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Prevalence, sociodemographic and academic correlates of obsessive-compulsive disorder in the students of college of applied medical sciences, Umm Al-Qura university

Sadia Sultan [a,*], Ebtihaj O. Fallata [b], M.D. Abu Bashar [c], Ebtehal Emad Olaqi [a], Ghadeer Hussain Alsharif [a], Razan Abdulahad BinSaleh [a], Rfal Abdulaziz Fakieh [a]

[a] Department of Laboratory Medicine, College of Applied Medical Sciences, Umm Al-Qura University, Saudi Arabia
[b] Department of Psychiatry, Eradah and Mental Health Complex, Jeddah, Saudi Arabia
[c] Department of Community Medicine, MM Institute of Medical Sciences & Research, MM Deemed University, Mullana, Haryana, India

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ABSTRACT

Introduction: The studies suggesting the prevalence of Obsessive-compulsive disorder is scant in the region of Saudi Arabia and more so in a population sample of medical and paramedical students. The aim of this study was to estimate the prevalence of obsessive-compulsive symptoms in a community sample of students of applied medical sciences. Furthermore, an association between obsessive compulsive symptoms and various socio-demographic variables and several aspects of academic life were investigated.

Methods: This cross-sectional study recruited 404 university students belonging to four departments. Tools used in the study included Obsessive compulsive inventory revised (OCI-R), DSM-IV criteria for diagnosis of OCD and Y-BOCS severity rating scale. The main outcome would be probable obsessive compulsive disorder (OCI-R score>21). The students with >21score were further evaluated for the presence of obsessive compulsive disorder using DSM-IV criteria and Y-BOCS.

Results: The prevalence of OCS was 20% [95%CI (19.902–20.098)] with the OCI-R screening tool. Actual prevalence of confirmed OCD was 5.06% [95%CI (4.39–6.12)]. Presence of probable OCD was significantly high [p = 0.002 and 95%CI (1.31–3.53)] in students of laboratory medicine department. A significant association was found between presence of OCS and dissatisfaction with the course selection [p = 0.001, 95% CI (1.38–3.92)], feeling of rejection [p = 0.004, 95%CI (1.39–5.88)] and depressive symptoms [p = 0.0001 and CI (1.81–4.89)]. Our sample was limited to college age women, therefore the interpretation of prevalence my not be generalizable.

Conclusion: The presence of such a disorder is likely to effect academic performance, quality of life and interpersonal relationships hence, identification and treatment at the right time help improve academic performance and quality of life.

1. Introduction

"Obsession is defined as an unwanted intrusive thought, doubt, image, or urge that repeatedly enters the mind". Obsessions are anxiety provoking and ego-dystonic which means they are incongruous with the person's beliefs. The individual often regards the intrusions as illogical and exaggerated and tries to resist them. Obsessional thoughts typically include fears of illness and contamination, unwanted aggressive thoughts, other taboo thoughts involving sex or religion, and the need for symmetry or exactness. "Compulsions are repetitive behaviours or mental acts that a person feels driven to perform in response to an obsession". They are mostly involuntary and are seldom resisted (American Psychiatric Association, 1994). A compulsion can be either an overt action observable by others (such as checking that a door is locked, cleaning, arranging and reassurance seeking) or a covert mental act that cannot be observed (such as repeating a certain phrase in the mind). Compulsions, generally serve to neutralize the distress and anxiety produced by obsessions (Goodman et al., 2014).

* Corresponding author.
E-mail address: sssultan@uqu.edu.sa (S. Sultan).

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The exact etiopathogenesis which underlies the development of OCD has not been established, although both genetics and environmental factors play an important role. The heritability of OCD is strongly supported by twin studies, with a genetic influence of 45–65% in studies on children and 27–47% in adults (Pauls, 2010). The concordance rate in monozygotic twins for OCD is 80–87% when compared with 47–50% concordance in dizygotic twins (Robillard & Boafo, 2016). Abnormalities of a variety of serotonergic, dopaminergic, and glutamatergic genes were reported in various genetic studies (Kim & Kim, 2006). Abnormalities in serotonin (5-HT) and dopaminergic neurotransmission in the brain was found to be involved in the etiopathogenesis of OCD. The efficacy of serotonin reuptake inhibitors (SSRIs) in the treatment of OCD strongly supports its role in etiopathogenesis of OCD. Evidence also suggests abnormalities in dopaminergic transmission in at least some cases of OCD. Among the environmental factors stress has remarkable effect on cortico-striato-thalamic circuitry. Evidence through functional magnetic resonance imaging (fMRI) and positron emission tomography (PET) found an increased metabolic activity and blood flow in the cortico-striato-thalamo-cortical circuits of OCD patients similar to what is seen during chronic stress (Pauls et al., 2014). Significant life events (a majority of which are stressful) was reported by at-least 25–60% of OCD patients in relation to the onset of their OCD which further highlights the role of stress in triggering the onset of OCD (Rosso et al., 2012).

More interestingly, it is observed that obsessive-compulsive (OC) phenomena or obsessive compulsive symptoms (OCS) are seen in 80% of non-clinical population which do not amount to a disorder by itself (Rachman & De Silva, 1978). Worldwide population prevalence of OCD is 2% of general population (Sasson et al., 1997) Epidemiological Catchment Area (ECA) study, a community based survey of more than 18,500 people in United States, estimated 2–3% life time prevalence of OCD (Karno et al., 1988). A more recent meta-analysis of the worldwide prevalence of OCD reported a lifetime prevalence of 1.0% for men and 1.5% for women (Fawcett et al., 2020).

The epidemiological studies conducted in the Middle-East reported a general population prevalence of OCD as 1.8% (Mohammadi et al., 2004) and 4.6% in Iraq (Alhasnawi et al., 2009),0.68% in Egypt (Ghanem et al., 2009) and 3% in turkey (CilliÇilli et al., 2004) respectively. Yoldascan et al. (2009) reported a prevalence of 4.2% OCD in Turkish university student. In a study limited to the Al- Ain region in UAE, a lifetime OCD prevalence of 0.07% was reported (Abou-Saleh et al., 2001). Prevalence of OCS was 15.8% and that of OCD was 2.7% in secondary school students of Menoufia region in Egypt (Al Bahnasy et al., 2013). Okasha et al. reported a prevalence of 43.1% of OCS and a 19.6% of OCD in a student sample from Cairo, Egypt. This study reported increased occurrence of OCD in younger age, females and first born. Aggression, contamination and religious obsessions, and cleaning compulsions were encountered more commonly in the study subjects (Okasha et al., 2001). A survey on Lebanese population reported 0.1%, 12 month prevalence of OCD(Kamran et al., 2006) Shams et al. reported a prevalence of 11.2% of OCS in adolescent students of Iran (Shams et al., 2011). Younger age and marital status (divorced or single) were significantly associated with OCD (Subramaniam et al., 2012). OCD was also found to be significantly associated with academic failure (Jaisoorya et al., 2017).

The studies about general population prevalence of OCD is scant in the region of Saudi Arabia. A study done on 4745 high school girls from various schools from the state of Riyadh using Mini International Neuropsychiatric Interview For Kids MINI-Kid (a screening measure) reported a prevalence of 13.7% OCD (Alatiq et al., 2017). A prevalence study done in Asser Province, southern Saudi Arabia on 1000 individuals recruited from university and shopping centres suggested a prevalence of 3.4% of OCD symptoms using OCI-R (Alsubaie et al., 2019). S A Mahfouz reported a prevalence of 14.5% of OCS in a sample of 1552 adolescent school children from Abha using a screening tool Symptom Checklist 90- Revised (SCL-90-R) (Mahfouz et al., 2009). Another study of similar nature from Abha region done on a sample of 545 secondary school girls using self-reporting scale SCL-90-R reported a prevalence of 12.3% of OCS (Al Gelban, 2009). A study done on 1024 secondary school female students using Obsessive Compulsive Disorder Scale found 23.1% prevalence of OCS at Taif, a western region of Saudi Arabia. Among those diagnosed with OCS 58.1% had co-occurring depressive symptoms (Desouky et al., 2015). Similarly another study from the same region reported a prevalence of 18.6% OCS in a sample of 334 school boys (12–15 years) using Spence Children Anxiety Scale (Alzahrani et al., 2016).

High prevalence of emotional suffering and common mental disorders has been reported among medical students. The academic demands, increased responsibility, competition and lack of leisure time may lead to increased stress and anxiety. OCS are psychological manifestations closely related to anxiety (Almeida et al., 2007). Such situations of stress and OC phenomenon may have a negative impact on cognitive function such as memory and attention (Johansen & Dittrich, 2013). Many studies suggested a higher prevalence of OCD in medical students when compared to general population. A study conducted in California on 1050 students taken from 3 different medical colleges using the Leyton Obsessional Inventory found 5.2% of probable OCD and this was significantly higher in first year students (Chandavarkar et al., 2007). This prevalence was 4 fold higher than in the US general population as reported in the National Comorbidity Survey Replication study, which was 1.0–1.2% (Ruscio et al., 2010). A Brazilian study which assessed OCD in 471 medical students using Obsessive Compulsive Inventory-Revised (OCI-R) found 3.8% prevalence of probable OCD (Torres et al., 2016). which was higher than the general population prevalence of 1% (Ruscio et al., 2010). However the high prevalence is expected with the use of self rating scale OCI-R (Torres et al., 2016) when compared to structured interview like CIDI (Ruscio et al., 2010). Another study on high school children from 7 schools in brazil found a prevalence of 18.3% of OCS and 3.3% of confirmed OCD (Vivan Ade et al., 2014). Moreover, OCD was found to be significantly associated with religiosity, depressive symptoms, being a freshmen, dissatisfaction with academic performance, difficulty in adaptation and difficulty making friends (Torres et al., 2016). A comparative study on symptoms of OCD in a student population found higher prevalence of OCS in medical students when compared to law students (Harries et al., 2017).

This study aims to find the prevalence rate of OCD in university students of college of applied medical sciences which will help add to the existing literature about prevalence of this disorder in the western region of Saudi Arabia. This study is different from previous studies in this region in terms of not only finding OCS but also further confirming the presence of OCD using Diagnostic and Statistical Manual Of Mental Disorders- 4th edition (DSM-IV criteria) and also Yale Brown Obsessive Compulsive scale (Y-BOCS Scale). Moreover, these symptoms are under-

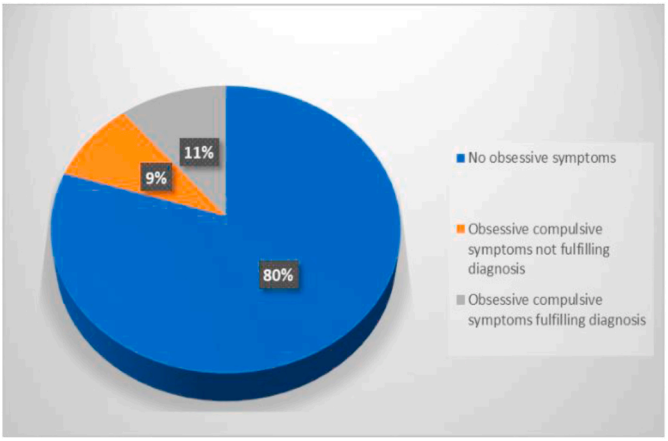

Fig. 1. Prevalence of Obsessive-Compulsive Symptoms fulfilling DSM-IV criteria.

reported and under-treated in this region. Such a disorder greatly impacts upon interpersonal relationships, academic performance and quality of life, hence early diagnosis and treatment initiatives may help improve student's academic performance and quality of life.

The aim of the study is to find the prevalence of OCS and further confirm OCD diagnosis in a population sample of students of applied medical sciences. The outcome measures are OCI-R score >21, DSM-IV and Y-BOCS-severity rating scale for diagnosing the severity of OCD. Furthermore, an association between obsessive compulsive symptoms and various sociodemographic variables and several aspects of academic life were investigated.

2. Materials and methods

2.1. Study design

The study was cross-sectional in design and ethical permission was attained from the Scientific Research Ethic Committee, Faculty of Applied Medical Sciences, Umm-Al-Qura University. Oral informed consent was taken from each student before enrolling them in the study.

2.2. Study setting

The study was conducted in College of Applied medical sciences, Umm-Al-Qura university from October 2019 to February 2020.

2.3. Sample size and sampling strategy

Sample size was calculated by using Open Epi Software. Taking prevalence of OCS among female students as 12.3% from a previous Study (Al Gelban, 2009), confidence interval of 95% and absolute precision of 5% and design effect as 2 for complex samples, the minimum sample required came out as 332.

The study included (N = 404) female students belonging to various departments (laboratory medicine, physiotherapy, nutrition and respiratory therapy departments) of applied medical sciences with the age of more than 18 years and with a good understanding of English language selected through convenient sampling. Student with chronic physical illness were excluded from the study. Hundred percent females were recruited in the study because the class comprised of only female students. Total students in all departments were 450 out of which 404 participated in the study with a response rate of 89.7%.

2.4. Measurements (assessment instruments)

- Data collection sheet

The data collection sheet was developed by researchers to obtain information about sociodemographic details such as age, education, marital status, family history of psychiatric disorder, importance of religion and common depressive symptoms. Academic correlates included dissatisfaction with course selection, dissatisfaction with academic performance, difficulty in adaptation and making friends, feeling of rejection, and depressive symptoms. (see appendix). Data collection sheet was completed as a self-report questionnaire by participants.

- Obsessive compulsive inventory-revised

OCI-R is a reduced version of the original instrument obsessive compulsive inventory (OCI). This is an 18-item self-report questionnaire measuring DSM-IV symptoms of OCD across 6 subscales (Foa et al., 1998, 2002). and has 18 self-report items (Likert scale from 0 = not at all to 4 = extremely), that evaluates presence of OCD. The total score ranges from 0 to 72 with a cut-off score of 21 representing a clinically significant level of symptoms (Foa et al., 2002). The OCI-R has demonstrated good reliability and validity in both clinical and nonclinical samples, and reported to have excellent internal consistency and good test retest reliability (Foa et al., 2002; Hajcak et al., 2004; Huppert et al., 2007; Williams et al., 2013).

- Yale Brown obsessive compulsive scale

The Y-BOCS symptom severity scale is a clinician administered "gold standard" instrument for assessing OCD symptom severity (Grabill et al., 2008). It is a semi-structured, clinician-rated scale, comprising of 10 items, each item rated from 0 (no symptoms) to 4 (extreme symptoms). The total Y-BOCS score is the sum of items 1 to 10 (range, 0 to 40). There are separate subtotals for severity of obsessions (sum of items 1 to 5) and compulsions (sum of items 6 to 10). 0–7 score = subclinical, 8–16 = mild, 16–23 = moderate, 24–31 = severe and 31–40 = extreme. It has excellent psychometric properties including reliability and construct validity (Goodman et al., 1989; Woody et al., 1995).

2.5. Study procedure

The study was conducted in two phases which included students from four different departments. The first phase involved the administration of the data collection sheet which included sociodemographic and academic details and OCI-R scale. A visit was done to each department during the first two days of the week. All the students present in the class during the visit were recruited in the study. The contents of data collection sheet, depressive symptoms and OCI-R were thoroughly explained to the students in both English and Arabic language. The OCI-R was applied to screen the presence of OCS. Those students who scored >21 with OCI-R were selected for the second phase. During the second phase a diagnostic assessment was conducted by a psychiatrist as a free form unstructured clinical interview to confirm the presence of OCD according to DSM-IV criteria in OCS positive subjects (OCI-R>21). Finally, Y-BOCS severity rating scale was administered to further assess the symptom severity. Furthermore, the association between the presence of OCD and sociodemographic characteristics and academic life conditions were evaluated.

2.6. Statistical analysis

Data were analysed using the SPSS software version 22.0. Descriptive analyses were conducted, which included the prevalence of OCS (OC symptoms, defined as an OCI-R score >21) and confirmed OCD cases. The bivariate analyses of the categorical outcome were done by chi-squared and fisher exact test. Furthermore, odds ratios with 95% CI were also calculated.

3. Result

The mean age of the students was 20.74 (standard deviation = 1.21). Regarding marital status, 388 (96.0%) were single and only sixteen (4%) were married. Three hundred and ninety-five (97.7%) live with other people and nine (2.3%) live alone. Three hundred and ninety-one

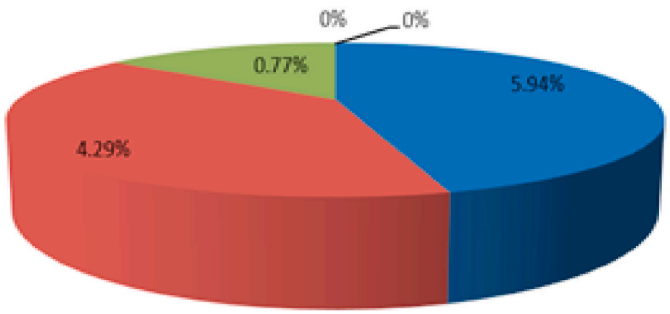

Fig. 2. Severity of OCD based on YBOCS score in participants with OCD.

Table 1
Prevalence of probable obsessive-compulsive disorder (OCD), according to the explanatory variables (bivariate analyses of the categorical outcome).

Variables	Total N (%)	OCD symptoms present N (%)	OCD symptoms absent N (%)	OR (95% CI)	*p*-value
Lives alone					0.323
No	395 (97.7)	78 (19.7)	317 (80.3)	1(Ref.)	
Yes	9 (2.3)	3 (33.3)	6 (66.7)	2.03 (0.47–8.30)	
Marital status					0.447
Currently married	16 (4.0)	2 (12.5)	14 (87.5)	1(Ref.)	
Single/Divorced	388 (96.0)	79 (20.4)	309 (79.6)	1.78 (0.39–8.03)	
Age-groups (in years)					0.217
<20	63 (15.6)	9 (14.3)	54 (85.7)	1(Ref.)	
≥20	341 (84.4)	72 (21.1)	269 (78.9)	1.61 (0.76–4.321)	
Residential background					0.671
Rural	13 (3.2)	2 (15.4)	11 (84.6)	1(Ref.)	
Urban	391 (96.8)	79 (20.2)	312 (79.8)	1.39 (0.30–6.41)	
Course of study					**0.002***
Clin.Nutr/Physio/Res. Med.	267 (66.1)	42 (15.7)	227 (84.3)	1(Ref.)	
Lab Medicine	137 (33.9)	39 (28.5)	98 (71.5)	1.31–3.53	
Fresher					0.354
No	277 (68.6)	59 (21.3)	218 (78.7)	1(Ref.)	
Yes	127 (31.4)	22 (17.3)	105 (82.7)	0.77 (0.45–1.33)	
Dissatisfaction with course					**0.001***
No	305 (75.5)	50 (16.4)	255 (85.6)	1(Ref.)	
Yes	99 (24.5)	31 (31.3)	68 (68.7)	2.33 (1.38–3.92)	
Dissatisfaction with academic performance					0.936
No	236 (58.4)	47 (19.9)	189 (80.1)	1(Ref.)	
Yes	168 (41.6)	34 (20.2)	134 (79.8)	1.02 (0.62–1.67)	
Thoughts of Abandoning the course					0.083
No	368 (91.1)	70 (19.0)	298 (81.0)	1(Ref.)	
Yes	36 (8.9)	11 (30.6)	25 (69.4)	1.96 (0.91–4.18)	
Difficulty making friends					0.77
No	305 (75.5)	55 (18.1)	250 (81.9)	1	
Yes	99 (24.5)	26 (26.3)	73 (73.7)	1.62 (0.95–2.76)	
Feeling of rejection					**0.004***
No	368 (91.1)	67 (18.2)	301 (81.8)	1	
Yes	36 (8.9)	14 (38.9)	22 (61.1)	2.86 (1.39–5.88)	
Depressive symptoms					**<0.0001**
No	259 (64.1)	35 (13.5)	224 (86.5)	1	
Yes	145 (35.9)	46 (31.7)	99 (68.3)	2.97 (1.81–4.89)	
Family history of psychiatric illness					0.934
No	348 (86.1)	70 (20.1)	278 (79.9)	1	
Yes	56 (13.9)	11 (19.6)	45 (80.4)	0.97 (0.48–1.97)	

(96.8%) were from urban background and thirteen (3.2%) were from rural background. All students were divided into two groups. First group included two hundred and sixty-seven (66.1%) students belonging to clinical nutrition, physiotherapy and respiratory therapy whereas second group included 137 (33.9%) from lab medicine.

The current prevalence estimates of OCS was 20% [95%CI (19.902–20.098)] with the OCI-R screening tool. Among the 20% only 11% were fulfilling DSM-IV diagnostic criteria for OCD and 9% were not fulfilling the criteria Fig. 1. Mean OCI and Y-BOCS score was 15.02 ± 4.53 and 9.72 ± 2.56 respectively. According to Y-BOCS severity classification, of the 11% subjects with OCD, 5.94were subclinical whereas 5.06% [95%CI (4.39–6.12)] had clinically significant OCD among this 4.29% had mild OCD, 0.77% had moderate and none had severe OCD Fig. 2.

The results of the bivariate analyses of the categorical outcomes and presence of OCS (OCI-R>21) are presented in Table 1. In the bivariate analysis, the variables that remained associated with presence of probable OCD were being a laboratory medicine student, dissatisfaction with course, feeling of rejection, and depressive symptoms (Table 1). Presence of probable OCD was significantly higher [p = 0.002 and 95%CI (1.31–3.53)] in students of the laboratory medicine department when compared to other departments. A significant association was found between presence of OCS and dissatisfaction with the course [p = 0.001 and 95% CI (1.38–3.92)], feeling of rejection [p = 0.004, 95%CI (1.39–5.88)] and depressive symptoms [p = 0.0001 and 95% CI (1.81–4.89)].

4. Discussion

This is the first study in the kingdom of Saudi Arabia and one of the few studies assessing OCS and further confirming OCD diagnosis among a population sample of paramedical students. The sample size was large, assessment was done with validated and structured instruments with a good response rate. Moreover, the presence of OCS and its association with various sociodemographic and academic variables were also assessed in this population.

4.1. Prevalence of OCD

The prevalence of OCS was 20% with self-reporting scale OCI-R. The confirmed cases of OCD were 11% as per DSM-IV criteria. Further detailed evaluation of this 11% using Y-BOCS severity rating scale found a prevalence of 5.06% (4.29% mild and 0.77% moderate) cases with confirmed OCD and 5.94% subclinical cases finally concluding the prevalence as 5.06%. The disparity between percentage of diagnosed cases with DSM-IV and Y-BOCS could be due to the fact that, diagnostic assessments are most often unstructured clinical interview, whereas standardized structured or semi-structured interviews have various advantages. Standardized interviews show less subjectivity and superior psychometric properties and are more comprehensive compared to unstructured interviews (Rapp et al., 2016). The prevalence of OCS (20%) in the present study is in approximation with the studies reporting 23.1% and 18.6% OCS in secondary school and boys respectively (Alzahrani et al., 2016; Desouky et al., 2015). On the contrary14.5% and 12.3% prevalence of OCS in adolescent school children and secondary

school girls respectively suggests increased prevalence of OCS in present study sample of paramedical students (Al Gelban, 2009; Mahfouz et al., 2009).One factor contributing to high prevalence of OCS and OCD could be purely female sample as women are at greater risk than men (Fawcett et al., 2020) The difference in prevalence rate can be attributed to different scales used and variation in sample characteristics.

The prevalence of confirmed OCD (using DSM-IV criteria and Y-BOCS) among paramedical students (5.06%) was higher than the general population, considering the fact that large epidemiological studies indicate a 1- year prevalence of approximately 1% in the community (Ruscio et al., 2010). Although the prevalence may vary according to type of instruments used and evaluation period. This prevalence could not be compared with the prevalence in the region of Saudi Arabia due to lack of large community based epidemiological studies. Moreover, most studies found in the literature in the region of Saudi Arabia assessed the presence of OCS using screening instruments which did not move further to confirm the diagnosis of OCD using DSM-IV criteria (American Psychiatric Association, 1994).

4.2. Prevalence of probable OCD and associated factors (outcome as a categorical variable)

The presence of OCS was significantly more in Laboratory medicine when compared to other departments such as nutrition and others. Although this study did not look into the symptom type, the explanation for this increase of OCS in laboratory medicine students could be due to concern over handling of microbes and doubts of getting infected with them. This finding is similar to the study by Toress et al. which found increased contamination obsessions in medical students due to concern over getting infected with microbes (Torres et al., 2016). An alternative explanation for higher score in laboratory medicine program could be frequent behaviour of daily hand washing between procedures. Dissatisfaction with the course was significantly associated with presence of OCD in the present study. It is noteworthy that Toress et al. also verified dissatisfaction with course as one of the academic correlates of OCD (Torres et al., 2016). In this study the presence of OCS remained significantly associated with feeling of rejection and depressive symptoms. Although feeling of rejection may also be attributed to the presence of other comorbidity such as depression. However, considering the shared phenomenology between anxiety, depression, and obsessive-compulsive symptoms, these constructs might have influenced our findings, specially feeling of rejection may be attributed to any of these constructs. The association with depressive symptoms was expected since many clinical and epidemiological studies have consistently shown depressive disorder as the most common comorbidity (Mohammadi et al., 2007; Tükel et al., 2002).

4.3. Limitations

The cross-sectional nature of the study does not allow inferences to be taken as cause and effect, indicating only associations between variables, and there is a possibility that the students might have had the disorder before they joined the paramedical course. The scales used were not translated in Arabic which might have led to the reporting bias. Convenience sampling was employed rather than random sampling, which reduced the generalizability of the findings. The sample consisted entirely of college age women, therefore the interpretation regarding prevalence may be considered circumscribed and more indicative of specific sample, further limiting generalizability.

No comparison group were evaluated (non-medical college students). DSM-IV criteria for diagnosis of OCD was used, instead of more recent DSM-5 because of the fact that the OCI-R scale used for screening is based on DSM-IV criteria and not DSM-5.

4.4. Strengths

The diagnosis of probable OCD using OCI-R was further confirmed using DSM-IV diagnostic criteria and Y– BOCS scale, which reduced the self-reporting bias which could have been present if only OCI-R (self-reporting scale) were used.

4.5. Future directions

Proper guidance to students in choosing the course in accordance with their aptitude may decrease the level of stress, anxiety and OCD. Further studies are required to evaluate the prevalence, severity, predictors of OCD on larger community samples. Common psychopathology of OCD encountered in these students and its relationship with academic correlates can be considered in future studies. Studies directed towards prevention, early diagnosis and treatment interventions in this group of population is much warranted.

5. Conclusion

The prevalence is limited to the sample of college age women with limited generalizability. OCD and subclinical OCD are not uncommon in the community more so in medical and paramedical students, both being associated with significant comorbidity. Therefore, it is important that both are identified and treated in the community because of associated morbidity. The presence of such a disorder is likely to affect the cognitive capacity, academic performance, quality of life and interpersonal relationships. Hence, identification and treatment at the right time help improve academic performance and quality of life.

Abbreviation	Definition
DSM-IV	Diagnostic and Statistical Manual Disorders (4th edition)
ECA	Epidemiological Catchment Area
FMRI	Functional Magnetic Resonance Imaging
MINI-Kid	Mini-International Neuropsychiatric Interview
OC	Obsessive Compulsive
OCD	Obsessive Compulsive Disorder
OCI-R	Obsessive Compulsive Inventory-Revised
OCS	Obsessive Compulsive Symptoms
PET	Positron Emission Tomography
SCL-90-R	Symptoms Chicklist-90-R
SRIs	Serotonin Reuptake Inhibitor
Y-BOSC	Yale Brawn Obsessive Compulsive Scale
5-HT	5-Hydroxytrypamine

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Author contributions

Dr. S. Sultan, MD, substantially contributed to conception or design of the work, finally approved the version to be published, and was responsible for agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. Ebtihaj O. Fallata, MD Abu Bashar, Miss Ebtehal Emad Olaqi, Miss Ghadeer Hussain Alsharif, Miss Razan Abdulahad Bin Saleh, Miss Refal Abdulaziz Fakieh substantially contributed to conception and design of the work. All authors read and approved the manuscript.

Declaration of competing interest

The authors declare that they have no conflicts of interest.

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