Delusional infestation: Epidemiology, clinical presentation, assessment and diagnosis

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Literature review current through: **Oct 2023.**
This topic last updated: **Jul 29, 2021.**

INTRODUCTION

Delusional infestation (also called delusional parasitosis) is a rare disorder in which affected individuals have the fixed, false belief (delusion) that they are infected by "bugs": parasites, worms, mites, bacteria, fungus, living “threads,” or other living organisms. As with all delusions, this belief cannot be corrected by reasoning, persuasion, or logical argument. Many affected individuals are quite functional; for the minority, delusions of parasitic infection may interfere with usual activities [1].

Delusional infestation is a delusional disorder of the somatic type [2], a subgroup of delusional disorders in which nonexistent disease or alteration of the body forms the basis of the disorder. Delusions of infestation are the most common form of monosymptomatic hypochondriacal psychosis; others include delusions of dysmorphism and delusions of body odor or halitosis.

This topic addresses the epidemiology, clinical presentation, and diagnosis of delusional infestation. Treatment of delusional infestation is discussed separately. Other psychotic disorders are discussed separately. First- and second-generation antipsychotic drugs are discussed separately.

- (See "Treatment of delusional infestation".)
- (See "Brief psychotic disorder".)
- (See "Postpartum psychosis: Epidemiology, clinical features, and diagnosis".)

- (See "Schizophrenia in adults: Clinical features, assessment, and diagnosis".)
- (See "Schizophrenia in adults: Maintenance therapy and side effect management".)
- (See "First-generation antipsychotic medications: Pharmacology, administration, and comparative side effects".)
- (See "Second-generation antipsychotic medications: Pharmacology, administration, and side effects".)

TERMINOLOGY

Delusional infestation — Delusional infestation is known by numerous other names, including Ekbom syndrome, delusory parasitosis, psychogenic parasitosis, delusional parasitosis, delusional ectoparasitosis, formication, chronic tactile hallucinosis, dermatophobia, parasitophobia, and cocaine bugs. The principal name for the disorder through approximately 2015 "delusional parasitosis" was introduced in 1948 in a description of 45 cases [3]. More recent literature refers to delusional infestation [4].

Two forms of delusional infestation are widely recognized [5,6]:

Primary delusional infestation — Primary delusional infestation is a psychiatric disorder with the delusion of parasitic infection as its only manifestation.

Secondary delusional infestation — Secondary delusional infestation is a symptom rather than a disorder. The delusion of infestation occurs secondarily to another psychiatric disorder, including substance use disorder, or to a medical illness.

Morgellons — Morgellons is a syndrome characterized by symptoms that appear to be identical to delusional infestation or very similar, but with the addition of the affected patient's beliefs that inanimate objects (such as colored strings or fibers) were present in the lesion as well [7,8].

Morgellons was named and described in 1674 by Sir Thomas Browne [9,10]. The term "Morgellons disease" has been adopted by an active online community of patients and family members who believe that this unexplained dermopathy is a poorly diagnosed infectious disease and dispute an underlying psychological basis [11]. An association between borreliosis and Morgellons disease has been proposed. (See "Microbiology of Lyme disease", section on 'Antigens of B. burgdorferi and other Lyme disease species'.)

The etiology and diagnosis of Morgellons is controversial. Multiple studies published between 2013 and 2015, largely from a single group of investigators, described histological observations and findings from electron microscopic imaging of skin samples from several patients with

Morgellons [12-14]. The findings included the presence of spirochetes, dermal filaments comprised of keratin and collagen, and proliferation and activation of keratinocytes and fibroblasts in the epidermis.

These findings were contrary to an earlier, larger study of 115 patients with unexplained dermopathy, conducted by the Centers for Disease Control and Prevention [8]. The Centers for Disease Control and Prevention study reported the absence of parasites and that most materials collected from participants' skin were composed of cellulose, likely of cotton origin.

EPIDEMIOLOGY

Incidence — Delusional infestation is a rarely diagnosed disorder. It may be underestimated in the psychiatric literature because patients with delusional infestation do not believe that their symptoms are delusional and are reluctant to see a psychiatrist.

Population-based studies found an incidence of delusional infestation of 1.9 cases (95% CI 1.5-2.4) per 100,000 person-years and a prevalence of 27.3 per 100, 000 person-years among residents of Olmsted County, Minnesota from 1976 to 2010 [15,16]. The diagnosis of delusional infestation in the study was defined as including delusional parasitosis as well as false beliefs of infestation by insects or inanimate objects. The mean age of patients at diagnosis was 61.4 years (range of 9 to 92 years). The incidence rate was fairly consistent in each decade of the study with a nonsignificant trend toward increasing over time. Analyses of the data that adjusted for age and sex found a prevalence of 27.3 per 100,000 person-years [16]. No difference in prevalence was seen between men and women, and in each sex, the prevalence increased with age.

While patients with this disorder are also seen by dermatologists and infectious disease specialists, they are relatively infrequently reported in these settings. Based on longitudinal studies, dermatologists might expect to see between one and five individuals with delusional infestation annually [17,18]. A more specialized combined tropical medicine and psychiatry clinic diagnosed 75 individuals over a five-year period [19].

Sociodemographic characteristics — A retrospective review of 147 patients diagnosed as having a delusional infestation identified the following sociodemographic characteristics [20]:

- Mean age was 57 years
- Female-to-male ratio was 2.89:1
- 56 percent were married

- 33 percent were self-described as disabled, 28 percent were retired, 26 percent were employed

Other studies have also reported that delusional infestation appears to be more common in patients older than 50 years of age and in women [21,22], whereas some studies [23,24] have found a majority of patients to be unmarried. In one series, 54 percent of patients were evaluated as "socially isolated" [21]. Social isolation appeared to be a premorbid state rather than a consequence of illness. A higher than expected prevalence of personality disorders has also been observed [25,26].

Morgellons — An epidemiologic study sponsored by the United States Centers for Disease Control and Prevention (CDC) reported on 115 patients (3.7 patients per 100,000 health plan enrollees) with unexplained skin lesions or skin sensations accompanied by patient-reported fibers or other inanimate materials [8]. Skin lesions were found to be most consistent with chronic excoriations or arthropod bites. No common underlying infection or other physical cause for the condition was found, similar to findings from studies of the more commonly recognized "delusional infestation." Seventy percent of the patients in the CDC sample additionally had chronic fatigue and 63 percent had clinically significant somatic complaints. (See 'Morgellons' above.)

Comorbidity — A series of 54 patients with a delusional infestation of parasites and inanimate objects found that 74 percent had an additional, co-occurring psychiatric disorder. Among these 40 patients, the most frequent psychiatric disorders were depression (45 percent) anxiety (19 percent) and substance use disorder (19 percent) [7]. The sample was limited to patients who were willing to undergo a psychiatric examination.

PATHOGENESIS

The pathogenesis of delusional infestation is unknown.

One theory for the development of somatoform-type disorders is that common, distressing somatic symptoms become amplified and perpetuated following the patient's new awareness of a known disease through another individual, the media, or publicity by public health agencies [27]. As an example, many individuals may experience fleeting pruritus following an encounter with an individual with scabies. For a small proportion of them, prone to hypochondriacal worry or a somatic delusion, the pruritus might worsen as they learn more about scabies. The reasons for this amplification are unclear. Patients may also misinterpret new sensations or symptoms to which they were previously oblivious, reaffirming their belief that they must be sick, and

perpetuating the cycle. Stress induced by the severity of the perceived illness may further augment symptoms.

It has also been proposed that delusional infestation may be related to an excess of extracellular dopamine within the striatum of the brain due to decreased functioning of the dopamine transporter [28]. Response of many patients to the dopamine antagonist pimozide lends some support to this theory.

CLINICAL PRESENTATION

Patients commonly present for general medical or dermatologic care (rather than psychiatric care) with a fixed, false belief of infestation. They typically describe pruritus and frequently have excoriations from scratching. They often have a history of dermatologic complaints, including rashes, pruritus, and sensations of stinging, biting, and formication (a feeling that bugs are crawling on the skin) [21,29]. The onset is usually insidious, and most patients have symptoms for at least six months, and some many years, before the diagnosis is established.

Patients typically have a history of prior negative evaluations by dermatologists and general medical physicians, and in some cases have consulted entomologists. They may have received repeated courses of dermatologic and anti-infective therapies, despite the lack of an objective diagnosis. Those who attribute their illness to household pets may have visited veterinarians repeatedly, seeking treatment for their pets. Patients often bring in specimens for examination, which they have picked from their skin and may include scabs or cloth fibers, but do not include parasites [30,31]. Often, they have already rejected the possibility of a psychiatric cause and refused to see a psychiatrist.

Patients may provide bizarre and unlikely stories concerning their infestation, including exhaustive descriptions of the parasite's appearance, habitat, reproductive cycle, and points of body entry and egress. Many have repeatedly had exterminators into their homes, and have sprayed themselves and their homes with potentially toxic pesticides. Some sufferers may move or rid themselves of their personal belongings in the hopes of ending the problem.

Other persons may be drawn into the patient's delusional system; 8 to 25 percent of delusions of infestation in several samples are shared [25,26,32,33], most often with one other person (ie, a folie à deux) [25].

Sufferers of delusional infestation generally have intact mental function and otherwise normal behavior. Their delusions are limited in scope. Many affected individuals are quite functional; for the minority, delusions of parasitic infection may interfere with usual activities [1].

Patients with primary delusional infestation do not generally have an antecedent history of psychiatric illness. Delusions may be preceded by an event in which possible exposure to parasites may have occurred such as sleeping in unclean bed sheets, borrowing clothing, or travel to and receipt of gifts from exotic destinations [1,34,35]. However, documented parasitic infections predate the development of delusional infestation in only 2 percent of cases [25].

Younger patients with delusional infestation may be more likely to have the secondary form of the disorder, with underlying causes being, most notably, head injuries, substance use disorder, and schizophrenia [25,36]. (See 'Secondary delusional infestation' below.)

ASSESSMENT

A thorough history, including health risk factors, review of systems, and use of prescription and illicit drugs should be obtained and may reveal clues to an underlying psychiatric or medical illness. The assessment also needs to rule out other psychiatric disorders and medical conditions to reach a diagnosis of primary delusional infestation.

Physical examination is often unrevealing apart from ulcers, excoriations, and scars that result from attempts to remove the organisms using fingernails, knives, pins, or other objects. Lesions may be asymmetric, particularly over the shoulders and scapulae, reflecting the increased range of the patient's dominant hand [25]. Contact or irritant dermatitis resulting from excessive cleaning or the use of abrasive soaps or chemicals may be present.

Medical evaluation to rule out a true parasitic infection includes: (See 'Parasitosis' below.)

- Inquiry about travel, especially to developing countries, and exposure to an infected individual (scabies) or to an infested environment (bed bugs, animal or bird mites).
- A complete blood count with differential, to look for eosinophilia. An absolute eosinophil count is not required if one can calculate this by multiplying the percentage of eosinophils by the total white blood cell count.
- A dermatologic evaluation to look for characteristic lesions.

Evaluation by a dermatologist can also provide reassurance to the patient that his or her symptoms are being taken seriously.

Some medical causes of secondary delusional infestation may be evident from the history or physical examination (eg, hyperthyroidism, neurologic disease). Laboratory tests to evaluate causes of unexplained pruritus in the context of possible delusions may include a complete

blood count and differential, electrolytes, urea, creatinine, liver function tests and enzymes, fasting blood sugar, thyroid stimulating hormone level, and B12 and folate levels. (See 'Secondary delusional infestation' below and "Syphilis: Screening and diagnostic testing" and "Acute and early HIV infection: Treatment" and "Dietary assessment in adults" and "Overview of the clinical manifestations of hyperthyroidism in adults" and "Screening for type 2 diabetes mellitus" and "Pruritus: Etiology and patient evaluation", section on 'Evaluation'.)

Based on the individual's risk factors, additional tests such as human immunodeficiency virus serology, a tuberculin skin test, venereal disease research laboratory or rapid plasma reagin test, a urine drug screen for substances, or radiologic imaging (eg, chest radiograph, computerized tomography, or magnetic resonance imaging of the brain) may be indicated.

Patients who bring specimens should be reassured that these will be examined under a microscope. Providing the patient with specimen bottles with preservative may avoid the argument that the "parasites" will be missed because of improper preservation. Skin biopsies are rarely indicated; skin scrapings may be more appropriate, and can be readily obtained during an office visit if scabies is suspected. In a study of 108 patients with suspected delusional infestation, neither skin biopsies nor examination of patient-provided specimens provided objective evidence of skin infestation [37]. A biopsy, however, may give the patient greater confidence in the diagnosis and, if performed at the patient's request might help the patient feel "listened to" and strengthen the patient-physician relationship [38].

Follow-up visits provide the opportunity for serial examination of the skin and allow the patient to develop trust in the clinician. Repeated assessments of the patient are helpful in determining whether the patient's beliefs about infestation are fixed or shakable. The patient with shakable beliefs may eventually question whether or not the problem is "in his head" or ask the clinician's opinion of the problem [30]. To help distinguish between a shakable and fixed belief, it can be useful to ask the patient: "If our investigations conclude that you do not have a parasite, how would you feel?" Most delusional patients will reply that they are convinced that they have a parasite, where a nondelusional patient would likely express some relief. (See 'Hypochondriasis' below.)

Once a medical condition has been ruled out, the next step diagnostically is to differentiate between a primary delusional infestation and delusional symptoms secondary to another psychiatric disorder. A thorough psychiatric assessment is desirable. However, most patients with delusional infestation refuse to see a psychiatrist. Tact and careful strategy may lead to a successful psychiatric referral. Alternatively, the primary care clinician should consider initiating treatment for delusional infestation, with guidance from a psychiatrist as needed.

In the primary disorder, the delusion may be the only symptom present, or may be accompanied by secondary anxiety or depression. In the secondary form, a wide range of mood, anxiety, psychotic, or substance-use disorders may be present. (See 'Primary delusional infestation' above and 'Secondary delusional infestation' below.)

Further complicating the diagnosis, depression or anxiety may be present in either the primary or secondary forms of the disorder. In primary delusional infestation, the anxiety or depression is secondary, emerging after the delusion, and often evolving out of fears about infestation and concern about its impact on the patient's life. The duration of the anxiety or depression tends to be briefer than the delusion. In secondary delusional infestation, the delusion occurs concurrently with or following the onset of an anxiety disorder or depression, and may follow a parallel course. (See "Generalized anxiety disorder in adults: Epidemiology, pathogenesis, clinical manifestations, course, assessment, and diagnosis" and "Unipolar depression in adults: Assessment and diagnosis".)

DIAGNOSIS

Primary delusional infestation is a psychiatric disorder, diagnosed in DSM-5 as delusional disorder, somatic subtype, with the delusion of infestation as the sole psychotic symptom [2]. DSM-5 diagnostic criteria for the disorder are as follows [2]:

- A. The presence of a delusion with a duration of one month or longer.
- B. Criterion A for schizophrenia has never been met.

  Note: Hallucinations, if present, are not prominent and are related to the delusional theme (eg, the sensation of being infested with insects associated with delusions of infestation).
- C. Apart from the impact of the delusion(s) or its ramifications, functioning is not markedly impaired, and behavior is not obviously bizarre or odd.
- D. If manic or major depressive episodes have occurred, these have been brief relative to the duration of the delusional periods.
- E. The disturbance is not attributable to the physiological effects of a substance or another medical condition, and is not better explained by another mental disorder, such as body dysmorphic disorder or obsessive-compulsive disorder.

Subtypes and specifiers

- Somatic type: This subtype applies when the central theme of the delusion involves bodily functions or sensations.

- Specify course after duration of one year:

  - First episode, currently in acute episode: First manifestation of the disorder meeting the defining diagnostic symptom and time criteria. An acute episode is a time period in which the symptom criteria are fulfilled.

  - First episode, currently in partial remission: Partial remission is a time period during which an improvement after a previous episode is maintained and in which the defining criteria of the disorder are only partially fulfilled.

  - First episode, currently in full remission: Full remission is a period of time after a previous episode during which no disorder-specific symptoms are present.

  - Multiple episodes, currently in acute episode.

  - Multiple episodes, currently in partial remission.

  - Multiple episodes, currently in full remission.

  - Continuous: Symptoms fulfilling the diagnostic symptom criteria of the disorder are remaining for the majority of the illness course, with subthreshold symptom periods being very brief relative to the overall course.

  - Unspecified.

- Specify current severity: Severity is rated by a quantitative assessment of the primary delusion. The symptom may be rated for its current severity (most severe in the last seven days) on a five-point scale ranging from 0 (not present) to 4 (present and severe).

(See "Delusional disorder".)

Differential diagnosis — The differential diagnosis of primary delusional infestation (delusional disorder, somatic subtype) includes true parasitosis, hypochondriasis and the manifestations of other psychiatric disorders or general medical conditions (ie, secondary delusional infestation).

Parasitosis — True parasitosis can cause systemic and/or cutaneous findings, which may be associated with peripheral blood eosinophilia (absolute eosinophil count >500 cells/microL). The exposure history, dermatologic evaluation, and laboratory testing can be used to determine

whether a true parasitic infection is a consideration. These factors are discussed in detail separately. (See "Skin lesions in the returning traveler" and "Approach to the patient with unexplained eosinophilia".)

Hypochondriasis — Hypochondriasis is a preoccupation with fears of having a serious disease despite appropriate medical evaluation and reassurance. Patients with hypochondriasis may focus on parasitic infestation. However, the fears of infestation are not of a delusional intensity. The patient shows some insight into the absence of disease. Rather than being fixed, the patient's beliefs about the infestation are said to be "shakable," in that the patient can be talked out of them. (See "Somatic symptom disorder: Assessment and diagnosis", section on 'Terminology and DSM-5'.)

Secondary delusional infestation — Secondary delusional infestation is a psychiatric symptom rather than a psychiatric disorder, occurring in the context of another psychiatric disorder or underlying medical illness. (See "Treatment of delusional infestation", section on 'Pharmacotherapy'.)

Psychiatric disorders — Symptoms of a secondary delusional infestation may occur in conjunction with a wide range of psychiatric disorders, including schizophrenia, anxiety, depression, obsessive-compulsive disorder, schizophreniform disorder, bipolar disorder, or post-traumatic stress disorder, as well as substance use disorders [30,36,39,40]. Primary delusional infestation presents without other psychotic symptoms characteristic of schizophrenia, including disorganized speech, disorganized or catatonic behavior, or negative symptoms such as apathy and amotivation. (See "Generalized anxiety disorder in adults: Epidemiology, pathogenesis, clinical manifestations, course, assessment, and diagnosis" and "Unipolar depression in adults: Assessment and diagnosis" and "Obsessive-compulsive disorder in adults: Epidemiology, clinical features, and diagnosis" and "Posttraumatic stress disorder in adults: Epidemiology, pathophysiology, clinical features, assessment, and diagnosis" and "Bipolar disorder in adults: Epidemiology and pathogenesis".)

Some experts, but not all, consider the coexistence of phobias and hypochondriasis with delusions of infestation as secondary delusional infestation [30].

Medical conditions — The differential diagnosis of a secondary delusional infestation among medical conditions includes a true parasitosis, thyroid disease, diabetes mellitus, vitamin B12 and folate deficiencies, syphilis, human immunodeficiency virus, hematologic disorders, and prescription-drug side effects. Many of these underlying medical conditions have been documented in case reports (described below) [21,26]. In most cases, however, reports of

secondary delusional infestation describe associations between the delusions and medical illness; causality has rarely been conclusively determined.

- Nutritional deficiencies, including vitamin B12 [25,41] and folate [25,26] deficiencies, and pellagra [25,42] have been reported in patients with delusional infestation. One patient with pellagra and one patient with B12 deficiency did respond with resolution of delusional infestation symptoms after treatment of the underlying vitamin deficiency [41,42]. (See "Dietary assessment in adults".)

- Central nervous system disorders are the most commonly reported underlying medical conditions associated with delusional infestation. Delusions have been described in the setting of dementia of various etiologies [26,29], head injury [26], cerebrovascular disease [25,43,44], multiple sclerosis [25], multiple system atrophy [45], central nervous system infections including encephalitis, meningitis, and neurosyphilis [26], and as a complication of neurosurgery [46]. Delusional infestation is nonetheless quite rare in neurologic practice. (See "Evaluation of cognitive impairment and dementia" and "Acute mild traumatic brain injury (concussion) in adults" and "Initial assessment and management of acute stroke" and "Evaluation and diagnosis of multiple sclerosis in adults" and "Viral encephalitis in adults" and "Clinical features and diagnosis of acute bacterial meningitis in adults" and "Neurosyphilis".)

- Delusional infestation has been associated with diseases of most other organ systems, including the hematopoietic [25], pulmonary [25], cardiac [3,22], renal [25], gastrointestinal [25], and endocrine systems [25,29,47]. Delusions of infestation have been reported in patients with a variety of malignancies [26,47,48] as well as systemic infections such as human immunodeficiency virus infection [49], tuberculosis [3], and leprosy [29]. It remains unproven whether any of these conditions truly underlie the symptoms of delusional infestation. (See "Clinical manifestations and complications of pulmonary tuberculosis" and "Leprosy: Epidemiology, microbiology, clinical manifestations, and diagnosis".)

- Substance use disorders can be a cause of parasitic delusions, which are usually transient. We are careful to assess for substance use disorder especially when delusional infestation presents in younger age groups [25,36]. Chronic alcohol use and withdrawal and long-term cocaine and amphetamine use are common precipitants; "cocaine bugs" have been described with acute use as well [50]. (See "Cocaine use disorder: Epidemiology, clinical features, and diagnosis" and "Risky drinking and alcohol use disorder: Epidemiology, clinical features, adverse consequences, screening, and assessment".)

- Prescription drugs may induce delusions of infestation; examples include phenelzine [51,52], pargyline [52], ketoconazole [53], corticosteroids [26], amantadine [54], ciprofloxacin [55], pegylated interferon alfa [56], and topiramate [57]. Drug-induced delusional infestation generally resolves once the drug is discontinued.

SOCIETY GUIDELINE LINKS

Links to society and government-sponsored guidelines from selected countries and regions around the world are provided separately. (See "Society guideline links: Psychotic disorders".)

SUMMARY AND RECOMMENDATIONS

- Delusional infestation (also called delusional parasitosis) is a rare disorder characterized by a fixed, false belief that an individual is infected with parasites or other living organisms. Classified as a delusional disorder, somatic subtype in DSM-5, delusional infestation is one of a number of disorders also described as a monosymptomatic hypochondriacal psychosis. The term delusional infestation has been used to describe patients with delusions of infestation by parasites, insects, or inanimate objects. (See 'Terminology' above and 'Epidemiology' above.)

- Two forms of delusional infestation have been described.

  - Primary delusional infestation is a psychiatric disorder with the delusion of parasitic infection as its only manifestation. It is a diagnosis of exclusion after ruling out a parasitic infection and other medical and psychiatric illnesses. (See 'Primary delusional infestation' above.)

  - Secondary delusional infestation is a symptom rather than a disorder. The delusion of infestation occurs secondarily to another psychiatric disorder, including substance use disorder, or to a medical illness. (See 'Secondary delusional infestation' above.)

- Delusional infestation can be distinguished from other psychiatric disorders. (See 'Differential diagnosis' above.)

  - Hypochondriasis is a preoccupation with fears of having a serious disease despite appropriate medical evaluation and reassurance. Although patients with hypochondriasis can fear parasitic infestation, their fears are not of delusional

intensity. They will acknowledge that they may not have the conditions. (See "Somatic symptom disorder: Assessment and diagnosis", section on 'Terminology and DSM-5'.)

- Patients with primary delusional infestation can be distinguished from patients with schizophrenia by the absence of disorganized thinking or behavior. Other than functional impairment stemming from the delusion of parasitic infection, these patients generally exhibit normal behavior. (See "Schizophrenia in adults: Clinical features, assessment, and diagnosis".)

- Symptoms of delusional infestation can occur secondarily to a wide range of psychiatric and medical illnesses, including true parasitosis. Neurological problems and substance use disorder are the most common. A thorough history and physical exam, with selective laboratory testing, can exclude these conditions. (See 'Differential diagnosis' above and 'Assessment' above.)

ACKNOWLEDGMENT

The UpToDate editorial staff acknowledges Jay Keystone, MD, MSc (CTM), FRCPC (deceased), who contributed to an earlier version of this topic review.

Topic 6957 Version 30.0

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