

Ekbom Syndrome: A Delusional Condition of “Bugs in the Skin”

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Abstract Entomologists estimate that more than 100,000 Americans suffer from “invisible bug” infestations, a condition known clinically as *Ekbom syndrome* (ES), although the psychiatric literature dubs the condition “rare.” This illustrates the reluctance of ES patients to seek mental health care, as they are convinced that their problem is bugs. In addition to suffering from the delusion that bugs are attacking their bodies, ES patients also experience visual and tactile hallucinations that they see and feel the bugs. ES patients exhibit a consistent complex of attributes and behaviors that can adversely affect their lives.

Keywords Parasitization · Parasitosis · Dermatozoenwahn · Invisible bugs · Ekbom syndrome · Bird mites · Infestation · Delusional infestation · Delusions of infestation · Delusory parasitosis · Delusions of parasitosis · Dermal invasion · Parasites · Skin parasites · Morgellons · Mite infestation · Anxiety-induced psychosis · Depression-induced psychosis

Introduction

Ekbom syndrome (ES) is the clinical term for what is popularly known as delusions of parasitosis or delusory parasitosis, eponymously named for Karl A. Ekbom, the Swedish neurologist who provided a definitive description of the condition in his 1938 paper [1]. It should not be confused with Wittmaack-Ekbom syndrome, which is restless legs syndrome. Synonyms used for ES have

included dermatophobia, delusions of infestation, and parasitophobic neurodermatitis [2••]. Despite initial publications referring to the condition as *acarophobia* (fear of mites), ES is not a phobia, as the individual is not afraid of insects but rather convinced that they are infesting his or her body [3, 4]. This paper deals with primary ES, not the form secondary to underlying psychological or physiologic conditions such as drug reaction or polypharmacy [5–8]. While Morgellons (“the fiber disease”) is likely a component on the same delusional spectrum, because it does not have entomologic connotations, it is not included in this discussion of ES [9, 10].

Valuable reviews of ES include those by Ekbom [1] (1938), Lyell [11] (1983), Trabert [12] (1995), and Bak et al. [7] (2008). Freudenmann and Lepping [2••] have provided an extensive overview of the condition, with discussions of various therapies, including advantages and contraindications.

Although ES has been known to result in suicide [13], it is seldom life-threatening but is always life-altering for patients and people around them [14, 15•, 16•]. Without treatment, the condition may persist for decades, with accounts of duration of symptoms of 24 years [3] or up to 31 years [17]. Initial symptoms in patients are paresthesia, pruritus, and stinging and biting sensations.

Patients have various names for the creatures they perceive to be infesting them, such as insects, larvae, organisms, parasites, worms, and beasties. The most common term is bug, which is used in this paper in the sense used by ES patients (as opposed to the “true bugs” or Hemiptera). Although ES is a delusion that the body is infested by bugs, it is almost always accompanied by tactile hallucination of a crawling sensation, or a feeling of biting or stinging [18, 19]. ES typically also includes visual hallucinations in which the individual perceives common materials such as lint and skin debris as the causative agents—the bugs [20, 21].

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An entomologist writing in a psychiatric journal calls for explanation [22]. As a veterinary entomologist, I work on ectoparasitic arthropods, including mites. For more than two decades, I have studied avian mites, and ES patients seek me out because they think that their bodies are infested by bird mites, due in no small part to the erroneous information promulgated by various online sites [4, 23]. Additionally, many ES patients think that they acquired their infestation from an animal, such as a neighbor's dog or a squirrel in the attic [20, 24]. One patient suspected that her infestation came from ducks at the pond in which she swam [25]. For the past 7 years, my office has received two or three ES calls each week. A survey of entomologic colleagues who field ES calls in their states puts the estimate of ES cases in the United States at about 100,000 to 250,000 (rivaling the prevalence of multiple sclerosis) or 10-fold higher than the 1995 estimate by Trabert [12]. Most of the literature on ES consists of case reports; because of the nature of the condition, it is difficult to conduct replicated scientific studies [12, 26].

Ekbom Syndrome: Symptoms and Signs

Because ES is a syndrome, by definition, it consists of several of the following features. A single feature or even several of them do not necessarily equate to ES, but the more attributes exhibited by an individual, the more likely the diagnosis of ES [2••]. Because ES is a medical diagnosis, an entomologist cannot definitively assign the term to an individual [27]. While no individual exhibits all the traits described below, these attributes are sufficiently common among ES patients that they constitute a typical profile [3, 12, 22]. An excellent overview of the condition can be found in the 1983 paper by Lyell [11].

Individuals exhibit dermal scarification and scarring from repeated assault (Fig. 1). They complain of the sensation of insects crawling on the skin, burrowing into the skin, biting, and/or stinging [3]. Patients claim that their wounds were created by the bugs' attempts to emerge from the skin. Upon further questioning, they typically admit that they caused some of the damage by assisting the bugs in their emergence, "because if I don't get them all out, the sore will never heal."

Initially, the patient is able to compartmentalize his or her infestation, carrying on an otherwise normal life. As the "infestation" comes to occupy more time and attention, behaviors become more obsessive and strange, with large portions of time devoted to decontamination rituals [28]. Eventually the delusion assumes a large role, coming to dominate the individual's thoughts and lifestyle. At this stage, infested belongings are discarded or destroyed, the infested home is abandoned, and the individual becomes more isolated in attempts to avoid infesting anyone else.



Fig. 1 Results of an Ekbom syndrome patient having spent hours every evening removing scabs with tweezers. She explained that she had to help the "bugs" emerge from her skin

The similarities in cases from different parts of the world over several decades are striking [22]. Patients describe the same sensations, exhibit the same behaviors, and go through the same experiences [28]. There is a range of descriptions that are repeated in ES accounts from various countries. Humans have an atavistic fear of infestation and parasites, which signify uncleanness and shame; perhaps this deep-seated repugnance explains the uniformity of ES experience [19].

One of the most astounding first-person accounts of ES was provided by Traver [29] (1951), a highly regarded zoologist with the University of Massachusetts in the middle of the last century. Dr. Traver recounted her own decades-long quest to recover and identify the bugs she believed were infesting her scalp. Her article includes almost all the characteristics considered common among ES patients:

- The symptoms were worse at night, giving her insomnia.
- At the time of publication, her condition had persisted for 17 years (it lasted for a total of 31 years, until her death).
- She felt sensations of crawling, scratching, and biting.
- Treatment made the mites more active.
- The bugs were able to enter her body through intact skin.
- They exhibited a cyclical periodicity, with periods of increased activity.
- She had to remove scabs to extract the mites underneath.
- Her experience with various physicians was unsatisfying, causing her to assure one that she "had no further need of his services."
- Eventually, two other members of her household became infested.

- Traver felt vindicated when she did capture a mite, a description and image of which she provided in the article; however, the mite was merely a common house dust mite, a contaminant of the collection swabs she used [17].

Her experience illustrates that even highly educated scientists accustomed to dealing with facts and evidence are not immune to delusions.

Patient Perceives Skin as Infested With “Invisible Bugs”

Although it would not be surprising for a patient to say, “It feels like bugs moving under my skin,” ES patients state, “I have bugs crawling under my skin.” The bugs demonstrate attributes and behaviors that are scientifically unrealistic [11]. The bugs are visible only to the patient, who is frustrated that the physician cannot see them. “There are millions of them,” but the patient cannot provide an actual specimen. Patients express desperation, using dramatic terms such as, “You’re my last hope.” Not infrequently, they express suicidal ideation, “I can’t take it anymore; I’m just going to end it all if you can’t help me” [9, 20, 30].

Patient Uses Sharp Objects to Extract Bugs From Skin

Patients spend considerable time picking and digging at the skin, attempting to extract the bugs (Fig. 1) [3]. This intentional mechanical desquamation, combined with dermal damage from harsh treatments applied to the body yields excoriation, scarification, and ulcerations [10].

Patient Treats Skin With Various Substances to Kill the Bugs

Patients exhibit self-inflicted excoriation, extraction wounds, lesions, and dermatitis due to the extreme treatments they employ. Most of them have “purification rituals” through which they attempt to eradicate their infestation [3]. Common home remedies include tea tree oil, cedar oil, and neem oil [21]. Almost any treatment is reputed to have a salutary effect, but the symptoms inevitably recur, typically with a vengeance. Patients attribute this to the bugs becoming resistant to the treatment.

Patient Misuses/Abuses Pesticides

ES patients apply many pesticides, including those not intended for indoor use, spraying insecticides in the home and vehicle as well as on their bodies [3, 11, 19, 31, 32]. The resultant dermal damage exacerbates skin irritation, perpetuating the itch–scratch cycle.

Patient Is Convinced the Environment (Clothing, Home, Vehicle) Is Infested

ES patients believe that not only are parasites infesting the body, but also their environment is likewise infested. This phenomenon of *facultative parasitosis*, in which parasites are able to live on inorganic materials (clothing, furniture, vehicles) and then switch to parasitizing living bodies, defies biology, but it is a common feature of the ES delusion [31, 32]. Patients attribute their repeated “reinfestation” to parasites moving from the environment to invade their bodies, despite their cleansing and decontaminating efforts [11, 19, 25].

Patient Exhibits Extreme Housecleaning Efforts

Some patients spend most of their waking hours scrubbing the house, using harsh chemicals and thereby damaging furnishings [25, 32]. These activities can produce severe dermatitis, interpreted by the patient as further parasite-caused damage [33].

Patient Discards/Destroys Belongings

Perceiving beds and furniture as infested, patients dispose of the home’s furnishings [34]. The cost of replacing these items rapidly leads to financial problems, increasing stress [11].

Patient Abandons Home

Believing the home to be infested, patients move from hotel to hotel (as each sequentially becomes infested) and eventually end up living out of their vehicle [11, 19, 21]. These additional costs can increase financial stress. Even after moving, patients insist that the bugs have accompanied them [25].

Female Predominance

In published accounts, the number of female patients typically is about double that of males [3, 12, 21]. These statistics are not reflective of secondary ES caused by underlying physiologic or psychological conditions [9, 35]. Men, however, exhibit the same symptoms and often present with extensive skin damage and lesions produced by their attempts to remove the bugs (Fig. 2).

Middle-Aged or Older

As Ekblom [1] described in his seminal work, onset of the syndrome typically occurs in middle age or later. Many of these patients are lost to follow-up [3, 36]; in their age



Fig. 2 Lesions produced by an Ekbom syndrome patient attempting to remove “bugs” from under his skin

category, many of them are in transition from independent living due to health status changes and family alterations [37, 38].

Folie à Deux (“Madness Between Two”)

One of the most unusual features of ES is *folie à deux*, in which another person (typically a spouse, child, or other household member) develops ES as well [31, 39, 40]. This “psychological contagiousness” develops in about one third of cases, with the second patient echoing the inducer’s behavior and conviction of infestation [18, 32]. The delusion is just as fixed in the secondary individual as in the inducer. Scratching is highly contagious; observing others’ scratching behavior subconsciously stimulates the same in the observer (similar to the contagiousness of yawning) [41].

Situations in which more than one member of a group (typically a family) suffers from ES are proffered as evidence of a contagious entity. However, such a phenomenon of *folie à plusieurs* (madness of many) is well-documented and not uncommon, reflecting the tendency of individuals to subconsciously mimic behaviors of others around them, eventually adopting their delusion. Thus, multiple individuals experiencing the same infestation symptoms is not confirmation of an actual infestation [4]. With shared delusional ideation being perpetuated by Internet interactions, the definition of *folie à plusieurs* may have to be expanded [23].

Patient Is Disinclined to Consider Any Other Explanation for Phenomenon

The patient’s adamant conviction is almost diagnostic for the condition [34]. ES patients are absolutely certain that their problem is caused by bugs and unwilling to consider alternative possibilities [42]. Notable for the condition is the tenacity with which patients persist in asserting their infestation, the vehemence with which they maintain their conviction. Common comments include, “I’m not crazy,” “I’m not delusional,” “I would know if this was a delusion,” and “I can see the bugs, so I’m not imagining them.” It is frustrating to them that no one around them can see the bugs, but that does not decrease their conviction that they themselves can [35].

Patient Is Eager to Provide Samples

Despite claims that “there are millions of them,” the patient is never able to procure a specimen; this does not yield discouragement but rather greater determination to try harder [35]. This phenomenon was originally called the *matchbox sign* but has been updated to the *baggie sign* [3, 30]. Samples include epidermal fragments, dermal debris, hairs, sloughed skin, scabs, dried blood, lint, and fabric pilling [21, 43, 44]. In their desperation to provide valid insect specimens, patients often will walk around the home dusting out windowsills and bringing in the dead insects they found as evidence of their infestation.

Patient Can Provide Elaborate Descriptions of the Bugs, Their Behavior, and Their Life Cycle

Patients often monitor and record the perceived activities of their bugs, illustrating their appearance and life cycle with sketches [3, 11, 13, 33]. Individuals often find arthropods described online and adopt them as the causative agent of their condition [4].

Patient Experiences Insomnia

Patients complain that the insects are more active at night, interfering with sleep [19, 31, 32]. Of course, this likely is a misattribution of cause and effect; patients who cannot sleep are exquisitely aware of corporeal sensations, with nothing to divert their attention [3].

Patient Quits Job

The perceived infestation often results in unemployment [15, 21]. Some patients are concerned about infesting coworkers and others in the work environment, so they quit

their jobs to prevent contact. Others become so engrossed in their cleaning and disinfecting activities that they have no time for their work [18].

Patient Exhibits Social Isolation

Again, because the patients are fearful of contaminating others, they often withdraw, having no interaction with people [3, 12, 21]. Some of the saddest cases are grandparents who have not seen their grandchildren in years, eliminating contact to avoid the contamination risk [15•]. Initially, the delusion is limited, not having a great impact on everyday life [35]. Over time, the delusion tends to expand, requiring more time and effort, thus intruding on daily activities and causing moderate to severe interference with the patient's life [15•, 45]. Typically, the delusion eventually causes the individual to give up employment and other activities outside the home, retreat inside the house, and avoid contact with other people to avoid the risk of infesting them.

Paranoia and Persecution Complex: Conspiracy Theories

Among patients' explanations for their conditions are outlandish conspiracy theories [19], including that the government has released genetically modified organisms that are infesting them. ES may be tied to persecutory delusions [2••, 39].

Onset Preceded by Major Life Event

Many patients recount a significant emotional experience just prior to development of their symptoms [20, 21, 31, 32, 37]. When questioned about their ability to remember the specific date on which the bugs appeared, they reply something to the effect of, "Well, it happened the weekend after my husband moved out and filed for divorce." Or, "We were cleaning out my mother's house after she died, and that's when the bugs infested me. I think they came from items she had stored in the attic." Scratching and autogrooming are prominent primate displacement activities. Traumatic events may be the precipitating factors that trigger ES episodes [35]. ES may be a form of displacement in which the individual diverts emotions with which he or she cannot deal and substitutes an infestation obsession. Thus, a woman going through a divorce may not be able to process her husband's abandonment, so she redirects her focus to putative insects in her skin [25].

Doctor Shopping

Patients complain of lack of understanding from those in the medical profession [15]. Most of them have been seen

by many physicians and specialists, with no success and instead only increasing frustration [3, 21, 33, 40]. Physicians' attempts to explain to patients about their condition and the lack of bug involvement are met with hostility and resentment [43]. One patient, for example, consulted a general practitioner, an emergency medical physician, a dermatologist, a parasitologist, and a veterinarian [25].

Projection of the Delusion Onto Animals

Pet owners frequently attribute the infestation to their animals as well. Veterinarians are confronted with the quandary of treating animals for nonexistent infestations. Pet owners frequently assume that the animals are maintaining the infestation and serving as the source of continued reinfestation [22]. In desperation, the owners eventually have the animal euthanized [24].

Infestation Persists for Years

The personal account provided by Traver [29] as well as other documented situations attest to the persistence of this condition without treatment. Costs in time, energy, and suffering can be tremendous [28]. The individual spends great amounts of time and money on cleaning, replacing discarded furnishings, living in hotels, and medical care. Misappropriation of time and effort in the health care system is a significant factor in these long-running delusional conditions [15•].

No Socioeconomic or Educational Predispositions

Individuals at all points on the socioeconomic spectrum are susceptible to ES, which does not discriminate based on education or intelligence [15•, 32]. We have had many medical professionals call about their bug infestations (including the nurse in Fig. 1), and the literature includes accounts of mental health professionals suffering from the condition as well, including a 48-year-old psychologist [43].

Many ES patients present with additional conditions; depression is a common comorbidity [45]. Under conditions of ongoing depression, stress, and health concerns, the individual's anxiety may increase the risk of depression, with a bidirectional feedback [36, 41]. The unemployed nurse pictured in Fig. 1 had many stressors in her life. Her husband had been injured in an accident and was hospitalized out of state. Living in her household was her teenage daughter's friend, who was estranged from her parents. She initially stated that the lesions were made by the parasites as they erupted from her skin; however, her sister reported that the patient spent hours every evening removing scabs with tweezers. The patient explained these

activities as her efforts to assist the parasites' emergence, based on her concern that the sores would not heal until she got all the parasites out.

Ekbom Syndrome in Popular Culture

This condition was featured in episodes of *The X-Files* and *ER* and was the focus of Philip K. Dick's novel *A Scanner Darkly*. Two characters suffered from ES in the 2006 movie *Bug*, starring Ashley Judd.

Therapies

The superb review by Freudenmann and Lepping [2••] includes a discussion of treatments used in ES, including an overview of drugs and their success rates. Treatment modalities, their benefits, limitations, and drawbacks have been discussed in some excellent papers [42, 46, 47•, 48, 49•]. Because ES therapies have not been extensively tested in double-blind clinical trials, investigation of best recommendations should continue, with clarification of best use practices [32, 40, 47•].

Simultaneously, physiologic investigations of underlying causes of ES are needed [5, 19]. Until an understanding of the condition is achieved, development of targeted treatments cannot be undertaken. What does ES have in common with formication resulting from use of cocaine and methamphetamines [44, 46]? Which attributes predispose older women to higher incidence of ES [45]? What causes the paresthesia and pruritus [41]? Why is it almost always accompanied by visual and tactile hallucinations? Why is this delusion so pervasive and its attributes so consistent (Table 1)?

Recommendations are that patients not be contradicted or confronted with their diagnosis, as this undermines the

therapeutic relationship [33, 34, 42]. Instead, it is helpful to suggest that a mental health expert may provide adjunctive therapy to reduce pruritic intensity, lessen anxiety, and counteract insomnia [32, 36]. Patients are likely to be more accepting if the consultation occurs in the dermatology department [28], with focus on how the condition has affected their quality of life [3, 30, 42]. Suicidal ideation may necessitate inpatient observation. Rapport-enhancing and trust-building efforts include examining samples and listening sympathetically without contradicting the patient's account while at the same time refusing to validate the delusion. Any indication that the expert considers that insects may indeed be involved in the condition fits with the patient's somatic concept of infestation and reinforces the delusion [9, 17, 34, 42].

Of course, explaining why there can be no infestation to the patient is ineffectual and pointless; it can instead be counterproductive because it undermines patient trust in the physician. However, family members who are confused because they do not understand why there is no infestation may benefit from information about valid arthropod infestations and their characteristics (Table 2) [10]. Dermatologic symptoms should be addressed as "lesions," "sores," or "wounds," not as "bites." Calling them "bites" presupposes their origin and validates the patient's conviction.

The literature on ES consists mostly of case reports and limited series [28, 37]. Recruiting participants for studies in such situations is challenging because the patients are convinced they have a bug problem and are disinclined to subject themselves to what they consider an irrelevant study about psychological problems [2••, 26, 35]. This highlights the need for multidisciplinary studies involving dermatologists and medical entomologists to recruit test subjects paired with psychiatrists and psychologists to provide the mental health components [26–28, 36].

In therapeutic settings, a collaborative approach is likewise desirable [2••, 16]. Although dermatologists

Table 1 Questions for further work regarding Ekbom syndrome

As debilitating as these delusions are to patients, they are fascinating to scientists. How does the brain reach conclusions that seem outlandish to the rest of us?
Why are delusions so consistent, and why are delusions of insects and mites infesting the skin so pervasive? Is this an atavistic fear that all humans retain?
What predisposes this subpopulation to susceptibility to delusional parasitization, and what are the triggers that cause this condition to manifest in an individual? Are psychopathologies such as anxiety, stress, and depression expressed in dermatologic manifestations?
Are these delusions prodromal or predictive of Alzheimer's disease or other dementias [35, 38, 45]?
What are the roles of power of suggestion and the placebo effect in Ekbom syndrome [41]?
How does psychological contagiousness work [31]?
How can Ekbom syndrome patients be motivated to seek and accept psychiatric interventions?
How can patients most successfully be transitioned to appropriate mental health resources by pest control operators, entomologists, dermatologists, and others who are most likely to encounter them?
How can reliable therapeutics be developed for Ekbom syndrome [16•, 49•]?

Table 2 Differentials to consider and how they do not reflect symptomatology (patient complaints)

Diagnosis (infestation)	Description (reasons diagnosis can be ruled out)
Scabies	Predilection sites, such as the interdigital web, rather than whole body infestation Produce localized pruritus rather than paresthesia Do not spontaneously arise; acquired only by close personal contact with infested individual
Human head lice	Occur only on head hair, not a whole body infestation Visible to naked eye Cannot jump or fly Cannot survive for more than a couple of days off the host Produce pruritus on the scalp only
Bed bugs	Produce pruritus, not paresthesia Visible to naked eye Cannot jump or fly Lesions not under clothing, only on body regions exposed outside bedclothes
Bird mites	Produce pruritus and paresthesia Visible to naked eye Cannot jump or fly Cannot survive on human body (or any other mammal), so they do not establish true infestation Limited temporally to spring and early-summer, when nestlings fledge Do not persist for months (rarely weeks) and do not spread to infest secondary location (e.g., vehicle)
Springtails (Collembola)	Cannot bite, sting, or infest human bodies Common in homes, particularly in bathrooms and other areas of high humidity (feed on fungi in damp areas) Visible to naked eye Jump like fleas

Other key considerations

Cheyletiella mites (a dog, cat, and rabbit parasite) can attempt to feed on humans and yield a pruritic rash. However, these mites cannot sustain themselves on humans, so they cannot establish an infestation and thus yield only transitory, self-limiting discomfort. These mites are rare and easily eliminated on the canine, feline, or lapine host using currently available pet ectoparasiticides.

Vague descriptions are indicative of the populace's imprecise biological understanding, reflected in oxymorons such as "flying larvae" and "jumping mites." Ekbom syndrome patients claim their bugs exhibit behaviors that scientists recognize as atypical of arthropods or biologically impossible. When it comes right down to it, there are no creatures that exhibit the characteristics attributed by patients. There are no invisible bugs. There are no facultative parasites, bugs that can feed in the environment and then switch to infesting the human body. There are no bugs that eat clothing that can also infest human bodies. Spiders do not bite humans; they are predaceous, not hematophagous. There are no human parasites that can fly. There are no external animal parasites that can infest humans. Humans cannot acquire scabies from other animals; strains are host specific. There is no such thing as a "black pepper mite," "paper mite," or "cable mite."

Confirmation of any arthropod in the patient's samples serves to solidify their conviction that their problem is caused by mites despite the entomologist's assurances that none of the insects or mites can bite or sting. The typical home is occupied by dozens of mite and insect species, all of which are common residents and of no consequence to human health. However, the general public's ignorance about arthropods and fear of them makes people anxious about the mere presence of the most innocuous insects or mites.

may be competent to diagnose and treat ES, expert assessment allows differentiation of cases compounded by another psychiatric condition, such as schizophrenia [28]. Secondary conditions such as depression and even suicidal ideation will require expert assessment and management. Dermatologists may be disinclined to oversee a course of neurotropic medication with requisite titration and monitoring. For these reasons, dermatologists and psychiatrists recommend a liaison approach [3, 26, 46].

With resistance to considering psychiatric medications so entrenched, health care professionals recom-

mend directing attention to impacts on quality of life, suggesting medications to help the individual cope with the stress and anxiety produced by his or her condition while assuring the patient that medical staff will simultaneously continue investigating the underlying condition [30, 36]. Once started on an appropriate medication, the patient typically relinquishes the obsession with infestation (although, interestingly, he or she usually continues to assert that the infestation was real). Even if the delusion is not eliminated, treatment may restore the patient's functionality, allowing resumption of a normal life [3, 45].

Conclusions

ES yields considerable misery for patients themselves and for their friends, families, and associates. Because the condition is so poorly understood, concerned family members often cannot obtain appropriate therapy for patients. As the population ages, an increase in ES patients can be anticipated. The condition is under-researched, and medicine has little to offer patients in understanding of the condition or its treatment. Clinically, the stigmatizing term of *delusion* is avoided by calling the condition Ekbom syndrome. Research into the condition may prove challenging, as the researchers most appropriate to address the condition—those in the psychiatric community—seldom see these individuals [16, 26, 45]. Because they do not consider themselves to have a psychiatric problem, ES patients are unlikely to approach a psychiatrist or psychologist. By comparison, pest control companies and entomologists are frequently approached by these people but are not equipped to conduct medical investigations [22, 27]. Recognizing this challenge, many authors have recommended a multidisciplinary approach, with collaboration among mental health researchers, dermatologists, and entomologists [26, 28].

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