Test, p=0.013) (Table 2a).

Significantly higher rate of suicide attempts was found in the patient group without DS (χ^2=8.26, p=0.004) (Table 2a).

When the mean disease onset ages of the two groups were compared the group with DS had a significantly younger age at disease onset (t=-4.70, p=0.000) (Table 2b).

There was not a significant difference between the side effects experienced by the two groups (χ^2=3.26, p=0.07) (Table 3).

Depression severity was determined on the CDSS and the patients were divided into two groups on the basis of the cut-off score. Comorbid depression symptoms were detected in 8% (n=4) of the group with DS and in 33.1% (n=53) of the group without DS, indicating a significantly higher prevalence of depression in this group (Fisher's Exact Test, p = 0.000) (Table 3).

Alexithymia levels were evaluated using the TAS and the patients were separated into two groups on the basis of the cut-off score. Alexithymic symptoms were detected in 64% (n=32) of the group without DS, which was significantly higher than 36.3% (n=58) of those with DS (χ^2=11.979, p=0.000) (Table 3).

Table 2a. Comparison of Clinical Characteristics of Schizophrenia Patients with and without DS

		With DS (n=50)	Without DS (n=160)	χ^2	p
Legal problems	Yes	1 (2.0%)	24 (15.0%)		0.013*
Suicide attempts	Yes	10 (20.0%)	68 (42.5%)	8.26	0.004
Cigarette use	Yes	22 (44.0%)	132 (82.5%)	28.875	0.000
Alcohol use	Yes	2 (4.0%)	49 (30.6%)		0.000*
History of drug abuse	Yes	0 (0.0%)	1 (0.6%)		0.580*
ECT history	Yes	13 (26.0%)	62 (39.2%)	2.888	0.090
Antipsychotic use	Typical	9 (18.0%)	32 (20.0%)		
	Atypical	37 (74.0%)	68 (42.5%)		0.000
	Combined	4 (8.0%)	60 (37.5%)		

*Fisher's Exact Test, ECT: Electroconvulsive therapy, DS: Deficit Syndrome, p<0.05 level of significance

Table 2b. Comparison of Clinical Characteristics of Schizophrenia Patients with and without DS

	With DS Mean±SD*	Without DS Mean±SD*	t	p
Age of onset	20.42±3.64	23.66±4.42	-4.705	0.000
Disease duration	16.08±9.12	13.73±7.04	1.677	0.100
Number of hospitalizations	3.64±3.46	4.19±3.60	-0.953	0.340

*: standard deviation, DS: Deficit Syndrome, t: Student's t test, p<0.05 level of significance

The positive and negative symptoms were evaluated using the PANSS. The group with DS had significantly higher mean total PANSS score (t=2.252, p=0.002) (Table 4).

While the mean total positive symptoms scores of the two groups did not differ significantly (t=-1.388, p=0.16) the mean total score on the negative symptoms was significantly elevated in the group with DS (t=17.607, p=0.000) (Table 4).

The group with DS had significantly lower depression score (t= -6.371, p=0.000) and significantly higher TAS total (t=3.905, p=0.03), TAS-B (difficulty expressing feelings) (t=3.459, p=0.01) and TAS-C (externally oriented thinking) (t=3.080, p=0.03) subscale scores (Table 4).

Correlation Analyses

Correlations between the PANSS scores and the alexithymia related scores of the group with DS were analysed (Table 5). The PANSS-Positive symptoms score correlated positively with the CDSS score (r=0.600) and negatively with the TAS-A (difficulty identifying feelings- r=-0.283) and the TAS-B (difficulty expressing feelings- r=-0.320) subscale scores. The PANSS general psychopathology score correlated positively with the CDSS (r=0.393) and negatively with the TAS-B (difficulty expressing feelings) subscale scores (r=-0.341) (Table 5).

The corresponding data on all schizophrenia patients with and without DS were analyzed (Table 6). The PANSS negative symptoms score correlated negatively with the CDSS score (r=-0.205) and positively with the alexithymia related scores on the TAS-A, TAS-B, TAS-C subscales and the total score on the TAS (r=0.356, r=0.347, r=0.198 and r=0.377, respectively).

The PANSS positive symptoms score correlated positively with the CDSS score (r=0.163). The PANSS general psychopathology score correlated positively with the CDSS score (r=0.143) and with the TAS-A, TAS-B subscale scores and the TAS total score (r=0.215, r=0.202 and r=0.218,

Table 3. Comparison of Schizophrenia Patients with and without DS with Regard to Severity of Drug Side Effects, Depression and Alexithymia

		With DS n(50)	Without DS n(160)	χ^2	p
Drug Side Effect	None or Lite	35 (70.0%)	89 (54.7%)	3.26	0.070
	Mid-Distinct	15 (30.0%)	51 (44.4%)		
Depression	Yes	4 (8.0%)	53 (33.1%)		0.000*
Alexithymia	Yes	32 (64.0%)	58 (36.3%)	11.979	0.000

*Fisher's Exact Test, DS: Deficit Syndrome, p<0.05 level of significance

Table 4. Comparison of Clinical Scale Scores for Schizophrenia with and without Deficit Syndrome

Clinical Scales	With DS (n=50)	Without DS (n=160)	t	p
	Mean±SD*	Mean±SD*		
PANSS total	67.42±5.74	64.34±13.94	2.252	0.020
PANSS positive	10.92±1.56	12.31±4.29	-1.388	0.160
PANSS negative	22.86±2.18	15.24±3.85	17.607	0.000
PANSS general psychopathology	36.44±2.92	35.49±7.85	1.279	0.200
CDSS	2.80±3.92	7.14±5.01	-6.371	0.000
TAS-Total	60.02±7.06	55.16±9.42	3.905	0.000
TAS-A	19.26±4.25	17.16±4.77	2.785	0.060
TAS-B	16.80±2.64	15.23±3.29	3.459	0.010
TAS-C	24.14±2.28	22.88±3.23	3.080	0.030

*: standard deviation, PANSS: Positive and Negative Syndrome Scale, TAS: Toronto Alexithymia Scale, TAS-A: difficulty identifying feelings, TAS-B: difficulty expressing feelings, TAS-C: externally oriented thinking, DS: Deficit Syndrome, CDSS: Calgary Depression Scale for Schizophrenia

Table 5. Correlations between the CDSS, the PANSS Negative, Positive, General Psychopathology and Total Scores, and the TAS Total and TAS-A/B/C Subscale Scores of the Schizophrenia Patients with DS

		PANSS negative	PANSS positive	PANSS general psychopathology	PANSS total	CDSS	TAS-A	TAS-B	TAS-C	TAS Total
PANSS negative	r	1	-0.225	0.267	0.398**	0.209	0.165	0.027	0.008	0.110
	p		0.116	0.061	0.004	0.145	0.251	0.852	0.955	0.445
PANSS positive	r	-0.225	1	0.250	0.083	0.600**	-0.283*	-0.320*	0.049	-0.214
	p	0.116		0.080	0.565	0.000	0.047	0.023	0.735	0.135
PANSS general psychopathology	r	0.267	0.250	1	0.593**	0.393**	-0.278	-0.341*	0.135	0.195
	p	0.061	0.080		0.000	0.005	0.050	0.015	0.350	0.175
PANSS total	r	0.398**	0.083	0.593**	1	0.176	-0.003	-0.019	0.264	0.115
	p	0.004	0.565	0.000		0.222	0.984	0.898	0.064	0.426
CDSS	r	0.209	0.600**	0.393**	0.176	1	-0.232	-0.146	-0.234	-0.013
	p	0.145	0.000	0.005	0.222		0.105	0.313	0.103	0.928

PANSS: Positive and Negative Syndrome Scale, TAS: Toronto Alexithymia Scale, TAS-A: difficulty identifying feelings, TAS-B: difficulty expressing feelings, TAS-C: externally oriented thinking, CDSS: Calgary Depression Scale for Schizophrenia
** 0.01 level of significance, * 0.05 level of significance

Table 6. Correlations between the CDSS, the PANSS Negative, Positive, General Psychopathology and Total Scores, and the TAS Total and TAS-A/B/C Subscale Scores of the Schizophrenia Patients with and without DS

		PANSS negative	PANSS positive	PANSS general psychopathology	PANSS total	CDSS	TAS-A	TAS-B	TAS-C	TAS Total
PANSS negative	r	1	-0.071	0.520**	0.608**	-0.205**	0.356**	0.347**	0.198**	0.377**
	p		0.307	0.000	0.000	0.003	0.000	0.000	0.004	0.000
PANSS positive	r	-0.071	1	0.605**	0.643**	0.163*	-0.040	-0.008	-0.096	-0.049
	p	0.307		0.000	0.000	0.018	0.562	0.905	0.166	0.483
PANSS general psychopathology	r	0.520**	0.605**	1	0.939**	0.143*	0.215**	0.202**	0.093	0.218**
	p	0.000	0.000		0.000	0.038	0.002	0.003	0.179	0.001
PANSS total	r	0.608**	0.643**	0.939**	1	0.063	0.243**	0.247**	0.109	0.259**
	p	0.000	0.000	0.000		0.360	0.000	0.000	0.115	0.000
CDSS	r	-0.205**	0.163*	0.143*	0.063	1	0.133	0.099	0.149*	0.165*
	p	0.003	0.018	0.038	0.360		0.055	0.154	0.031	0.017

PANSS: Positive and Negative Syndrome Scale, TAS: Toronto Alexithymia Scale, TAS-A: difficulty identifying feelings, TAS-B: difficulty expressing feelings, TAS-C: externally oriented thinking, CDSS: Calgary Depression Scale for Schizophrenia
** 0.01 level of significance, * 0.05 level of significance

Table 7. Alexithymia Predictors in Schizophrenia as Determined by Logistic Regression Analysis

	B	Standard error	Wald	p	Exp (B)
PANSS positive	-0.138	0.079	3.103	0.078	0.871
PANSS negative	0.145	0.072	4.015	0.045	1.156
PANSS general	-0.103	0.073	1.985	0.159	0.902
PANSS total	0.089	0.058	2.395	0.122	1.093
Calgary	0.183	0.036	25.333	0.000	1.201
Constant	-4.396	1.030	18.210	0.000	0.012

Beta: regression coefficient, Constant: constant, B: constant, p<0.05 level of significance,
PANSS: Positive and Negative Syndrome Scale

respectively). The PANSS total score was positively correlated with TAS-A, TAS-B subscale and TAS total scores (r=0.243, r=0.247 and r=0.259, respectively). The CDSS score was also found to be positively correlated with the TAS-C subscale and the TAS total scores (r=0.149 and r=0.165, respectively) (Table 6).

Regression Analysis

When the TAS was used as the dependent variable for the presence and absence of alexithymia, as determined by the TAS total score and the cut-off value, the PANSS negative, positive and the general psychopathology scores, and the CDSS score constituted the independent variables for the logistic regression analyses the results of which indicated the PANSS negative symptoms score and the CDSS score as the predictors of alexithymia (Table 7).

DISCUSSION

This study investigated the relationship between the DS in schizophrenia patients and the relevant multiple clinical parameters. It was aimed to compare schizophrenia patients with and without DS on grounds of sociodemographic details, the positive and negative symptoms and symptoms related to alexithymia and to investigate the relationship between the negative symptoms and the depressive symptoms with alexithymia.

Among the 210 participating schizophrenia patients the prevalence of DS was 23.8% appearing to be in agreement with the results of others. In a long-term study by Fenton and McGlashan (1994), the prevalence of DS reached 25% among schizophrenia patients with repeated hospital admissions.

In our study the groups with and without DS did not differ significantly on the basis of gender. Although the effect of gender on DS is not clear more of the previous studies have observed a higher prevalence of DS among male patients (Beck et al. 2011, Mucci et al. 2017, Barabassy et al. 2018). Although not statistically significant in our study 52% of the patients with DS were males supporting the reports in the literature. Mete et al. (2015) have reported results similar to ours. The relationship between DS and gender has been argued to be weak (Tiryaki et al. 2009). However, a higher percentage of male patients (M/F= 1.75) were noted among patients with DS in a meta-analysis by Roy et al. (2001). Some other studies also report on male dominance in DS (Fenton and McGlashan 1994, Buchanan et al. 1994, Bustillo et al.1997, Buchanan et al. 1997, Tiryaki et al. 2003).

Since schizophrenia has a chronic course after an early onset age most patients are known not to have continued with their education (Nasrallah and Smeltzer 2003). In this study the mean of the years of education among the patients with DS was found to be significantly lower as compared to those without DS which is in agreement with the studies by others (Harris et al. 1991, Fenton and McGlashan 1994, Bustillo et al. 1997). Xiang et al. (2010) reported a correlation between low education level and the low scores on the Wisconsin Card Sorting Test and negative symptoms scores.

We found that the prevalence of unmarried patients was higher among those with DS. Previous studies have reported a lower prevalence of marriage among patients with schizophrenia as compared to the general population. It is generally accepted that schizophrenia mostly presents between the ages of 15-35 years coinciding with early adulthood and thus preventing marriage of the patients (Nasrallah and Smeltzer 2003, Köroğlu and Güleç 2007). As the age of disease onset was lower in the group with DS it can be assumed that the participants of our study could have been ill before the age of marriage. Fenton and McGlashan (1994) found in a longitudinal study that very few of the schizophrenia patients with DS had married before disease onset explaining the low prevalence of marriage among these patients although this has also been attributed to the low functionality that these individuals had before the onset of schizophrenia (Galderisi et al. 2002). Negative symptoms of schizophrenia are present even in the prodromal phase (Larson et al. 2010), which makes it less likely for the individuals to get married. Presence of the negative symptoms has been claimed to be a predictor for interpersonal problems that also can be related to the low marriage prevalence (Milev et al. 2005, Patel et al. 2015).

Our results show that a lower percentage of the group with DS were employed in comparison to the patients without DS. This finding agrees with those of others indicating that once the primary negative symptoms emerge and persist employment as well as professional functionality is adversely

affected (Fenton and McGlashan 1994, Rabinowitz et al. 2013).

Our study shows that more patients with DS were born in summer months which was also reported by many other studies (Barabassy et al. 2018, Kirkpatrick et al. 1998, Messias and Kirkpatrick 2001, Mete et al. 2015). There is need for comprehensive epidemiological studies to identify biological factors that may affect the summer births similarly to the viral infections implicated in the problematic births during the winter and spring months.

Our results have shown a higher prevalence of suicide attempts among patients without DS. Suicide prevalence of 1.5% versus 8% were reported in patients with and without DS respectively (Fenton et al.1997). This can be explained by the lower depression rates in the patients with DS. A previous study by Fenton and McGlashan (1994) did not find a history of suicide attempts among patients with DS.

The prevalence of depression in schizophrenia has been reported to be around 40%. While reaching 60% at acute psychosis attacks the moderate depression in chronic schizophrenia is found to be about 20% after treatment of a psychotic attack and it is 50% after treatment of the first attack episode (Upthegrove et al. 2017). In a study on the negative symptoms and depression it was concluded that the depressive mood, pessimism and suicidal ideation were related to depression, while limited affect and alogia were associated with the negative symptoms; and anhedonia, anergia and avolition were related to both the negative and the depressive symptoms (Krynicki et al. 2018). Comparison of schizophrenia patients with and without DS has shown that those with DS had lower rates of depressive mood, and lower anxiety and guilt (Tek et al. 2001). Suicides in schizophrenia were found more related to depression than the auditory hallucinations giving the instruction (Upthegrove et al. 2017). The 2-year follow up study by Kirkpatrick et al. (1994) has shown lower rates of depression and less severe depressive symptoms in patients with DS, which were independent of age, ethnicity, gender or socioeconomic status. In agreement with the literature, we found depression rate to be 33% in patients without DS. By using the dimensional differentiation of the negative and depressive symptoms as suggested by some studies, more detailed investigation of these symptoms can be done in patients with DS.

Our study found that the prevalence of alexithymia in patients with DS was significantly higher than in patients without DS, reflected in the TAS-B and the TAS-C subscale scores. Nkam et al. (1997a, b) also found higher prevalence of alexithymia in schizophrenia with DS and suggested a possible relevance to the negative symptoms. However, our study did not find a relationship between the negative symptoms and alexithymia in the group with DS suggesting that the negative symptoms and alexithymia are separate phenomena. While there are two separate studies in the literature that could not find a relationship between alexithymia and DS (Fogley et al. 2014, Todarello et al. 2005) there is also a study that has reported positive correlation (van't Wout et al. 2007). It has been argued that the difficulty in identifying feelings and externally oriented thinking in alexithymia are related to neurocognitive deficits, while the difficulty in expressing feelings arises from increased emotional difficulties and stress (Fogley et al. 2014). It has also been claimed that there is a problem with the cognitive dimension of alexithymia in schizophrenia and that this is related with the subthreshold depressive and anxiety symptoms (van der Velde et al. 2015).

Alexithymic symptoms are observed more frequently in schizophrenia patients than in healthy individuals and have been related to cognitive functionality and alogia (Henry et al. 2010). Investigation of the alexithymic symptoms separately in relation to the negative symptoms and cognitive functions may yield further useful information.

Our study found that when all of the schizophrenia patients are considered (with and without DS) PANSS negative symptom scores correlate with alexithymia scores. However, when only the group with DS is taken into consideration alexithymia correlates with PANSS positive symptom scores. Todarello et al. (2005) did not find any relationship between alexithymia and the PANSS general psychopathology score, the positive symptoms score and the depression score. Nkam et al. (1997a) found that alexithymia is a trait characteristic in patients with DS compared to those without DS. Their study had 25 patients (12 deficit and 13 non-deficit), where 10 out of 12 patients with DS had alexithymia. Alexithymia in patients without DS was concluded to be a state related to many symptoms like limited affect, limited speech, depressive symptoms and anxiety. van't Wout (2007) suggested that negative symptoms are related only to the difficulty in identifying feelings in alexithymia. Gaweda and Krezolek (2019) found alexithymia to be related to the severity of the hallucinations in paranoid schizophrenia, and attributed this effect to different cognitive mechanisms causing delusions and hallucinations. The severity of psychotic symptoms during the course of the illness were found to be related to the severity of alexithymic symptoms. Alexithmia symptoms were also found to be related to delusions by Maggini and Raballo (2004a). The abilities of paranoid schizophrenia patients to recognize and express feelings were found to be inadequate in comparison to healthy controls (Cedro et al. 2001). Alexithymic symptoms were found to be related to positive symptoms in our study. Alexithymic symptoms of

anhedonia and avolition have been found to be related to the adjustment of interpersonal distance (Maggini and Raballo 2004). Negative symptoms of schizophrenia were believed to differentiate as limitation of expressions and avolition (Bucci and Galderisi 2017). Investigation of these two dimensions of the negative symptoms with relation to alexithymia may be undertaken in future studies.

In our study the positive symptoms and general psychopathology in patients with DS were found to be related to depressive symptoms. In schizophrenia with and without DS, depressive symptoms negatively correlated with the negative symptoms, positively correlated with general psychopathology and the positive symptoms; and were also found to be related to alexithymia. Many studies have found alexithymia and depressive symptoms to be related (Van der Meer et al. 2009, Parker et al. 1991, Honkalampi et al. 2000). Alexithymia is known to increase predisposition to depression (Tolmunen et al. 2011). Bamonti et al. (2010) found that alexithymia total score, when demographic characteristics and cognitive functioning were controlled, was independently related to depressive symptom severity. It was found in the same study that the scores on TAS subscales of difficulty in identifying and expressing feelings were independently related to depression scores.

CONCLUSION

We found in schizophrenia patients with DS that the prevalence of depression was significantly lower and the prevalence of alexithymia was significantly higher as compared to the patients without DS; and that the TAS based alexithymia scores were independent of the negative symptoms scores.

In a future study, if the same patients could be followed up, they could be checked to see whether alexithymic characteristics persist or not. It could be useful to check and see how different alexithymia dimensions relate to positive and negative symptoms. It is important to check alexithymia's cognitive and affect dimensions separately. It could be helpful to consider the alexithymic characteristics and negative symptomatology together with the cognitive functioning when looking for a relation. The depressive symptoms should be followed so that they could be controlled against causing temporary alexithymic symptoms. On the basis of the findings by Brewer et al. (2016) that alexithymia encompasses all feelings such as hunger, touch, stimulation, feeling heat and fatigue, it could be explored how these different feelings are processed by schizophrenia patients. The relationship between alexithymia and DS can be studied more comprehensively in further research. Investigation of the alexithymia and neurocognition link would not only enable understanding the causative mechanisms of alexithymia but also facilitate the studies on alleviating alexithymic symptoms. Psychometric tools that evaluate alexithymia are self-report scales that express the views of the patient with regard to externally oriented thinking, identifying and expressing feelings. Given the opinion that alexithymia is better evaluated by clinical interviews (Meganck et al. 2011), planning on future studies to include clinical interviews should improve the quality of the results.

Being single centered and lacking long term follow up can be regarded as the limitations of our study.

Understanding the relationship between alexithymia and the clinical symptoms can be useful for more effective treatment of the patients. Future studies should be focused on the alterable risk factors for the difficulties in identifying and expressing feelings.

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