



# Delusional infestation: Clinical presentations, diagnosis, and management

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## Abstract

**Background:** Delusional infestation is a primary psychiatric disorder characterized by a somatic-type delusional disorder (primary delusional infestation) that may lead to self-induced cutaneous lesions which are often difficult to recognize and treat properly. It may be also secondary to other psychiatric disorders, medical diseases, or substance abuse.

**Aims:** This review will describe prevalence, common clinical features, different clinical presentations, differential diagnoses, and treatment recommendation. Special focus has been put on psychological aspects.

**Methods:** We conducted a literature search on PubMed from January 2001 to June 2020 with the search terms of delusional parasitosis, delusional infestation, psychological, Reference lists of identified articles were examined for further relevant studies. The search was limited to English language articles. No specified quality criteria were used for study inclusion.

**Results:** The clinical manifestations of delusional infestation are very important in the differential diagnosis and its psychological implications and management perspectives.

**Conclusion:** This article presents an update regarding the clinical aspects and treatment options of delusional infestation in order to provide an up-to-date review for dermatologists and general practitioners.

## KEYWORDS

antipsychotics, delusional disorder, delusional infestation, psychocutaneous, psychodermatology

## 1 | INTRODUCTION

Delusional infestation (DI) is a medical condition in which the patient delusionally believes that his or her body, mainly the skin, is infested by small pathogens, alive or not, in absence of any medical evidence.

Patients usually present intense skin picking and self-harm behaviors to get rid of the pathogens.<sup>1,2</sup>

The typical DI patient is generally female, middle-aged, with limited social contacts, with no previous psychiatric history and preserved cognitive functioning. Affected body regions may include

**TABLE 1** Clinical subtypes of DI<sup>13,16,17</sup>

Subtype	Characteristics
Primary, autochthonous	DI is independent of any other medical condition or associated psychiatric disorder. Likewise, there is no additional decline in basic mental functioning.
Secondary, functional	DI is associated with other psychiatric disorders (schizophrenia, depression, among others)
Secondary, organic	DI is caused by an underlying medical condition or substance abuse.

skin, hair, and natural orifices, among others. The prognosis of DI depends on the duration of untreated psychosis and how timely the treatment is, including the chance to be assessed by a dermatologist, or psychiatrist, or general practitioner. In primary DI, antipsychotics are considered the first-line treatment. When appropriately treated, DI shows a favorable prognosis, with possible remission in 75% of the cases.<sup>1,2</sup>

## 2 | CLASSIFICATION AND EPIDEMIOLOGY

DI is a clinical condition classified by Koo and Lebowhl<sup>3</sup> as a primary psychiatric disorder leading to self-induced cutaneous lesions. It is characterized by the presence of a delusional idea in which the body, mainly the skin, is infested by small pathogens, alive or not, in absence of any dermatological or microbiological evidence.<sup>1,2,4-8</sup>

This delusional idea may include abnormal cutaneous sensations (tactile or coenesthetic hallucinations), such as itching, tingling, or biting sensations. Patients show self-destructive behaviors in effort to get rid of skin pathogens, generating excoriations, ulcerations, and severe secondary infections.<sup>7</sup> They also seem to be reluctant to seek help from psychiatrists and usually consult first their general practitioner or dermatologist or even a microbiologist.<sup>8</sup> This approach may add delay in the correct diagnosis and may lead to initial inadequate treatments.

In 1938, Ekbohm described with detail a clinical condition named with the German term *Dermatozoenwahn* (from Old Greek "derma" = skin, "zoon" = living creature/animal and the German word "wahn" = delusional idea). Since this term was difficult to be employed in others languages, the disorder was re-named as "Ekbohm Syndrome," becoming an eponymous disease. Nonetheless, many authors pointed out that "Ekbohm syndrome" is not appropriate because it may also refer to the homonymous restless leg syndrome.<sup>8,9</sup>

In 1946, Wilson and Milner introduced the term "delusional parasitosis"<sup>10</sup> and this became the most common term to indicate the DI. Nonetheless, patients may report different forms of infestation, so the name "delusional parasitosis" has the disadvantage of indicating those form supposed to be caused by parasites,<sup>4</sup> whereas the broader term "delusional infestation" highlights the delusional core of this syndrome and may represent all possible pathogens considered to be responsible of the current "infestation".<sup>1</sup>

It is of note that DI is not a medical condition per se, and it is not classified in the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) or in the eleventh edition of the International Classification of Diseases (ICD-11); it is included in the broader category of somatic delusional disorder, described both in ICD-11 and DSM-5 within the "delusional disorders" section.<sup>11,12</sup>

DI affects both women and men, with a 3:1 sex ratio.<sup>13</sup> This difference increases proportionally with age, and it may be due to the aging and cognitive impairment, as suggested by Ekbohm.<sup>14</sup>

It is difficult to estimate the prevalence of DI. DI annual incidence rates vary between 2.37 and 17 for per 1 million inhabitants per year.<sup>5</sup> The illness onset occurs between 55 and 68 years old.<sup>7,8</sup> Nonetheless, it may occur in adolescents and young adults (between 20 and 40 years), mostly secondary to substance abuse.<sup>7,8</sup>

There are no evidences about possible association between economic or social factors with the onset of the syndrome<sup>13,15</sup>; nevertheless, some social and demographical factors may have a role in the outcome of the disease. Also, most of patients show a baseline high personal functioning and many of them may be even physicians or psychologists.<sup>13</sup>

## 3 | PATHOPHYSIOLOGY

DI can start with a cutaneous sensorial misinterpretation that turns into a tactile hallucination and consolidates into a delusional idea.<sup>13</sup>

There may be a set of clinical presentations as classified by Le and Gonski<sup>16</sup> and Hinkle.<sup>17</sup> Table 1 reports three clinical subtypes of DI, differentiating the primary form from secondary forms such as functional and due to other organic illness.<sup>13,16,17</sup>

DI etiology is multifactorial. It has been proposed, by Huber and colleagues,<sup>18</sup> that a decrease in dopamine transport within the striatum, with the consequent rise of its extracellular levels, may contribute to the onset of delusional condition. The above-mentioned model was supported by Millard and Millard,<sup>19</sup> who proposed that DI may happen in patients with higher dopamine levels, either because of consumption of dopamine transporter inhibitors (cocaine, pemo-line, bupropion, amphetamines, among others) or due to secondary dysfunction of dopamine transporter (which is observed in traumatic brain injury, Parkinson's disease, schizophrenia, depression, alcoholism, Huntington's disease, human immunodeficiency virus infection, iron deficiency, among others).<sup>19-21</sup> It should be noted here that

antipsychotics could improve the symptoms of DI in the majority of patients by improving the altered dopamine transmission.<sup>1,2,4,5,7-9,13</sup>

Likewise, the aging process can trigger the development of DI, through a multifactorial mechanism as summarized in Table 2.<sup>13,17</sup>

Regarding the secondary organic DI, studies conducted with structural magnetic resonance have demonstrated the importance of striatum lesions (mainly putamen) in its etiopathogenesis.<sup>18</sup> These lesions generate alterations in the putamen functioning (which mediates motor and visual-tactile perception) and in the function of cerebral regions associated with striatal-thalamic-cortical dorsal somatic gyrus. In addition, the involvement of the of fronto-striato-thalamo-parietal brain circuits and the efficacy of antipsychotics in the treatment of DI, as previously mentioned, may add evidence on the hypothesis of a dopaminergic dysfunction.<sup>22,23</sup>

## 4 | CLINICAL PRESENTATION

As discussed, according to the literature, the average patient is generally a female, middle-aged with limited social contacts, and no previous psychiatric story and with preserved cognitive functioning.<sup>24</sup> We have also reviewed that DI may occur in individuals with any personality type, but it is more frequent in those with obsessive or paranoid characteristics.<sup>1,2,7-9</sup>

Affected body sites include skin, hair, and natural orifices. DI onset can be sudden or progressive, and it is generally characterized by severe pruritus, followed by intense scratching.<sup>16,17,19,25,26</sup>

Patients may use fingers or nails, but also scissors, needles, razors, and tweezers in order to alleviate pruritus. In some severe cases, it has been reported the employment of rocks, kitchen utensils, surgical instruments, chemical and corrosive agents, and pesticides. Many patients end up with mutilations and cutaneous lesions such as lichenification, ulcers, or scabs.<sup>17,26</sup>

When patients are able to delusionally “catch some insects,” they bring them to the physician as proof of infestation. This “specimens” are usually presented in small containers, paper envelopes, or plastic bags. The “proof” is usually dandruff, scabs of cutaneous lesions, hair, strands, dirt, or sand.<sup>27</sup> Nowadays, and with a growing frequency, patients may present videos or digital pictures of the sites in which they believe to be infested.<sup>1,2,4</sup> The presentation of the supposed

**TABLE 2** Multifactorial contribution of aging in DI pathophysiology<sup>13,17</sup>

- Presence of senile pruritus
- Increased incidence of diabetic neuropathy
- Decreased visual acuity
- Reduction of blood flow due to arterial stenosis, which generates paresthesia
- Loss of autonomy, consequently generating depression, and decreases in self-esteem
- Polypharmacy
- Frequent consumption of over-the-counter drugs/supplements/herbs
- Other medical conditions

pathogen to the physician was recognized as a pathognomonic sign named “matchbox sign” in *The Lancet*.<sup>28</sup> However, Freudenmann and Lepping have proposed to use the name “specimen sign,” since it is more appropriate to point the “pathogen” than the container.<sup>5</sup>

Dangerous behaviors, such as setting fire at furniture in the house or burning clothes, as well as fleeing their houses<sup>29</sup> to avoid more infestations, have been described in the literature. Furthermore, and as previously mentioned, some other patients may burn their own skin using abrasive detergents to “kill the bugs”.<sup>17</sup> Often, patients develop secondary depressive symptoms in the context of their delusional state. Occasionally, suicide and suicide attempts have been reported.<sup>30</sup>

Up to 15% of patients can present shared delusional ideas of infestation with a relative or a close friend.<sup>21</sup> This shared psychosis may involve two or more individuals of the family: *folie à deux* (two people), *folie à trois* (three), *folie à plusieurs* or *folie à famille* (many people or the entire family).<sup>31,32</sup> Recently, it has been observed that the media and the internet may play a role in the development of shared psychotic disorders (*folie à Internet*).<sup>21</sup>

Several studies have shown that risk factors for the development of shared psychotic disorders are related to common characteristics of the individuals developing shared symptoms. They may have genetic or environmental factors in common or may live in close cohabitation (which is an essential factor in the shared psychoses).<sup>33</sup> Patients' and families' quality of life are both severely compromised.

### 4.1 | DI variants and related conditions

According to the reviewed literature, clinical variants and related conditions to DI may be summarized as following<sup>34-37</sup>:

- Orificial delusional infestation: DI variant that involves body's natural orifices.
- Delusory cleptoparasitosis: The patient believes the pathogen is infesting his/her own house.
- Morgellons disease: It includes DI with cognitive defects, behavioral changes, and fatigue.
- Formication: perception of walking ants on the skin (from Latin “formica” which means ant). It is a very common symptom, although unspecific and does not define the diagnosis of DI, if not associated with the delusion of being infested.
- Illusory Parasitosis: produced by real physical causes such as static electricity, allergens or formalin, which produce dermatitis. Affected patients are not delusional and are easily convinced when their condition is technically explained.

DI can also occur in the context of other diseases, such as stroke that affects the nondominant hemisphere.<sup>1,2</sup> Structural brain abnormalities that have been reported in these cases may include subcortical vascular encephalopathy and right temporo-parietal cortex lesions.<sup>13</sup> Furthermore, there are several mental disorders that can be accompanied by DI, such as schizophrenia, depression, anxiety,

and dementia. Secondary organic DI is associated with hypothyroidism, anemia, vitamin B12 deficiency, hepatitis, severe renal disease, diabetes, and infections (HIV, syphilis).<sup>21</sup> In adolescents and young adults, it may be related to concomitant substance abuse.<sup>38</sup>

## 5 | DIAGNOSIS

Freudenmann and Lepping<sup>5</sup> have proposed minimum criteria for the diagnosis of DI, taking into account that the disorder is not classified as an independent entity neither in ICD nor DSM (Table 3).

### 5.1 | Differential diagnosis

Primary and secondary variants, as previously described, should be recognized and differentiated. Then, DI should be differentiated from other psychiatric conditions (Table 4) such as schizophrenia, major depressive disorder with psychotic symptoms, obsessive-compulsive-related disorders, factitious disorders, medical or substance related disorders (general medical diseases, brain disorders, medication/illicit substances, such as cocaine), and from formication.<sup>1,2,5,7,8,12,13</sup>

## 6 | OUTCOME AND PROGNOSIS

DI clinical course may vary depending on the clinical type presented. Primary DI has an insidious onset and a chronic course. This type of chronic course is also observed in patients with DI secondary to a medical condition (mostly among elders). On the contrary, substance induced DI has an abrupt onset and its symptoms may only last hours, days or weeks.<sup>5</sup> Prognosis relies on the promptness of diagnosis and treatment and on different pathways to care (dermatology or psychiatry). Dermatologists might pay attention to cutaneous disorders strongly associated with psychological factors and may involve mental healthcare professionals in their daily practice. Up to 75% of the cases of primary DI show a good prognosis with remission with appropriate treatments. Outcome may be poor in case of concomitant organic disease with higher probability of chronic course.<sup>2</sup>

## 7 | TREATMENT OPTIONS

Some authors have proposed that, when possible, treatment for DI patients should be administered in dermatology clinics, in cooperation with the local liaison psychiatry department.<sup>39</sup> This approach could be seen as friendlier and help overcome patients' reluctance to seek help from mental health professionals.<sup>8</sup> Firstly, DI should be diagnosed, excluding differential diagnoses and, secondarily, the disease nature (primary, secondary organic, secondary functional) should be recognized.<sup>39</sup>

Therapeutic approach in primary DI is mostly based on antipsychotic medications.<sup>1,2,7-9,21-24,40-44</sup> Secondary DI may benefit from treating the underlying disease, besides antipsychotics. For example, DI secondary to a psychotic depression may benefit from the treatment of depressed mood with antidepressants and antipsychotics.<sup>7,8,43</sup> Occasionally, a major depressive disorder with concomitant symptoms of DI may respond to an antidepressant therapy on its own, without needing an antipsychotic treatment.<sup>1,2</sup> Selective serotonin reuptake inhibitors are usually first-line agents.<sup>21</sup>

Atypical antipsychotics are highly recommended. Risperidone (1-8 mg/d) and olanzapine (5-10 mg/d) are mostly used with positive outcomes in 69% and 72% of treated DI patients, respectively.<sup>41</sup> Some authors described a successful outcome associated with trials with aripiprazole,<sup>45</sup> ziprasidone,<sup>46</sup> or quetiapine.<sup>4</sup> Some other studies have reported a remission rate of 90% with pimozide,<sup>47</sup> even if it should not be considered as a first option because of its safety problems.<sup>8,9</sup> First-generation antipsychotics in general should be considered as a second-line option.

As DI is a type of delusional disorder, we recommend an adjunct psychological approach. Cognitive behavioral therapy (CBT) focusing on different aspects of delusions (anxiety, reasoning biases, faulty logic, among others) has shown efficacy in improving symptoms in the short-term.<sup>48</sup> Furthermore, depressive symptoms might be secondary to DI. Before starting any antidepressant treatment, patients with mild depressive symptoms should try CBT as well.<sup>21</sup> It should be noted that suicide is a risk in patients with severe DI.<sup>1,2</sup> We strongly recommend that such cases should be admitted to the hospital and carefully monitored. Finally, secondary scratching lesions, ulcers, and infections should be treated with accordingly dermatological therapy.<sup>1,2</sup>

1. Presence of a belief of being infested with pathogens (small, alive, unanimated, many times "new for science") without medical or microbiological evidence that supports this. This belief can range from an overvalued idea to a delusional, unwavering, idea
2. Presence of abnormal, usually qualitative, cutaneous sensations, explained by the first criteria

Additional symptoms	Additional psychotic or nonpsychotic symptoms may be present, such as visual illusions or hallucinations
Localization	Skin ("in," "on top of," "inside," "underneath"), but all body parts can be infested
Duration	Typically, months or years (chronic cases), although it can vary from minutes (in the case of DI secondary to delirium or substance induced) to many years

**TABLE 3** Criteria for the diagnosis of DI<sup>5</sup>

**TABLE 4** Differential diagnosis of DI<sup>1,2,5,7,8,12,13</sup>

Diagnosis	Characteristics
Schizophrenia	Delusional ideas and behavior in schizophrenia are usually bizarre, contrasting with ideas in delusional disorders, which is the case in primary DI
Major depression disorder with psychotic characteristics	Patients with major depressive disorder with psychotic symptoms usually present guilt delusional ideas or hypochondriac ideas, while other psychotic symptoms in the spectrum of DI are rare complications
Excoriation Disorder	Skin manipulation and lesions observed in excoriation disorder can be like those observed in DI, but they are not caused by the presence of imaginary pathogens in the skin
Dermatitis artefacta	Dermatitis artefacta is a variety of factitious skin disorders. Skin lesions are self-inflicted and seek secondary gain such as arousing sympathy or evading some form of responsibility. Such lesions are not due to the presence of delusions of infestation
Formication	As previously mentioned, the symptom of feeling "ants walking on the skin" (from Latin "formica" = ant) is very common, although unspecific and does not sustain the DI diagnosis. The absence of a delusional idea of being infested indicated the absence of DI

## 8 | CONCLUSIONS

DI is a double psychiatric and cutaneous disorder, characterized by difficult diagnosis and treatment. It may occur as a somatic-type delusional disorder (primary DI) or secondary to other psychiatric disorders, medical diseases, or substance abuse. The disease can progressively develop as a cutaneous sensorial misinterpretation that turns into a tactile hallucination and consolidates into a delusional idea. Typical patients are females, middle-aged, with limited social contacts, with no previous psychiatric history, and with preserved cognitive functioning. According to the evidence that DI is sustained by a dopamine increase in the striatum, antipsychotic treatments are recommended with good prognosis in most of cases. Secondary DI treatment may be also based on the resolution of the underlying comorbid disease. Prognosis generally relies on promptness of diagnosis and appropriate treatments.

### CONFLICT OF INTEREST

Authors have no conflicts of interest.

### AUTHOR CONTRIBUTIONS

All authors equally contributed in the production of this manuscript.

### DATA AVAILABILITY STATEMENT

All data derived from public domains.

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