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Olfactory Reference Syndrome: Demographic and Clinical Features of Imagined Body Odor

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Abstract

Objective—Olfactory reference syndrome (ORS), preoccupation with a false belief that one emits a foul or offensive body odor, has been described around the world for more than a century. However, only a few small studies have systematically assessed ORS's clinical features.

Method—Twenty patients with ORS were systematically assessed using semi-structured measures.

Results—Subjects' mean age was 33.4 ± 14.1 ; 60% were female. Preoccupation most often focused on the mouth (75%), armpits (60%), and genitals (35%). Bad breath (75%) and sweat (65%) were the most common odor descriptions. Currently, 85% of subjects had delusional ORS beliefs, 77% had referential thinking, and 85% reported actually smelling the odor. Ninety-five percent of subjects reported performing one or more ORS-related repetitive behaviors (e.g., excessive showering). Forty percent had been housebound for at least one week because of ORS symptoms, 68% had a history of suicidal ideation, 32% had attempted suicide, and 53% had been psychiatrically hospitalized. Forty four percent of subjects had sought non-psychiatric medical, surgical, or dental treatment for the perceived odor, and one third had received such treatment, which was ineffective in all cases.

Conclusion—ORS appears to be characterized by high morbidity and seeking of non-psychiatric treatment.

Keywords

olfactory reference syndrome; imagined body odor; clinical features; delusional disorder; taijin kyofusho

INTRODUCTION

Olfactory reference syndrome (ORS) -- preoccupation with a false belief that one emits a foul or offensive body odor -- has been described for over a century [1–3]. Cases have been reported around the world, including Africa, Japan, Europe, South America, Canada, the

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Middle East, and the United States [3,4]. However, ORS's clinical features have received little systematic study.

In a case report of "hallucination of smell," published in 1891, a man believed he "smelt like a 'heavy sweat,' and wherever he goes he hears people talking about it...." He believed the odor was so offensive that men would not work near him [1]. Over the following century, ORS was described under rubrics such as parosmia, autodysmosophobia, delusions of bromosis, olfactory hallucination, chronic olfactory paranoid syndrome, delusional or hallucinatory halitosis, halitophobia, offensive corporal smell, fear of emitting bad odor, and olfactory delusional syndrome [3–6].

DSM-IV does not include ORS as a separate disorder, nor does it mention the term ORS or other terms for this syndrome. However, DSM-IV considers ORS symptoms a type of delusional disorder, somatic type [7]. The text states: "Somatic delusions can occur in several forms. Most common are the person's conviction that he or she emits a foul odor from the skin, mouth, rectum, or vagina...." [7]. Similarly, ICD-10's text on persistent delusional disorders notes that delusions may "express a conviction that...others think that he or she smells...." [8]. DSM-IV also implicitly refers to ORS in the text on social phobia, noting that in certain cultures (e.g., Japan and Korea), persons with social phobia may fear offending others with their body odor [7]. DSM-IV's section on culture-bound syndromes implicitly refers to ORS under *taijin kyofusho*, a diagnosis used in Japan that is similar to social phobia [7]. A subtype of *taijin kyofusho* more specifically denotes ORS: *jiko-shu-kyofu* (*jiko*, oneself; *shu*, odor; *kyofu*, fear) [9]. Indeed, some authors consider ORS a severe form of social phobia [9–11]. Others have noted similarities between ORS and body dysmorphic disorder (BDD) [3,12], and some authors consider ORS a form of BDD [13,14]. Similarities between ORS and obsessive compulsive disorder (OCD) have also been noted [15].

ORS has been proposed for inclusion in DSM-5 in an Appendix of Criteria Sets Provided for Further Study [12]. Most reports on ORS, however, consist of case reports or small case series. The largest series are from Japan (N=38), Canada (N=36), Nigeria (N=32), Saudi Arabia (N=15), and Brazil (n=14) [4,6,14,16,17]. Most reports assessed a limited range of clinical features, and no prior reports to our knowledge assessed some key features (for example, insight/delusional, ideas/delusions of reference, global severity of symptomatology and psychosocial functioning, or improvement following non-psychiatric treatment) using standardized measures of these constructs.

This report presents data on ORS's demographic and clinical characteristics. We use standardized measures to examine the features noted above in addition to ORS severity and comorbidity. We also report on some other previously unstudied features of ORS, including a number of demographic characteristics; frequencies of a full range of odor types and sources, resulting repetitive behaviors, and types of camouflaging behaviors; severity of individual ORS symptoms; age at onset of ORS compared to that of commonly comorbid disorders; retrospectively assessed course of illness; and suicidality attributed primarily to ORS. We also include a case report from this series.

METHODS

Subjects

Subjects were 20 individuals with lifetime (current or past) ORS referred to the first author for a diagnostic consultation or treatment in an outpatient setting. They were interviewed between 1996 and 2004. During this time, the first author had both a general outpatient practice, consisting of patients with a wide array of psychiatric disorders, as well as a

specialty practice that consisted of patients with BDD. Patients seen in the practice were not systematically screened for ORS, and thus the prevalence of ORS was not determined. The hospital Institutional Review Board approved the study, and subjects provided written informed consent.

ORS was defined as preoccupation with the belief that one emits a foul or offensive body odor, which is not perceived by others. The preoccupation was required to cause clinically significant distress or impairment in social, occupational, or other important areas of functioning. The symptoms could not be accounted for by schizophrenia or another psychotic disorder or due to the direct physiological effects of a substance (e.g., a drug of abuse or medication) or a general medical condition. These criteria are those proposed for the DSM-5 Appendix [12].

Although ORS is a type of delusional disorder, somatic type, in DSM-IV, patients were not required to meet DSM-IV criteria for delusional disorder, as it is not clear that these criteria are suitable for ORS [12]. For example, symptoms were not required to meet delusional disorder criterion D, which specifies that the total duration of any concurrent mood episodes has been brief relative to the duration of the delusional periods. Furthermore, patients were included regardless of whether their belief about the body odor was delusional or non-delusional, as some reports suggest that ORS beliefs are not always of delusional intensity [3,18].

Procedures and Measures

The first author did an extensive in-person interview with all participants, which included a psychiatric intake evaluation and medical history, including inquiry about a seizure diagnosis or a history of seizures or head trauma. All participants appeared cognitively intact and able to provide a valid medical and psychiatric history. Measures were: **Body Dysmorphic Disorder Data Form Modified for ORS** (Phillips KA, unpublished): This semi-structured interview obtained data on demographic and clinical features of the perceived odor (e.g., nature and sources, referential thinking), repetitive ORS behaviors, suicidality, associated morbidity, age at onset, course of illness (retrospectively assessed), and treatment history. This measure is a slightly modified version of the BDD Data Form (Phillips KA, unpublished) [19–21]. **Yale-Brown Obsessive Compulsive Scale Modified for ORS (ORS-YBOCS)**: This semi-structured interviewer-administered measure assesses current (past week) severity of ORS symptoms. It is a slightly modified version of the BDD-YBOCS, a reliable, valid, and widely used measure of current BDD severity [22], which in turn is based on the Y-BOCS for obsessive-compulsive disorder (OCD) [23,24]. Like the BDD-YBOCS, the ORS-YBOCS contains 12-items. Five items assess preoccupation with body odor (time occupied, interference with functioning due to the preoccupation, resulting distress, resistance, and control). Five items assess repetitive behaviors done in response to the preoccupation with body odor (time spent, interference with functioning, distress if the behaviors are prevented, resistance, and control). Item 11 assesses insight regarding the perceived body odor, and item 12 assesses avoidance of activities because of the perceived odor. Items are rated from 0 (no symptoms) to 4 (extremely severe symptoms); the total score ranges from 0 to 48. **Brown Assessment of Beliefs Scale (BABS)**: This 7-item semi-structured clinician-administered scale assesses current insight regarding a false belief across a range of disorders [25]. It assesses 1) conviction regarding the belief's accuracy, 2) certainty that most people think the belief makes sense, 3) explanation for the difference between the patient's and others' view of the belief, 4) whether the patient could be convinced the belief is wrong, 5) attempts to disprove the belief, 6) recognition that the belief has a psychiatric/psychological cause, and 7) ideas/delusions of reference. The BABS is reliable, valid, and sensitive to change [25]. BABS items were asked in reference to the belief about the perceived body odor (for example, "I stink"). Each item is rated from 0 to 4,

yielding a total score of 0 to 24 (item 7 is not included in the total score). Higher scores indicate greater delusional. Scale cutpoints categorize beliefs as delusional or reflecting poor, fair, good, or excellent insight. The *Structured Clinical Interview for DSM-III-R, Patient Version (SCID)* [26] assessed Axis I comorbidity and odor-related lifetime ideas or delusions of reference. The *Global Assessment of Functioning (GAF)* assessed global severity of symptomatology and psychological, social, and occupational functioning during the past month [26]. Scores range from 0 to 100; lower scores denote more severe illness and/or poorer psychosocial functioning. The *Clinical Global Improvement Scale (CGI)* [27] retrospectively assessed global longer-term change in ORS symptoms following non-psychiatric medical, surgical, or dental treatment received for ORS symptoms.

Data Analyses

Means, standard deviations, and percentages were calculated; occasional data are missing. A score of 20 or higher on the 48-point ORS-YBOCS determined whether subjects had current (rather than past) ORS. This cutpoint is often used on the 48-point BDD-YBOCS in BDD studies [e.g., 28,29]. ORS-YBOCS, BABS, and GAF scores – which reflect current severity -- are reported only for subjects with current ORS. On the CGI, a score of 1 or 2 (much or very much improved) defined improvement in ORS; scores of 3 (minimally improved), 4 (no change), or 5 (minimally worse) were considered no change; and scores of 6 or 7 (much or very much worse) defined worsening. The Spearman rank correlation examined correlations.

RESULTS

Table 1 shows the sample's demographic characteristics. As shown in Table 2, subjects reported a broad array of odor sources, most often the mouth (in 75%), followed by the armpits (60%) and genitals (35%). Over the course of the disorder, subjects were preoccupied with 2.9 ± 1.4 different odor sources. Odor descriptions largely corresponded to these sources, with bad breath and sweat most common (in 75% and 65%, respectively). Twenty percent of subjects reported emitting both a typical body odor and an odor not typically considered a body odor (ammonia, an "oily, fishy smell," vegetable soup odor, and "five-day-old food and cigarettes"). No subject reported emitting only an odor not typically considered a body odor.

The mean BABS score (20.6 ± 3.7) was in the delusional range, and the ORS belief of 84.6% of subjects was currently delusional (Table 2). No subjects had good or excellent insight. Eighty-five percent reported that they actually smelled the odor, and 95% believed that other people could smell the odor. Nearly all subjects reported lifetime ideas or delusions of reference, believing that other people took special notice of them because of their supposed odor and misinterpreting others' behavior as indicating that they smelled bad.

As shown in Table 2, 95% of patients performed at least one excessive repetitive behavior in response to their preoccupation with body odor. The most common behaviors were smelling oneself to check for odor (80%), excessive showering to remove perceived odor (68.4%), and excessive clothes changing to remove clothes believed to be malodorous because they were in contact with the odor (50%). Examples of other behaviors were drinking lots of fluids, talking softly to minimize "bad" breath, and checking one's breath by blowing into one's nose. Subjects performed 4.2 ± 2.0 repetitive behaviors over the course of the disorder. Nearly all subjects attempted to mask the perceived odor, most often with perfume or powder (70%), gum (60%), deodorant (55%), or mints (55%).

The total mean score on the ORS-YBOCS was 33.1 ± 6.5 . Scores for individual preoccupation items were: time preoccupied per day: 3.0 ± 1.0 (3 – 8 hours/day);

interference in functioning: 2.5 ± 1.1 (moderate - severe); distress: 2.7 ± 1.0 (moderate - severe); attempts to resist thoughts: 2.4 ± 1.6 (some - little); and control over thoughts: 3.4 ± 0.8 (little - none). Scores for repetitive behaviors items were: Time spent per day: 2.5 ± 1.3 (between 1 - 3 and 3 - 8 hours a day); interference in functioning: 1.9 ± 1.1 (mild - moderate); distress: 3.2 ± 1.0 (severe - extreme); attempts to resist behaviors: 3.3 ± 1.1 (little - none); and control over behaviors: 3.3 ± 0.8 (little - none). The mean insight score was 3.8 ± 0.4 (poor insight - delusional beliefs), and the mean avoidance score was 2.2 ± 1.2 (moderate - severe). ORS-YBOCS total score was correlated $r = -.44$ ($p = .20$) with the GAF and $r = .23$ ($p = .46$) with BABS total score. GAF and BABS scores were correlated $r = -.55$ ($p = .13$).

ORS usually began during adolescence, with two thirds of subjects reporting onset before age 18 (Table 2). Most reported a chronic, and often worsening, course.

Most subjects experienced substantial morbidity due to ORS symptoms (Table 3). Nearly three-quarters reported periods of avoidance of most social interactions because of ORS symptoms, and nearly 50% reported periods during which they avoided most important occupational, academic, and/or role activities because of ORS symptoms. Forty percent had been completely housebound for at least one week because of ORS symptoms. The mean GAF score reflected serious symptoms or serious functional impairment. On the ORS-YBOCS, 54% of subjects reported that current interference in psychosocial functioning was "severe" or "extreme and disabling" due to ORS preoccupations.

High rates of suicidal ideation and suicide attempts were reported, which many subjects attributed primarily to ORS symptoms, and 21.4% reported violent behavior that they attributed primarily to ORS symptoms (Table 3). For example, one patient became so angry about emitting a foul odor that she destroyed her bedroom furniture and gave her sister a black eye.

Major depressive disorder (MDD) was the most common comorbid disorder (Table 4). The mean age at MDD onset was 17.6 ± 8.8 years (compared to 15.6 ± 5.7 for ORS). Fifty percent ($n = 7$) of subjects with comorbid MDD developed ORS at least one year before MDD, 21.4% ($n = 3$) developed MDD and ORS within the same year, and 28.6% ($n = 4$) developed ORS at least one year after MDD onset. Social phobia, substance use disorders, OCD, and BDD were also common, with mean ages of onset as follows: social phobia: 12.3 ± 4.6 years; substance use disorders: 17.1 ± 2.4 years; OCD: 13.6 ± 6.9 years; and BDD: 13.2 ± 4.4 years.

Eight (44.4%) patients sought treatment from a non-psychiatric health professional for their perceived body odor. These eight patients sought treatment from 20 different clinicians (mean = 2.5 ± 1.6 , range 1-6, clinicians) (Table 5). Six (33.3%) patients received treatment from a total of 10 non-psychiatric health professionals for their ORS symptoms (mean = 1.5 ± 0.8 , range 1-3, clinicians). Examples of treatment received were a tonsillectomy, gastrointestinal medications, nasal sprays, prescription mouth wash, and electrolysis of the axillae. All 10 clinicians who did not provide requested treatment withheld it because they thought treatment was unnecessary. The mean CGI score was 4.0 ± 0.0 , indicating that all non-psychiatric treatments led to no longer-term change in ORS symptoms. One subject no longer worried about emitting a sweat odor from his armpits after receiving a prescription soap from a dermatologist, but he then believed that he emitted sweat and fecal odors from his anus.

Ninety percent ($n = 18$) of subjects had received at least one psychotropic medication (Table 5), with a lifetime mean of 4.1 ± 2.3 medications received per subject.

Case Report

A 29-year-old single unemployed white female who was receiving disability payments because of her ORS symptoms was convinced that she emanated “a horrible smell.” She was initially preoccupied with smelling like sweat, then with smelling like feces after hearing a comment about flatulence, and then with having bad breath after hearing on television that an Olympic rower breathed out two gallons of air a day. She additionally believed that she smelled like “5-day old food and cigarettes.” The patient believed the odors could be detected 20 to 30 feet away. She thought about her supposed body odor “all the time” and said it made her feel ashamed and degraded. She had prominent delusions of reference, which were triggered by being given gum or soap (even when she was working in a soap factory); observing someone sniff, frown, glance at her, open a window, or move away from her; or hearing comments such as “Isn’t it stuffy in here?” or “I need some fresh air.” To diminish the perceived body odor, she showered for 2.5 hours/day; changed her clothes five to ten times a day; frequently checked her breath, armpits, and underwear for odor; excessively brushed her teeth; scraped her tongue and the sides of her mouth, sometimes until they bled; ate a special diet to decrease perceived flatulence; and used lots of soap, deodorant, perfume, mouthwash, and gum. As a result of her ORS symptoms, she was socially isolated and had quit 15 to 20 jobs because she erroneously believed that people talked about her body odor. She had been completely housebound, and she stated “I think about suicide all the time” because of her ORS symptoms. The patient had sought treatment for these concerns from a gastroenterologist, gynecologist, and dentist. A dentist prescribed a prescription-strength mouthwash, which did not diminish her concerns. The patient’s ORS symptoms had previously been diagnosed as schizophrenia; she did not have any psychotic symptoms other than those associated with ORS or any other schizophrenia symptoms.

DISCUSSION

All subjects reported emitting at least one odor that may normally be emitted from the body, consistent with prior reports that ORS most commonly focuses on bodily smells such as flatulence/fecal/anal odor, general body odor, halitosis, and genital odor [3,6,16–18]. Other odors reported in the literature include sweat, sperm, urine, armpit odor, and malodorous hands and feet [6,16,17]. Occasionally, the odor has been said to resemble non-bodily smells, such as ammonia, detergent, burned rags, candles, or rotten onions [2,18,30–32]. Indeed, 20% of our subjects reported emitting non-bodily odors (in addition to a typical body odor). People with an uncommon metabolic disorder -- trimethylaminuria (also known as fish malodor syndrome) --emit a body odor that may smell like rotting fish [33]. None of our subjects reported having this syndrome. In addition, no subjects actually emitted a body odor (this was not tested objectively but was based on the perception of the first author and program staff).

Most patients (85%) had delusional ORS beliefs, whereas 15% had poor or fair insight. Thus, insight spanned a range. Although no prior study assessed insight in ORS using a reliable and valid insight measure, some authors have noted that ORS beliefs are not always delusional [9,17,18,34,35], and in a recent report only 21% of 14 patients had delusional beliefs [14]. These findings suggest that although ORS beliefs are often delusional, ORS should not be classified as delusional disorder in DSM. Further research is needed, however.

Most (85%) subjects reported actually smelling the odor, which likely contributed to the high mean BABS score. It is unclear whether such patients are hypersensitive to normal body odors, which they consider noxious or offensive, or whether they experience an olfactory hallucination. Some reports suggest that an olfactory hallucination is often present [31,35,36], and Pryse-Phillips selected his 36 cases based on the presence of olfactory hallucinations [6]. However, other authors suggest that most patients do not actually smell

the odor but instead infer its presence based on their misinterpretation of other people's behavior (e.g., nose rubbing) [16,37,38]. If olfactory hallucinations are present, the presence of a general medical condition such as intranasal disease, head injury, migraines, or a seizure disorder involving the temporal lobe should be considered. However, ORS symptoms differ from symptoms of these disorders in consisting of a typical bodily odor that emanates from the sufferer, being persistent rather than brief, and not being accompanied by other auras typical of temporal lobe epilepsy [6,39–41].

Nearly all subjects (88%) reported lifetime ideas or delusions of reference, similar to Pryse-Phillips' finding of 97% [6]. Referential thinking involves misinterpreting the meaning of other people's comments (e.g., about an odor), gestures (e.g., touching their nose), or other behaviors (e.g., clearing their throat, opening a window, or looking or moving away from the patient) [3]. However, not all subjects reported current referential thinking, which is interesting given that "reference" is part of this syndrome's name.

Nearly all subjects (95%) performed at least one excessive repetitive behavior (if camouflaging is considered a type of repetitive behavior, then all subjects did, as found in a report of 14 subjects) [14]. These behaviors are intended to eliminate, check, obtain reassurance about, or mask the perceived odor. They appear similar in form to those of OCD and BDD (e.g., they are driven, performed in response to a preoccupation, and are not pleasurable). The "content" of some ORS behaviors is also similar to that of compulsions that may occur in BDD and/or OCD – e.g., repetitive checking, excessive showering, and excessive clothes changing. However, some ORS repetitive behaviors appear unique to ORS; for example, neither BDD nor OCD involve camouflaging with breath mints, sniffing one's underwear, or excessively laundering one's clothes.

The mean age at ORS onset in the literature is the early or mid-20s [3,18], but we found a mean onset of 15.6 ± 5.7 years, which is more similar to that found by Yamada and Suzuki (17 years) [4,9]. Our finding that ORS is usually chronic is consistent with Pryse-Phillips' finding that 10 of his 11 patients' ORS symptoms persisted relatively unchanged over two years of follow-up [6].

The high rates and levels of morbidity are striking and consistent with prior reports. In one report, only 3% of patients were "socially active" [6]. Case descriptions suggest that many individuals with ORS are socially isolated because they are embarrassed or fear offending others with their smell [3,30,42]. Patients may not be able to hold a job or attend school because of shame and embarrassment, referential thinking, and time-consuming preoccupations and repetitive behaviors [3,6,13,16,35,37,43]. Consistent with the high rates of lifetime suicidal ideation (68.4%) and suicide attempts (31.6%) in our study, Prazeres et al reported lifetime suicidal ideation in 64.3% and past suicidal behavior in 21.4% of their 14 patients [14]. Of Pryse-Phillips' 36 subjects, 43% experienced "suicidal ideas or action" [6]. A remarkably high proportion of his sample -- 5.6% -- committed suicide over an average follow-up period of 17 months, with the author implying the suicides were due to ORS [6].

MDD was the most common comorbid disorder, consistent with case reports and the only prior report that systematically examined comorbidity [3,14]. MDD most often began after onset of ORS; indeed, nearly three quarters of our sample considered their depressive symptoms primarily due to ORS. However, a causal relationship cannot be established in a cross-sectional study such as this. A high proportion of subjects (50%) had a lifetime substance use disorder; social phobia, OCD, and BDD were also common. (It is possible that the prevalence of comorbid BDD was elevated in part because patients were obtained from a setting where many BDD patients were treated.) Thus, patients with ORS should be

carefully assessed for these disorders. ORS's high comorbidity with these disorders raises the question of whether ORS may be related to them, although it appears to have important differences [3,12,15,44].

Many patients sought non-psychiatric medical, surgical, or dental treatment for the perceived odor, which was ineffective in all cases. This finding is consistent with the literature, which notes that patients may consult dentists, surgeons, and ear, nose, and throat specialists for supposed halitosis; proctologists, surgeons, and gastroenterologists for supposed anal odors; and other physicians such as dermatologists and gynecologists [3,14]. In one sample, patients with ORS had been seen by 4.5 ± 2.8 different non-psychiatric physicians [14]. Such treatment appears to usually be ineffective and associated with patient dissatisfaction [6,16,45]; however, this issue has been minimally studied and needs further investigation.

Most patients received psychotropic medication, although we could not determine whether it was prescribed for ORS or for comorbid disorders. We did not assess these medications' efficacy for ORS. However, case reports and series suggest that serotonin-reuptake inhibitor (SRI) monotherapy, an SRI plus an antipsychotic, or antipsychotic monotherapy may be efficacious [3,12,14,15,17,34,38,46–49]. Antidepressants -- in particular, SRIs -- were efficacious in more cases than antipsychotics [3,18], which is interesting in light of findings that ORS beliefs are often delusional. Case reports and small case series also suggest that behavioral approaches consisting of exposure to avoided social situations and ritual prevention may be efficacious [3,18]. However, treatment research is extremely limited.

The case report described above reflects many of ORS's key clinical features -- for example, excessive preoccupation with multiple bodily odors that could not be perceived by others, related delusions of reference, time-consuming repetitive behaviors performed in response to the preoccupation, and seeking of ineffective non-psychiatric medical treatment for the perceived odors, consistent with the patient's poor insight. The patient's ORS symptoms had a severe and pervasive effect on her psychosocial functioning, as was the case for the 54% of our sample who reported severe or extreme and disabling interference in functioning due to ORS symptoms,

This report and prior literature on ORS have several possible implications for DSM-5. First, the finding that not all patients with ORS have delusional beliefs suggests that ORS should not continue to be considered a type of delusional disorder. ORS appears to have similarities to, as well as differences from, other disorders. For example, like social phobia, social avoidance appears common in ORS; however, unlike social phobia, prominent, repetitive, time-consuming behaviors appear characteristic of all ORS patients (if camouflaging is included). This latter finding, in addition to prominent preoccupation in ORS, raises the question of whether ORS is a form of OCD or BDD. However, differences from OCD include ORS's frequent social avoidance, high prevalence of ideas/delusions of reference, and higher prevalence of current delusional beliefs (occurring in 85% of our sample) compared to OCD (occurring in only 2% of patients) [50,51]. ORS appears more similar to BDD (e.g., preoccupation with a perceived bodily defect, resulting ritualistic behaviors, social avoidance, seeking of non-psychiatric treatment), although delusional beliefs appear less common in individuals with BDD (occurring currently in 36–60% [50–52]), and treatment response may differ [53]. Additional similarities and differences vis a vis other disorders have been discussed elsewhere [3,12]. These findings suggest that ORS should not be considered the same disorder as any of the above disorders [3,12], although ORS may be related to one or more of them and could be considered for inclusion in DSM as an obsessive-compulsive spectrum or an anxiety disorder. It must be emphasized, however, that research on ORS is still extremely limited, and no studies have directly compared ORS's

features with those of any other disorder. Such research is needed to elucidate the relationship of ORS to other disorders and how it should be classified in DSM.

Currently, ORS is proposed for inclusion as a separate disorder in DSM-5's Appendix of Criteria Sets Provided for Further Study [12]). Our findings provide support for elements (e.g., preoccupation) of the proposed diagnostic criteria (see methods section). The universal presence of repetitive behaviors raises the question of whether they should also be included in ORS's diagnostic criteria. Our finding that not all patients have ideas or delusions of reference supports the recommendation that this symptom not be required for the diagnosis. It also raises the question, however, of whether this syndrome should have a name other than ORS. Indeed, as noted in this paper's introduction, ORS has had many different names over the past century. Our view is that because the name ORS is now so widely used, it should be retained. If future research confirms that referential thinking is not universal, consideration could be given to changing this disorder's name.

Study limitations include the relatively small sample of convenience and lack of a control/comparison group. In most cases, we did not review non-psychiatric medical records, and we did not obtain EEGs; however, no subjects reported a history of seizures or another medical condition that appeared to account for ORS symptoms. Another limitation is that we did not assess the efficacy of psychotropic medication for ORS symptoms. Strengths include extended in-person clinical interviews, assessment of some previously unstudied features of ORS, and use of standardized measures. Further studies of this often-severe and understudied disorder are needed.

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Table 1

Demographic Characteristics

Variable	% (n) or Mean $\pm$ SD
Age	33.4 $\pm$ 14.1 (range: 15–65)
Gender (% female)	60% (12)
Marital Status	
Single	60% (12)
Married	40% (8)
Divorced	0% (0)
Employment Status	
Full-time	23.5% (4)
Part-time	17.6% (3)
Unemployed	17.6% (3)
Student, in school	35.3% (6)
Student, not in school	5.9% (1)
Education	
Part high school	10.5% (2)
High school graduate or GED	15.8% (3)
Part college	42.1% (8)
Graduated 2 yr college	10.5% (2)
Graduated 4 yr college	5.3% (1)
Part graduate school	15.8% (3)
Living Situation	
Roommate or spouse	63.2% (12)
Parent	31.6% (6)
Alone	5.3% (1)
Sources of Economic Support	
Self supporting	27.8% (5)
Partial supporting	27.8% (5)
Supported by others (not on disability)	22.2% (4)
Receiving disability payments	22.2% (4)
- Attributed primarily to ORS	16.7% (3)
- Attributed primarily to other reasons	5.5% (1)
Treatment Status	
Outpatient	66.7% (12)
Inpatient	16.7% (3)
Non-patient	16.7% (3)

Table 2**Clinical Characteristics***

Clinical Feature	% (n) or Mean $\pm$ SD
Source of Odor[†]	
Mouth	75% (15)
Armpits	60% (12)
Genitals	35% (7)
Anus	30% (6)
Feet	30% (6)
Skin	25% (5)
Groin	10% (2)
Hands	10% (2)
Head/Scalp	10% (2)
Under breasts	5% (1)
Total number of sources	2.9 $\pm$ 1.4
Description of Odor[†]	
Bad breath	75% (15)
Sweat	65% (13)
Other smell [‡]	55% (11)
Flatulence/Fecal	30% (6)
Urine	20% (4)
Vaginal	10% (2)
Delusions Related to the Perceived Body Odor	
BABS mean score	20.6 $\pm$ 3.7
BABS categories	
Delusional	84.6% (11)
Poor	7.7% (1)
Fair	7.7% (1)
Good	0% (0)
Excellent	0% (0)
Subject smells the odor	85% (17)
Believes others can smell the odor	95% (19)
Ideas or delusions of reference	
Delusions of reference – lifetime (SCID)	82.4% (14)
Ideas of reference – lifetime (SCID)	5.9% (1)
Delusions of reference – current (BABS)	69.2% (9)
Ideas of reference – current (BABS)	7.7% (1)
Excessive Repetitive Behaviors[†]	
Smelling self	80% (16)
Showering	68.4% (13)
Changing clothes	50% (10)
Seeking reassurance	45% (9)

Clinical Feature	% (n) or Mean $\pm$ SD
Dieting/unusual food intake	45% (9)
Brushing teeth	40% (8)
Laundering clothes	30% (6)
Comparing to other people	30% (6)
Other behavior [§]	30% (6)
At least one behavior	95% (19)
Total number of behaviors	4.2 $\pm$ 2
Attempts to Mask the Perceived Body Odor [†]	
Perfume/Fragrance/Powder	70% (14)
Gum	60% (12)
Deodorant	55% (11)
Mints	55% (11)
Mouthwash	50% (10)
Toothpaste	30% (6)
Clothes	25% (5)
Other ^{!!}	25% (5)
At least one item used to mask odor	100% (20)
Total number of items used to mask odor	4 $\pm$ 2.2
ORS Severity (current)	
ORS-YBOCS	33.1 $\pm$ 6.5
Course of Illness	
Age of ORS onset (full criteria)	15.6 $\pm$ 5.7
ORS onset < 18 years old	65% (13)
Type of onset	
Acute [#]	52.6% (10)
Gradual	47.4% (9)
Years duration of ORS	16.6 $\pm$ 15.5
Chronicity of course	
Chronic [§]	84.2% (16)
Episodic	15.8% (3)
Type of course	
Improving	10.5% (2)
Steady	36.8% (7)
Worsening	52.6% (10)
Course of odor concerns over time	
One set of odor(s) started at same time and did not change	38.9% (7)
New odors added to ongoing previous odors	44.4% (8)
Miscellaneous	
Frequent teasing about odor	26.3% (5)

* All variables reflect lifetime occurrence except where noted.

[†] Total is greater than 100% because some patients reported more than one odor source, odor description, or behavior.

[‡]Other smells were (n=1 for each): ammonia, “bad” odor, “body odor/mucus/post nasal drip,” “body odor/rotten odor/morning breath,” “hard/unpleasant smell,” “like 5 day-old food and cigarettes,” oily-fishy smell, “puss/sour,” “salt,” “foul smelling/rancid,” and “vegetable soup/putrid body odor”

[§]Other behaviors were (n=1 for each): scrapes tongue/coughs to remove bacteria on tonsils/talks softly/uses feminine wash, scrapes back of tongue/checks tonsils to remove mucus, uses spoon to scrape skin on tongue and inside of mouth, checks breath by blowing into nose/drinking water, frequent haircuts/avoiding hats, drinking lots of fluids

^{!!}Other items used to mask the odor were (n=1 for each); spraying alcohol on self and surroundings/wears heavy underwear, putting cornstarch under feet, putting toilet paper in underwear, crossing legs/putting toilet paper in underwear, using air fresheners

[#]Acute onset triggers included; comments about odor (n=10) and reactions of other people (n=2)

[§]Symptoms had not remitted for at least 1 month since onset; assessed retrospectively

Table 3**Psychosocial Impairment, Suicidality, and Other Morbidity ***

Clinical Feature	% (n) or Mean $\pm$ SD
Functional Impairment Attributed to ORS	
Avoidance of social interactions	73.7% (14)
Avoidance of occupational/academic/role activities	47.4% (9)
Housebound for at least 1 week	40% (8)
GAF (current)	47.5 $\pm$ 13.2
Suicidality	
Suicidal ideation	68.4% (13)
Suicidal ideation attributed primarily to ORS	47.4% (9)
Attempted suicide	31.6% (6)
Attempted suicide primarily due to ORS	15.8% (3)
Violence[†]	
Physical violence for any reason	50% (7)
Physical violence attributed primarily to ORS	21.4% (3)
Psychiatric Hospitalization	
Hospitalization for any reason	52.6% (10)
Hospitalization attributed primarily to ORS	31.6% (6)

* All variables reflect lifetime occurrence except where noted.

[†] Physical violence was defined as motor behavior that physically injured another person or caused significant property damage.

Table 4**Axis I Comorbidity***

Disorder	Lifetime % (n)	Current % (n)
Mood Disorder	95% (19)	60% (12)
Major depressive disorder	85% (17)	55% (11)
Bipolar disorder	10% (2)	0% (0)
Dysthymia [†]		0% (0)
Psychotic Disorder	15% (3)	0% (0)
Delusional disorder	10% (2)	0% (0)
Schizoaffective disorder	5% (1)	0% (0)
Schizophrenia	0% (0)	0% (0)
Schizophreniform disorder	0% (0)	0% (0)
Brief reactive psychosis	0% (0)	0% (0)
Substance Use Disorder	50% (10)	20% (4)
Alcohol	30% (6)	10% (2)
Other drug	35% (7)	10% (2)
Anxiety Disorders	80% (16)	75% (15)
Social phobia	65% (13)	60% (12)
Obsessive compulsive disorder	30% (6)	25% (5)
Panic disorder	20% (4)	10% (2)
Specific phobia	10% (2)	10% (2)
Generalized anxiety disorder	5% (1)	5% (1)
Agoraphobia	0% (0)	0% (0)
Somatoform Disorders[†]		30% (6)
Body dysmorphic disorder		30% (6)
Hypochondriasis		5% (1)
Somatoform pain disorder		0% (0)
Somatization disorder		0% (0)
Undifferentiated somatoform disorder		0% (0)
Eating Disorders	5% (1)	0% (0)
Bulimia nervosa	5% (1)	0% (0)
Anorexia nervosa	0% (0)	0% (0)
Adjustment Disorder	0% (0)	0% (0)

* Some totals are greater than 100% because some subjects had more than one disorder in that category.

[†] Lifetime data are not obtained by the SCID.

Table 5**Treatment Sought and Received (Lifetime)**

Treatment	Sought Treatment[*] % (n)	Received Treatment[†] % (n)
Non-Psychiatric Clinicians Seen for ORS		
Ear, nose, and throat specialist	22.2% (4)	11.1% (2)
Dentist	16.7% (3)	5.6% (1)
Dermatologist	11.1% (2)	11.1% (2)
Electrologist	11.1% (2)	11.1% (2)
General practitioner	11.1% (2)	5.6% (1)
Surgeon	11.1% (2)	5.6% (1)
Gastroenterologist	11.1% (2)	0% (0)
Endocrinologist	5.6% (1)	5.6% (1)
Gynecologist	5.6% (1)	0% (0)
Unspecified	5.6% (1)	0% (0)
Psychotropic Medication Received		90% (18)
Serotonin-reuptake inhibitor		65% (13)
Benzodiazepine		45% (9)
Non-SRI antidepressant		40% (8)
Antipsychotic		30% (6)
Buspirone		15% (3)
Mood stabilizer		15% (3)
Anti-parkinsonian agent		10% (2)
Stimulant		10% (2)

^{*} Eight patients (44.4%) sought non-psychiatric treatment for ORS symptoms.

[†] Six patients (33.3%) received treatment for ORS symptoms.