

Delusional Parasitosis: Diagnosis and Treatment

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ABSTRACT: Delusional parasitosis (DP) is a somatic type of delusional disorder, usually mono-symptomatic, in which the patients are convinced they are being infested with animal parasites while no objective evidence exists to support this belief. The complaints are usually about skin infestation, but involvement of the gastrointestinal tract has also been described. Numerous samples are brought for examination from skin, clothes, and environmental sources, while a detailed description of the “parasite” is given. In primary DP, the delusion arises spontaneously as a mono-delusional disorder, while in secondary DP, the delusional disorder arises secondary to another major medical, neurological, or psychiatric disorder. Practically all patients refuse psychiatric help. Shared psychotic disorder – *folie à deux* – is a known mode of presentation in delusional parasitosis. More than one member within a family may experience the same delusional state. For diagnosis and treatment of DP, a close collaboration among dermatologists, psychiatrists, and parasitologists is essential. Patients whose delusion of parasitosis is not severe can sometimes be relieved of their symptoms by establishing a reliable and meaningful therapeutic relationship. Symptomatic medication may be prescribed for the relief of pruritus, pain, and other symptoms. In more severe cases, such patients should be treated with psychopharmacological agents.

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Delusional parasitosis (DP) is also known as delusion of parasitosis, delusional infestation, and Ekbom’s syndrome. It is a somatic type of delusional disorder, usually mono-symptomatic, in which the patient is convinced of being infested with animal parasites (usually insects or worms), although no objective evidence exists to support this belief. Patients with DP cannot be convinced of the delusional nature of their misconception by arguments or lack of evidence and appear mentally healthy when addressing issues other than their own “infestation.” Many patients with DP have a fear of contaminating other people,

Symptoms of delusional parasitosis are very real and distressing to the patient, who visits medical centers and seeks advice from family practitioners, dermatologists, and parasitologists

especially members of their family, and perform various preventive actions. Numerous disinfectants, creams, soaps, and chemicals are used excessively to get rid of the “parasite” or to alleviate symptoms.

DP presents a particular challenge to health providers and typically lasts for months or years. Symptoms of delusional parasitosis are very real and distressing to the patient, causing the patient to visit medical centers and seek advice from family practitioners, dermatologists, and parasitologists, which leads to financial losses due to absence from work, cleaning costs, and visits to medical specialists.

During consultation, these patients can provide extensive, elaborate, and intricate descriptions of the pests as well as their life cycle and behaviors. Patients with DP usually stop consulting a health provider or parasitologist once their attempts to persuade the specialists of the parasitic etiology of their symptoms have failed. When health providers or parasitologists bring up the possible psychiatric nature of the disorder, patients usually feel they are not being taken seriously, get disappointed and/or angry, and often sever their relationship with the particular professional they were seeing. Denial that the condition may be psychogenic is often manifest by refusal to engage in psychotherapy and take psychiatric drugs [1-4].

There are limited epidemiological data regarding the frequency of this condition. It is considered the most common mono-symptomatic delusional disorder encountered by dermatologists [5]. Such patients visit many physicians, such as dermatologists and parasitologists, to seek a solution to their problems. The entomologists Schrut and Waldron [6] reported more than 100 consultations by patients with presumptive DP in 5 years, while another group of entomologists reported examining 77 patients in 10 years [7]. At the Psychiatric Clinic of the Vienna University (Psychiatrische Universitätsklinik, Wien) in Austria,

only 73 cases were seen during the years 1958–1987 [8]. Reilly and Batchelor [9] found that 85% of the dermatologists interviewed in the U.K. had seen at least one such patient in their practice, and about one-fifth of them were currently treating such a patient. About 77% of the respondents had seen between one and five patients with DP during the past 5 years. Out of 108 dermatologists in Poland, 84.7% had seen at least one patient with DP in their

practice. About one-third of the respondents (33%) had seen one or two cases of DP during the past 5 years, and 28% of them treated three to five such patients. Of respondents, 40.7% always requested psychiatric consultation for their patients with DP, and 28.8% often made such requests. [10].

In 1988, it was reported that DP was diagnosed in about seven of 10,000 psychiatric admissions. However, the incidence of this disorder is probably much higher because most cases of DP are treated by dermatologists and the prevalence of the disease reported by psychiatrists only reflects a minority of this population. Moreover, even among patients with DP who do see mental health professionals, only a minority are hospitalized [11].

DP is more common in Caucasians and occurs more often in middle-aged or older women. The female-to-male ratio is 1:1 in people younger than 50 years of age and 3:1 in those older than 50 [12,13].

Two of the authors of this article (KYM and VL) have each been seeing 10 to 20 patients yearly during the past 5 years. The aim of this review is to describe the main symptoms of this disorder and provide information regarding its prevalence, triggering factors, classification, and treatment strategies.

PARASITOLOGICAL ASPECTS

Patients with DP are convinced of being infested by small and vivid pathogens such as insects, worms, and “parasites,” and rarely also by viruses and bacteria.

The most frequent imaginary source of the infestation are other people (50%), especially those returning from a trip to developing countries, pet animals, and real infestations with parasites (fleas, bed bugs), which were treated/controlled successfully in the past.

The imaginary parasites are usually reported to be on the skin, but also inside their nose, mouth, genitalia, feces, and direct environment (e.g., clothes, bed, sofa, and floor). Specimens are collected in boxes, bottles, plastic bags, and/or on adhesive tapes, which are then marked with the name of the “identified parasite,” as well as date and place of collection. When these specimens are sent or brought to a specialist, a detailed letter explaining the symptoms and the collected material is usually attached [Figure 1, Figure 2]. The phenomenon, known as the “matchbox sign” has been reported in 26% of the patients visiting a health provider [14]; however, our experience indicates that more than 70% of people visiting an entomologist/parasitologist bring material for examination under the microscope. If the biologist is not able to find a parasite, which could explain the source of the agony, the patient is ready to send/bring new specimens for examination, believing that this specific time he did not “catch” the parasite or that the parasitologists is incompetent. Out of 80 samples brought by DP

In delusional parasitosis primary skin lesions are not present. Secondary skin lesions such as excoriations, lichenification, and scars are frequently observed

Figure 1. Material for examination brought by a patient affected by delusional parasitosis inside boxes, cello tapes attached to microscopic slides, or kept in tissues covered with cellophane and accompanied by a letter explaining where and when the “parasites” were found [matchbox sign]



Figure 2. Plastic bags hermetically sealed by a patient with delusional parasitosis and the accompanying letter explaining from where the “parasites” were collected



patients for examination, 13% were harmless insects and only one was a pubic louse [15].

Before consulting an entomologist, patients with DP usually have already visited a number of general practitioners, dermatologists, and specialists working in medical centers, museums, and academic institutions. They have repeatedly cleaned and disinfected their house with insecticides (either on their own or with the help of a pest control manager) and have sent a large amount of their cloths for laundering and dry cleaning. They were usually treated with scabicides, pediculicides, antihistamines, and corticosteroids.

In many cases, patients believe that family members, friends, and other contacts, as well as personal belongings, their habi-

Table 1. Recommendations for diagnosis and treatment

Allow sufficient time to obtain a careful history of the patient's distress
Ask whether there are other family members with the same symptoms or pet animals in the house
Inquire about recent trips to exotic/developing countries
Carefully examine the patient for any real parasitic infestation of dermatological ailment
Contact parasitologists, dermatologists, and psychiatrists when necessary
Treat patients with empathy, providing a place where they can express their distress without being stigmatized
Avoid words such as delusional, psychotic, psychologic, and psychiatric
Do not continuously contradict patients
Indicate that you are familiar with the problem and that you were able to help other patients; however, treatment took a while
Prescribe medications for the relief of symptoms such as pruritus, pain, and superinfections
Try to persuade the patient to ask for professional help due to a stressful life
In more severe cases, prescribe psychopharmacological medication
Do not give any anti-parasitic medication, not even a placebo, and suggest to the patient that this could help
Do not mention any possible diagnoses if you are not sure what is causing the symptoms

tation, the garden, and pets, are also infested. These patients examine themselves for hours during the day, particularly on their skin and in their environment, and collect specimens from their skin with the help of the nails, sometimes also using magnifying glasses and tweezers.

Often digital photos of the imaginary pathogens and skin lesions are sent to the biologist and/or to physicians. The material that such patients bring to entomologists/parasitologists usually consists of skin scales, crusts, scabs from healing skin lesions, coagulated blood, hair, fibers, dirt, sand, and parts of harmless insects such as flies, ants, and beetles.

Collaboration between dermatologists and entomologist/parasitologists is of paramount importance to exclude the existence of any possible infestation with ectoparasites such as fleas, bed bugs, head lice, bird mites, and parasitic worms. Sometimes, harmless insects such as spring tales (*Collembola*), book lice (*Psocidae*), and thrips (*Thysanoptera*), which can be found everywhere in the house in large numbers, give the impression to the patient that not only the environment but also the body is infested by these “parasites” [16].

DERMATOLOGICAL ASPECTS

Individuals with DP usually report itching, conceived as tactile hallucinations known as formication, a sensation resembling insects crawling and biting on or under the skin. While trying to remove the “parasite” they may damage their skin, which can get worst with the application of disinfectants and pesticides. Skin lesions are typically concentrated in body regions that are easy to reach, such as hands, arms, feet, lower legs, scalp, upper back, and breast region, and genitals, while difficult to reach parts of the body (back) are free of symptoms. They are often more severe on the side opposite to the dominant hand.

Physical examination of the skin may reveal no skin lesions. Primary skin lesions are not present. Secondary skin lesions such as excoriations, lichenification, erosions, ulcers with hemorrhagic crusts, hyper- and hypopigmentation, and scars are frequently observed [1].

The first step in the management of a patient with DP should be to exclude any organic skin pathology. A true infestation has to be ruled out, and the patient should be examined with regard to known infectious agents and clinical symptoms, which can cause pruritus. All underlying systemic diseases should be properly treated, while symptomatic medication may be prescribed for the relief of pruritus, pain, or other symptoms.

If not sure about the diagnosis, suggesting that symptoms are caused by ectoparasites such as scabies and bird mites, or that it might be a rare, exotic disease will only strengthen the belief of the patients that their problem is real. It is more important to treat patients with empathy, providing a place where they can express their distress without being stigmatized. Reassurance by a health provider may temporarily reduce the delusional intensity of the belief, but this reassurance cannot usually be maintained [17].

It should be noted that pruritus could be caused by other diseases such as dry skin, scabies, head or pubic lice, psoriasis, eczema, prurigo nodularis, or dermatitis herpetiformis, as well as by side-effects of medications used for other purposes [4].

Skin biopsies should be used only in rare cases. Histological examination of biopsies often reveals prurigo nodularis-like findings [18]. In a study conducted at the Mayo Clinic between 2001 and 2007, out of 108 patients with a diagnosis of DP, 80 underwent biopsies, but none of them provided evidence to support skin infestation.

The most common interpretations in the biopsy specimens were excoriation, ulceration, erosion, and non-specific dermal inflammation [3].

Skin lesions should be treated symptomatically. No medication, not even placebo, should be prescribed, promising that this specific medication will solve the problem. This kind of prescription leads to a short time of improvement of symptoms, if at all. However, it may strengthen the belief of the patient that something real is causing the infestation, and that the ultimate medication has not yet been prescribed. In addition, DP patients carefully read the indications for use of the medications prescribed, and they quickly learn that these are not true anti-parasitic remedies. Patients usually are not relieved when the physical and laboratory examinations are negative. However, the fact that a clear-cut diagnosis has not been offered will be interpreted as an incompetence of the physician, putting the physician in a no-win situation.

Suggesting psychiatric consultations usually irritates the patient. It is generally easier for a patient to accept psychopharmacological treatment prescribed by a general practitioner or

Delusional parasitosis can be shared by more than one person (folie à deux or folie à trois), usually in the same household

dermatologist than by a psychiatrist. If psychiatric referral is impossible, the treating physician should at least consult with a psychiatrist to gather psychiatric expertise for the differential diagnosis and psychopharmacology [19].

General practitioners and dermatologists are not sufficiently conversant with this entity to diagnose and treat patients with DP. A diagnosis of DP can best be made when physicians cooperate with entomologists and psychiatrists. It is difficult for a physician to convince a DP patient to seek psychiatric help if the physician does not spend enough time with the patient, take a careful history, show empathy for the distress of the patient, and not be contradictory.

PSYCHIATRIC ASPECTS

Many patients with DP are well educated, 50–70 years old, and female. They often experience other psychological problems such as depression, often secondary to psychosocial stressors such as quitting/losing their job, social isolation due to health problems, children leaving home, or death of a spouse [2,20].

DP can be primary or secondary. In primary DP, the delusion arises spontaneously as a mono-delusional disorder, meeting criteria of the International Classification of Diseases, 10th revision (ICD-10), for persistent delusional disorder and criteria of the Diagnostic and Statistical Manual of Mental Disorders, (DSM-5, Fifth edition) for delusional disorder, somatic type [21]. In secondary DP, the delusional disorder arises secondary to another major medical, neurological, or psychiatric disorder. These are most often schizophrenia, dementia, depression, diabetes, neuropathies, and cardiovascular disorders. DP may also arise temporarily out of intoxication with amphetamines or cocaine, or as a side effect of other medication [1].

DP should be differentiated from anxiety disorders or phobias, although DP is sometimes wrongly referred to as dermatophobia. DP must also be differentiated from obsessive-compulsive disorder or, according to DSM-5, “skin picking disorder,” which can result in ritualized skin cleaning and consecutive skin lesions, but shows no unshakeable belief in being infested by living creatures.

Many patients with delusions of infestation have multiple co-existing or underlying psychiatric disorders. In the Department of Psychiatry at the Mayo Clinic, 109 patients with DP were seen during a period of 7 years, 50% of whom actually followed through with psychiatric consultation. Out of 54 patients, 40 (74%) received additional active psychiatric diagnoses, while 14 patients (26%) had delusional infestation alone [3].

DP can be shared by more than one person (*folie à deux* or *folie à trois*), usually in the same household. In such cases, the person who first develops the illness (inducer) usually persuades the others of his or her delusion to the point at which it

becomes a shared delusional belief. Effective treatment of the inducer usually causes a recovery of all other affected people. This phenomenon was reported to occur in 14.4% (65 of 449) of DP cases [14]. Other studies reported frequencies ranging from 8% to 49%. There is even one report of a *folie à cinq*, in which five family members were sharing the DP [17].

The precipitating factor for DP cannot always be identified. However, it has been reported that stressful life events, such as death of a family member, flood in the patient’s home, or injury, as well as contact with people infested with parasites, views of animals grooming their skin, and travel to developing countries, in addition to pruritus, served as initiating factors for certain individuals [21,22].

DP patients often refuse psychiatric referral as they do not believe that they have a psychiatric problem. In a recent study from Argentina [23], psychiatric referral was possible for only 1 of 12 patients (8%). When offered, such patients became upset and angry, blaming incompetence of the physicians. Although aggressive reactions are rare, an attempt to murder a family doctor has been reported [24].

In the past, pimozide was considered the treatment of choice for DP. However, this is no longer the case due to a higher risk of adverse drug reactions and lower adherence. Second-generation antipsychotics such as amisulpride, risperidone, olanzapine, quetiapine, sertindole, and paliperidone in age-appropriate doses are being prescribed today for the treatment of DP [25]. Due to the paucity of well-controlled medication treatment studies,

response rates for antipsychotic treatment have not been well-established and reported response rates vary.

CONCLUSIONS

DP is a disorder that presents particular challenges to healthcare providers. Collaboration between parasitologists, dermatologists, and psychiatrists is necessary to better help a patient with DP. Specialized multi-disciplinary outpatient clinics in dermatology with a liaison psychiatrist are theoretically the best places to provide such patients with care. The most challenging and intricate problem for practitioners is to sufficiently build patients trust and alliance to be able to engage them in psychiatric psychopharmacological treatment.

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Capsule

Inflammatory decoy control

Bacterial infection can lead to sepsis, inflammation, and death. Li et al. found that the long noncoding RNA MEG3-4 and the mRNA encoding the proinflammatory cytokine interleukin-1 β (IL-1 β) competitively bound to the microRNA miR-138 in the lungs of bacterially infected mice. Initially, MEG3-4 binding to miR-138 facilitated IL-1 β production, but it ultimately shut down

IL-1 β -dependent inflammation. Lung-specific overexpression of MEG3-4 prolonged infection and exacerbated inflammation and lung injury in mice, whereas intravenously delivering miR-138 mimics to infected mice enhanced their survival.

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Capsule

CARD9^{S12N} facilitates the production of IL-5 by alveolar macrophages for the induction of type 2 immune responses

The adaptor CARD9 functions downstream of C-type lectin receptors (CLRs) for the sensing of microbial infection, which leads to responses by the T_H1 and T_H17 subsets of helper T cells. The single-nucleotide polymorphism rs4077515 at *CARD9* in the human genome, which results in the substitution S12N (CARD9^{S12N}), is associated with several autoimmune diseases. However, the function of CARD9^{S12N} has remained unknown. Xu et al. generated CARD9^{S12N} knock-in mice and found that CARD9^{S12N} facilitated the induction of type 2 immune responses after engagement of CLRs. Mechanistically, CARD9^{S12N} mediated CLR-induced activation of the non-canonical transcription factor NF- κ B subunit RelB,

which initiated production of the cytokine IL-5 in alveolar macrophages for the recruitment of eosinophils to drive T_H2 cell-mediated allergic responses. The authors identified the homozygous *CARD9* mutation encoding S12N in patients with allergic bronchopulmonary aspergillosis and revealed activation of RelB and production of IL-5 in peripheral blood mononuclear cells from these patients. This study provides genetic and functional evidence demonstrating that CARD9^{S12N} can turn alveolar macrophages into IL-5-producing cells and facilitates T_H2 cell-mediated pathologic responses.

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