Obsessive compulsive symptoms in schizophrenia

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Background
Obsessive compulsive symptoms (OCS) and obsessive compulsive disorder (OCD) have been identified frequently in patients with schizophrenia. In most reported studies, those schizophrenic patients with OCS show worse global functioning than those without OCS.
Aim
The aim of this study was to assess the prevalence of OCSs in schizophrenic patients to evaluate their impact on global functioning, with assessment of relation of whole-blood serotonin with presence of OCS.
Patients and methods
The study included 50 cases with ICD-10 diagnosis of schizophrenia and 50 healthy volunteers as the control group. Both groups were assessed for OCSs using the Yale-Brown obsessive compulsive scale. The Global Assessment of Functioning Scale was also used to evaluate global functioning of the schizophrenic patients. The whole-blood serotonin level was measured for our study groups as well.
Results
Thirty-one (62%) patients had OCS, whereas 21 (42%) controls had OCS. Eight (16%) patients versus only two (4%) controls met the ICD-10 diagnosis for OCD. There was no difference between patients with OCS versus patients without OCS on the Global Assessment of Functioning scale, whereas there was high statistical difference between patients with OCD versus patients without OCD as regards the Global Assessment of Functioning scale. The highest whole-blood serotonin level was recorded in the control group, followed by that among schizophrenic patients without OCS and then schizophrenic patients with OCS, whereas the lowest level was recorded in schizophrenic patients with OCD.
Conclusion
OCS and OCD are more common and more severe in schizophrenic patients than in general population. The global functioning is worse in the schizophrenic patients with OCD than in those patients without OCD. Moreover, serotonin dysfunction may be involved in various mental disorder- related OCS.

Keywords:
obsessive compulsive disorder, obsessive compulsive symptoms, schizophrenia

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Introduction

Schizophrenia is a debilitating psychiatric condition that significantly interferes with functional capacity. In addition to the primary diagnosis, psychiatric comorbidities are frequently seen, with one of the most common being obsessive compulsive symptoms (OCSs) [1]. They were first recognized early in the 20th century by Jahreiss in 1926 and by Rosen in 1957. Recent studies have reported widely varying rates of comorbid OCS in schizophrenic patients [2].

In a recent review of studies, a new formulation emerged with specific diagnostic criteria for a distinct clinical subgroup of schizophrenia – namely, 'schizo-obsessive' psychotic disorder [3]. Indeed, it has been suggested that this subtype of schizophrenia is with a distinct pathophysiology, treatment response, and clinical course [2].

There is still a debate as to whether this comorbid group represents a more severely ill population whose symptoms are caused by common neurodevelopmental predisposing factors, or whether the two conditions instead reflect a more complex syndrome that may constitute a distinct diagnostic entity. Regardless of which of these two perspectives are correct, the presence of concomitant OCSs has been linked to poorer prognosis on a range of diagnostic indicators [1].

At present, interest in the relation between serotonin and schizophrenia has been revived due to the development of serotonin-blocking agents that appear to exert therapeutic effects in schizophrenia. A hypothesis of cortical–subcortical imbalance with a subcortical 5-HT functional increase responsible for positive symptoms and a prefrontal 5-HT functional decrease responsible for negative symptoms has been proposed [4]. Findings from numerous studies demonstrated that different types of 5-HT dysfunction might be partly dependent on whether psychotic symptoms accompany OCS and suggest that schizophrenia with OCS is likely to be a specific schizophrenia subtype [5].

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Patients and methods

This cross-sectional case–control study enrolled 50 schizophrenic patients in Benha Psychiatric Hospital, which is located in Benha, the capital of governorate of Qalyubia, during the period from March 2015 to September 2015, and 50 healthy volunteers.

Patients

The case sample of the study consists of a significant number (50) patients fulfilling the inclusion and exclusion criteria.

Inclusion criteria

(1) Patients fulfilling ICD-10 diagnostic criteria of schizophrenia.
(2) Patients between 21 and 50 years of age.
(3) Patients of both sexes.
(4) Patients who provided written consent according to the ethical committee to participate in the study were included in the study.

Exclusion criteria

(1) Patients in acute psychotic episode.
(2) Patients who refused to sign the consent form.
(3) Patients whose psychiatric symptoms were attributable to the physiological effects of substance (e.g. a drug abuse, a medication) or another medical condition were excluded from the study.

Controls

Fifty healthy volunteers were included as a control group. They were matched with the patient group for age, sex, and educational level, with no past history of psychiatric disorders.

Methods

Cases and controls were subjected to the following:

(1) Semistructured interview for clinical psychiatric assessment, with full history and mental state examination conducted separately and privately for each participant by two consultants for diagnosis of schizophrenia with assessment of the presence of OCS and obsessive compulsive disorder (OCD).
(2) The Yale-Brown obsessive compulsive scale (YBOCS): The Arabic version of the YBOCS was used in this study to detect OCSs and its severity [6].
(3) The Global Assessment of Functioning (GAF) scale [7].
(4) Measurement of the whole-blood serotonin level in both the patient and control groups [5].

Results

One hundred participants were included in the study, 50 schizophrenic patients and 50 volunteers as the control group. Demographic features and clinical characteristics are presented in Table 1.

The patient and control groups were matched for age, sex, and educational level. A highly significant statistical difference was reported between the patient and control groups as regards marital and occupational status.

Symptom distribution is presented in Table 2. There was a statistical difference between the patient and control groups. The most common type of obsessions was the

Table 1 Demographic features and family history of study groups

	Patients ($N=50$)	Control ($N=50$)	Significance test	*P*-value
Age (years)	44.3±10.6	41.2±9.5	$t=1.54$	0.13 (NS)
Sex [*n* (%)]				
Male	31 (62)	26 (52)	$\chi^2=1.02$	0.31 (NS)
Female	19 (38)	24 (48)		
Educational level (study years)	11.5±3.9	12.3±3.4	*t*-test=1.2	0.23 (NS)
Marital status [*n* (%)]				
Single	27 (54)	9 (18)	$\chi^2=17.45$	<0.001 (HS)
Married	21 (42)	41 (82)		
Divorced	2 (4)	0 (0)		
Occupational status [*n* (%)]				
Employed	20 (40)	45 (90)	$\chi^2=34.6$	<0.001 (HS)
Nonemployed	25 (50)	0 (0)		
Housewife	5 (10)	5 (10)		
Family history of psychiatric disorders [*n* (%)]	23 (46)	8 (16)	$\chi^2=10.52$	0.001 (HS)
Age of onset of schizophrenia (years)	22.85±5.3	–	–	–
Number of hospital admissions	3.91±1.14	–	–	–
Timing of OCS emergence from onset of schizophrenia (years)	11.7±2.4	–	–	–

HS, highly significant; OCS, obsessive compulsive symptom.

Table 2 Symptom distribution in our study groups

	Patient ($N=50$) [*n* (%)]	Control ($N=50$) [*n* (%)]	Total ($N=100$) [*n* (%)]	Significance test (χ^2)	*P*-value
With OCS	31 (62)	21 (42)	53 (53)	4	0.04 (S)
With OCD	8 (16)	2 (4)	10 (10)	3.96	0.047 (S)

OCD, obsessive compulsive disorder; OCS, obsessive compulsive symptom; S, significant.

contamination obsessions, which was present in 29.2% of patients with obsessions and 22.2% of the control group. The most common compulsions were the cleaning compulsions and were present in 38.9% of patients and 41.7% of the control group (Tables 3–5).

On analysis of those who had any obsession, there was high statistical difference between the two groups as regards time occupied by obsessive thoughts, interference and distress due to obsessive thoughts, resistance against obsessions, and degree of control over obsessive thoughts.

On analysis of those who had any compulsion, there was statistical significance between the patient and control groups as regards time spent performing compulsions, whereas no statistical significance between them was found as regards the interference due to compulsive behavior, distress with compulsion, resistance against compulsion, and control over compulsion.

Table 6 shows that there was high statistical difference between the case and control groups as regards YBOCS obsession subscore, compulsion subscore, and total YBOCS score ($P > 0.001$).

As shown in Table 7, there was a significant statistical difference between the two groups as regards the psychosocial stressor before onset of OCS and family history of anxiety disorders.

There was no statistical difference between patients with OCS versus patients without OCS on the GAF scale. However, there was high statistical difference between patients with OCD and patients without OCD as regards the GAF scale ($P > 0.001$) (Table 8).

Table 9 shows that only seven (22.6%) patients with OCS were treated with first-generation antipsychotics compared with 10 (52.6%) patients without OCS. Moreover, it shows that 24 (77.4%) patients with OCS were treated with second-generation antipsychotics compared with only nine (47.4%) patients without OCS, which is statistically significant.

Table 10 shows that 13 patients were taking clozapine among 24 patients with OCS treated with second-generation

Table 3 Comparison between study groups as regards the presence of obsessions and compulsions

	Patient ($N = 50$) [n (%)]	Control ($N = 50$) [n (%)]	Total ($N = 100$) [n (%)]	Significance test (χ^2)	P-value
With obsessions	24 (48)	18 (36)	42 (42)	1.46	0.23 (NS)
With compulsions	18 (36)	12 (24)	30 (30)	1.7	0.19 (NS)

Table 4 Comparison between study groups as regards Yale-Brown obsessive compulsive scale obsessions

	Patient with obsessions ($N = 24$)	Control with obsessions ($N = 18$)	t-test	P-value
Time occupied by obsessive thought				
Mean	2.5	1.22	39.3	<0.001 (HS)
SD	0.78	0.43		
Interference due to obsessive thought				
Mean	2.12	0.83	22.1	<0.001 (HS)
SD	0.95	0.79		
Distress associated with obsessive thought				
Mean	2.04	1.28	7.9	<0.001 (HS)
SD	0.9	0.9		
Resistance against obsession				
Mean	2.42	0.8	33.5	<0.001 (HS)
SD	0.97	0.7		
Degree of control over obsessive thoughts				
Mean	2.42	1.1	20.7	<0.001 (HS)
SD	0.93	0.9		

HS, highly significant.

Table 5 Comparison between study groups as regards Yale-Brown obsessive compulsive scale compulsions

	Patient with compulsions ($N = 18$)	Control with compulsions ($N = 12$)	t-test	P-value
Time spent performing compulsion				
Mean	1.5	0.67	2.1	0.04 (S)
SD	1.2	0.6		
Interference due to compulsive behavior				
Mean	1.22	0.66	1.7	0.1 (NS)
SD	1.11	0.4		
Distress associated with compulsion				
Mean	1.56	1.1	1.11	0.28 (NS)
SD	1.3	0.75		
Resistance against compulsion				
Mean	1.44	0.99	1.2	0.24 (NS)
SD	1.2	0.6		
Degree of control over compulsion				
Mean	1.4	1.1	0.9	0.4 (NS)
SD	1.2	0.6		

Table 6 Comparison between study groups as regards the Yale-Brown obsessive compulsive scale

	Patient ($N=50$)	Control ($N=50$)	*t*-test	*P*-value
YBOCS obsession subscore				
Mean	5.72	1.92	10.98	<0.001 (HS)
SD	2.31	0.81		
YBOCS compulsion subscore				
Mean	3.24	1.56	5.34	<0.001 (HS)
SD	2.1	0.74		
YBOCS total score				
Mean	8.4	4	11.37	<0.001 (HS)
SD	2.5	1.11		

HS, highly significant; YBOCS, Yale-Brown obsessive compulsive scale.

Table 7 Comparison between patient groups as regards the presence of psychosocial stressors and family history of anxiety disorders

	Patients with OCS (31 cases) [*n* (%)]	Patients without OCS (19 cases) [*n* (%)]	χ^2	*P*-value
With psychosocial stressor preceding onset of OCS	12 (38.7)	2 (10.5)	4.46	0.03 (S)
With family history of anxiety disorders	6 (19.3)	0 (0)	4.18	0.04 (S)

OCS, obsessive compulsive symptom; S, significant.

Table 8 Effect of presence of obsessive compulsive symptom and obsessive compulsive disorder on the Global Assessment of Functioning scale in the patient group

	GAF scale Mean	SD	*t*-test	*P*-value
With OCS				
Yes (31 cases)	54.5	9.62	0.67	0.51 (NS)
No (19 cases)	56.2	6.88		
With OCD				
Yes (8 cases)	44.5	6.14	4.43	<0.001 (HS)
No (42 cases)	57.1	7.6		

GAF, Global Assessment of Functioning; OCD, obsessive compulsive disorder; OCS, obsessive compulsive symptom; HS, highly significant.

antipsychotics, whereas only four patients received olanzapine and seven patients were treated with other types of second-generation antipsychotics (SGA). Among patients without OCS treated with second-generation antipsychotics, one patient was treated with clozapine, one was treated with olanzapine, and seven were treated with others, which is statistically significant ($P=0.04$).

Table 11 shows that the mean whole-blood serotonin level in schizophrenic patients without OCS was 0.49 ± 0.21 μmol/l, whereas that of patients with OCS was 0.42 ± 0.18 μmol/l, that of patients with OCD was 0.26 ± 0.16 μmol/l, and in the control group it was 0.61 ± 0.22 μmol/l. This shows high statistical significance with a *P* value of 0.0001.

Discussion

The presence of OCSs in patients with schizophrenia has been described since the 19th century, long before the advent of psychotropic medications. However, the reports on *de novo* and worsening of OCSs in patients with schizophrenia have increased in the last decades. It is believed this is true especially for schizophrenia patients who are refractory to conventional treatments [8].

Our study is a trial to evaluate the frequency of OCSs in patients with schizophrenia and to study the impact of OCSs on psychological, social, and occupational functioning of schizophrenic patients.

The participants in both the patient and control groups were matched for age, sex, and educational level. As regards marital status, our study results revealed that the patient group was predominantly single [27 (54%) patients], whereas the majority of controls were married [41 (82%)]. Moreover, as regards the occupational status, unemployment was reported in half of the patients (50%), whereas most of the control group was employed [45 (90%)] participants. This created a high statistical difference between groups as regards marital and occupational status ($P<0.001$), which may reflect the burden of the disease that causes limitation and impairment of social interaction and functional ability of the patients.

As regards the presence of OCSs, 31 (62%) cases in the patient group had OCS, which is higher than that in the control group in which 21 (42%) participants had OCS, with a significant statistical difference between the two groups ($P=0.04$). Our results are closely in agreement with those obtained by Kayahan *et al.* [9], who recorded an incidence of 64% for OCS in schizophrenic patients. Moreover, Schirmbeck and Zink [10] mentioned in their study that patients with schizophrenia have a high lifetime risk for OCS of about 25%, and recent meta-analyses concluded that at least 12% also fulfill the criteria for an OCD, and even higher comorbidity rates for OCS in schizophrenia patients were reported varying from 7.8 to 46.6%, with prevalence rates for OCD reported in schizophrenia populations varying from 7.8 to 26% as reported by Sterk *et al.* [11]. In contrast, the general population prevalence rates for OCD are only 1–2%, whereas patients suffering from primary OCD carry a relatively low risk (1.7%) of developing comorbid psychotic symptoms [12].

Table 9 Comparison between patient groups as regards the type of antipsychotic drugs used

	Patients with OCS (31 cases) [*n* (%)]	Patients without OCS (19 cases) [*n* (%)]	χ^2	*P*-value
First-generation antipsychotics	7 (22.6)	10 (52.6)	4.74	0.03 (S)
Second-generation antipsychotics	24 (77.4)	9 (47.4)		

S, significant.

Table 10 Comparison between patient groups as regards the type of second-generation antipsychotic used

	Patients with OCS treated with second-generation antipsychotics (24 cases) [*n* (%)]	Patients without OCS treated with second-generation antipsychotics (9 cases) [*n* (%)]	χ^2	*P*-value
Clozapine	13 (54.2)	1 (11.1)	6.64	0.04 (S)
Olanzapine	4 (16.7)	1 (11.1)		
Others	7 (29.2)	7 (77.8)		

OCS, obsessive compulsive symptom; S, significant.

Table 11 Comparison between study groups as regards whole-blood serotonin level in our study groups

	Whole-blood serotonin (μmol/l) Mean	SD	ANOVA	*P*-value
Schizophrenia patients without OCS (19 patients)	0.49	0.21	13.06	0.0001 (HS)
Schizophrenia patients with OCS (23 patients)	0.42	0.18		
Schizophrenia patients with OCD (8 patients)	0.26	0.16		
Control (50 controls)	0.61	0.22		

ANOVA, analysis of variance; HS, highly significant; OCD, obsessive compulsive disorder; OCS, obsessive compulsive symptom.

According to the presence of OCD in our study groups, eight (16%) patients had a full picture of OCD diagnosed by both fulfilling criteria of ICD-10 for OCD and having a total score in the YBOCS of at least 16, compared with only two (4%) participants in the control group with a significant statistical difference ($P=0.047$). The incidence of OCD in the normal group was close to that obtained by Vivan *et al.* [13], with an incidence of 3.27%, whereas the incidence of OCD in schizophrenic patients reported in our results was closely in agreement with that obtained by Ohta *et al.* [14], who recorded it as 18.3%.

Our study results revealed that 24 (48%) patients had obsessions compared with 18 (36%) controls. However, there was no significant statistical difference between the two groups ($P=0.23$), whereas as regards the presence of compulsions, we found that 18 (36%) patients had compulsions compared with only 12 (24%) controls with no statistical difference between the two groups as well ($P=0.19$). On analysis of those who had any obsession, there was high statistical difference between the two groups as regards time occupied by obsessive thoughts, interference and distress due to obsessive thoughts, resistance against obsessions, and degree of control over obsessive thoughts. However, on analysis of those who had any compulsion, there was a statistical significance between the patient and control groups as regards time spent performing compulsions, whereas no statistical significance between them was found as regards the interference due to compulsive behavior, distress with compulsion, resistance against compulsion, and control over compulsion.

Worse OCSs were observed in schizophrenic patients than those in participants in the control group who usually show mild degree symptoms; this is also evident on comparing the YBOCS scores between the study groups as there was a high statistical difference between the case and control groups as regards YBOCS obsession subscore, compulsion subscore, and total YBOCS score ($P<0.001$).

As regards the presence of psychosocial stressors and family history of anxiety disorders, both were statistically significant. This indicates that psychosocial stressors and positive family history for anxiety disorders may be risk factors for emergence of OCS in schizophrenic patients. Several frequent and disabling mental disorders manifest as a consequence of both genetic and environmental factors. Schizophrenia and OCD for instance are commonly perceived on the background of a gene and environment interaction, in which individual genetic properties dispose to a specific liability and sensitivity for specific stressors. Environmental factors and possible neurogenetic disposition to develop OCS during the course of psychotic illness have just recently become a focus of interest. Research within this field is still scarce and needs further exploration [10].

Upon analysis of the effect of presence of OCS on the GAF scale in our patient group, we found that patients with OCS [31 (62%) cases] had a mean GAF scale of 54.5 ± 9.62 compared with 56.22 ± 6.88 in patients without OCS [19 (38%) case] with no significant statistical difference ($P=0.51$). However, patients with OCD [8 (16%) cases] had lower GAF scale with a mean of 44.5 ± 6.14 compared with 57.1 ± 7.6 in patients without OCD [42 (84%) cases], which created a high statistical significance with a *P* value of less than 0.001.

These results are in agreement with Devi *et al.* [15] and Hagen *et al.* [16], who found no significant statistical difference between schizophrenic patients with and

those without OCS on the GAF scale. However, Nolfe *et al.* [17] found different results reporting also that patients with OCS had lower GAF scale in comparison with patients with schizophrenia only but with a statistical significance ($P > 0.001$). Somewhat different results were obtained by Ucok *et al.* [18], who reported the mean GAF score for patients with OCS of 58.4 (14.2), whereas it was lower for patients without OCS 51.9 (16.5), which indicates a better functioning in the OCS patients than others without OCS. They proved in their studies that, although OCD comorbidity is in close association with some negative qualities, schizophrenic patients who exhibit OCS but do not fulfill OCD diagnosis are found to have less comorbidity with other psychiatric disorders and less number of hospitalizations with a general higher functioning. This is generally different from most other studies such as that by Zink [12], who proved through his study that comorbid patients more often utilize healthcare services and show heightened levels of anxiety and depression, leading to increased risk for suicidality, and these pronounced impairments increase the burden of disease and lead to poorer social and vocational function with a less favorable overall prognosis. Therefore, prospective studies are warranted to further evaluate the effects of OCD/OCS on schizophrenia in areas of functionality, which ensures the importance of early detection of comorbid OCS/OCD in schizophrenic patients to enhance their quality of life.

A significant statistical difference was found between the two groups of patients taking first-generation and those taking second-generation antipsychotics, and the finding that most of those with OCS are receiving atypical antipsychotics indicates that the incidence of OCS emergence in schizophrenic patients may be increased with intake of second-generation antipsychotics. Moreover, finding most of the patients with OCS treated with second-generation antipsychotics, especially clozapine and olanzepine, showing statistical significance suggests that the incidence of OCS in schizophrenic patients is increased with intake of clozapine and olanzapine as second-generation antipsychotics. This hypothesis is supported by several case reports as in Allen and colleagues [19,20] and Cheung [21]. Moreover, our study results are closely in agreement with the study by Schirmbeck *et al.* [22], which was conducted on 70 schizophrenic patients; 55.7% were treated with clozapine and olanzapine compared with 57.6% in our study. Schirmbeck *et al.* [22] recorded that 71.8% of patients treated with clozapine and olanzapine showed OCS compared with 51.5% in our study. In contrast, Ucok *et al.* [18] reported that both OCD and OCS are not more frequent in patients taking clozapine. Moreover, on comparing patients taking atypical antipsychotics with those taking typical antipsychotics, it was found that OCS was significantly more frequent and OCD was marginally more frequent in the first group. At this time, there was insufficient experimental evidence to characterize the effects of other SGAs on OCS. Despite some experimental support for the involvement of longer treatment duration and genetic factors in mediating drug-induced OCS, more research is needed to clearly elucidate these associations. On the basis of these results, routine OCS monitoring and treatment modifications should be available for patients throughout the course of SGA treatment, particularly when administered clozapine or olanzapine. Future research in functional neuroimaging and pharmacogenetics may uncover functional pathways that can be exploited to mitigate SGA-induced OCS effects while preserving intended treatment benefits. This is of high clinical importance, considering that clozapine is the only existing pharmacotherapy that exhibits superior therapeutic efficacy over other SGAs in treatment-resistant schizophrenia [23].

As regards the whole-blood serotonin, we wanted to study its relation to the presence of OCS and OCD in schizophrenic patients, whether it would be elevated or decreased or even simply has no relation to OCS. Our study results revealed the lowest level in schizophrenic patients with OCD (0.26 ± 0.16 μmol/l), in schizophrenic patients with OCS (0.42 ± 0.18 μmol/l), and schizophrenic patients without OCS (0.49 ± 0.21 μmol/l), and the highest level was recorded among controls (0.61 ± 0.22 μmol/l). Thus, there is a highly significant difference between our study groups ($P = 0.0001$). This is in accordance with Ma *et al.* [5], but with different levels. Ma *et al.* [5] also studied the whole-blood serotonin and its relation to OCS in schizophrenia and suggested in their study that a similar dysfunction may be involved in various mental disorder-related OCS. They recorded a whole-blood serotonin level in their control group of 0.93 ± 0.35 μmol/l, with a nonsignificant difference in schizophrenic patients without OCS (0.97 ± 32 μmol/l), whereas significantly lower levels were found in patients with OCS (0.67 ± 17 μmol/l) and in patients with OCD (0.58 ± 39 μmol/l).

According to the 5-HT levels in OCD, several studies reported a deficit of serotonin in specific brain regions, in both preclinical and clinical models of OCD. However, it is recorded differently in various studies. There was decreased 5-HT level in OCD patients than in controls [24,25], which goes along with our study results but in schizophrenic patients with OCD.

Moreover, the whole-blood 5-HT level in schizophrenic patients was found to be controversial in many studies. It was recorded to be lower than normal levels in study by Braunig *et al.* [26]; Banki [27] but it was increased in DeLisi *et al.* [28]. However, the hypothesis confirmed by various recent research studies is that the serotonergic and dopaminergic neurotransmitter pathways in the brain are intertwined and both are impaired in schizophrenia.

Conclusion

Our study results suggest that the possible 5-HT dysfunction caused by schizophrenia is exaggerated by the presence of OCSs and OCD as comorbidities or even representing a specific schizophrenia subtype. Moreover, schizophrenia treatment, especially second-generation antipsychotics, particularly clozapine, may cause the emergence of OCS or lead to the exacerbation of already present symptoms. Therefore, early detection of OCS in schizophrenia patients, especially those under psychosocial stressors, with a family history of anxiety disorders or receiving SGAs, particularly clozapine and olanzapine is

required for rapid intervention and management of this comorbidity. We also reported that OCSs are more severe in schizophrenic patients than in normal population, yet not affecting the global functioning, which is worse in the schizophrenic patients with OCD than in those patients without OCD. This requires further studies with more assessment and evaluation of OCS in schizophrenic patients for better management and for improving their quality of life and general functioning.

Conflicts of interest

There is no conflicts of interest.

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