



E-ISSN: 2320-7078

P-ISSN: 2349-6800

JEZS 2019; 7(3): 894-900

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Received: 21-03-2019

Accepted: 25-04-2019

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A review on Ekbom Syndrome

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Abstract

Ekbom Syndrome synonymous with Delusional Parasitosis, is a turmoil in the mind of patient wherein people erroneously trust that they are pervaded with parasites, insects, or bugs, while as a general rule no such invasion is available. People experiencing this kind of disorder arrogantly believe the feelings of tactile sensations and the imaginary presence of insect, although nobody else can see those. Morgellons malady is a doubtful condition expressed by a fixed conviction that fibers that are imbedded or expelling from the skin; this condition is also falls in the range of Delusional Parasitosis. Ekbom Syndrome is a capricious condition; it is unmanageable and can't be redressed by argument or proof. Ekbom Syndrome sufferers display a scope of unsurprising practices in their endeavors to take out their pervasions, including looking for distinguishing pieces of proof and treatment from physicians and entomologists. Moreover, they may additionally experience co-morbid psychological conditions. Since this is a delusional affliction, effective treatment commonly requires intervention by therapeutic experts as well as need based antipsychotics. From an investigation, it was observed that disturbed reasoning and judgment were present in all cases of DI as against only 82% (27 of 32 patients) tactile symptoms, the picture is better clear by the disturbed thought.

Keywords: Delusion, infestation, imperceptible bug, formication

1. Introduction

Ekbom Syndrome (ES) can likewise be called as Delusional Parasitosis (DP), delusions of parasitosis, delusion of infestation, psychogenic parasitosis, or dermatozoenwahn (dermatozoic delusion) [1-5]. Ekbom syndrome or Delusional parasitosis (DP), is characterized as a delusional disorder where there is a fixed, unshakeable, and mixed up conviction by the patient that he or she is pervaded with parasites [6, 7]. A delusion is a false belief that is not consistent with the patient's intelligence, educational level, or cultural background, and that cannot be corrected by reasoning [8]. Patients who are experiencing this disorder expresses false believe to feel vibrate of insects slithering under skin and furthermore can visualize them however no one else can observe it. These invasions are seen as tactile sensations (e.g., stinging, burning, itching, or crawling) and envisioned in an assortment of structures. ES should not be mistaken for Wittmaack-Ekbom Syndrome, the medical term for restless legs disorder; nor should it be mistaken for entomophobia, the anxiety of insects, or acarophobia, the fear for mites [9]. Those affected with ES usually experience visual and tactile hallucinations perceived as bugs crawling in or on the skin. These perceptual delusions might be monosymptomatic pathological components and not recognize as seriously as if it is not a disorder. Patients have various names for the creatures they perceive to pervade them, such as insects, larvae, organisms, parasites, worms and beasties. The most widely recognized term is bug, which is used in the sense used by ES patients.

A comparative condition called Morgellons Syndrome is said to include putative invasion of the skin by fibers [10]. Since Morgellons does not include insects, it isn't synonymous with DP yet likely is a variation inside the equivalent delusional complex [11-14].

2. History

The Parisian dermatologist Georges Thibierge in 1894, is normally credited with the discovery and point out the therapeutic portrayal of the clinical picture. Thibierge called the influenced people "les acarophobes" [ancient Greek "akari" =mite, antiquated Greek "phobos" =fear] [15]. The sufferer had the bogus conviction that they had affected with scabies. The author mentioned briefly about the two subgroups: the individuals who truly had scabies previously (and were cured) and the individuals who never had it. Thibierge likewise expressed that a comparable picture happens in cocaineism, as he learned from Saury and Seglas at a congress

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on mental health in Rouen (France) in 1890 ^[16]. Just after two years, the dermatologist Perrin from Marseille (France) displayed three comprehensive case studies, utilizing the name "des nevropathies parasitophobiques" ^[16]. They focused on that patients had the dismal conviction of having a parasitic pervasion. In another case, as indicated by Tarbert's comprehensive historical literature search ^[17], the clinical picture was first referenced by Robert Willan in 1799 and Johann Heinrich Jordens in 1801. However, Musalek ^[18] discovered a patient with delusions of intestinal parasitosis (Enterozoenwahn) in an article from 1843. On the other hand, Karl Axel Ekblom ^[2], the Swedish neurologist depicted eight patients with the silly conviction that they were pervaded with little creatures, for example, insects or mites, a condition he called 'Dermatozoewahn' or 'delusion of animal life in skin'. He published seminal accounts of the disease in 1937 and 1938 and the disease was named after him.

3. Classification

Delusional parasitosis is divided into three Groups *viz.*, primary, secondary functional, and secondary organic groups.

3.1 Primary

The name "primary" DI was first presented by Skott in 1978. This disorder can't be clarified by some other condition and has been depicted as monosymptomatic, circumscribed, or segregated. The diagnosis is valid for disorders characterized by non-bizarre delusions of at least 1-month's duration and unremarkable cognitive and social functioning with normal behavior. Therapeutic specialists allude to this phenomenon as "monosymptomatic hypochondriacal psychosis", and at times as "true" delusional parasitosis. In the Diagnostic and Statistical Manual of Mental Disorders, 4th Edition (DSM-IV), it relates with "delusional disorder, somatic type".

3.2 Secondary functional

Secondary functional delusional parasitosis occurs when the delusions are associated with a psychiatric condition such as schizophrenia, obsessive-compulsive disorder or clinical depression.

3.3 Secondary organic

When a medical sickness or use of medical substances (therapeutic or recreational) causes the patient's manifestation secondary organic delusional parasitosis occurs. In the DSM-IV this circumstance relates with "psychotic disorder due to general medical condition". Physical ailments that can underlie secondary organic delusional parasitosis include: hypothyroidism, cancer, cerebrovascular disease, tuberculosis, neurological disorders, vitamin B12 insufficiency, and diabetes mellitus. Any sickness or medication for which formication is a symptom or side effect can turn into a trigger or hidden reason for delusional parasitosis.

Other physiological components which can cause formication and accordingly sometimes can lead to this condition include: menopause (i.e. hormone withdrawal); hypersensitivities, and medication misuse, including cocaine misuse and methamphetamine (as in amphetamine psychosis). It appears that a large number of these physiological components and

ecological factors, for example, airborne aggravations, are fit for prompting a "crawling" sensation in healthy people; unfortunately, a group of people become focused on that particular sensation which leads delusional parasitosis.

4. Portrayal of sufferers

Primary DP happens autonomously of any medical condition. Conversely, secondary DP goes with a physiological circumstance that produces paresthesia, pruritus, erythema, rash, or different side effects that are then confounded as undetectable bugs in the skin ^[19]. Although people may feel genuine dermal sensations, the hallucination is a consequence of the brain endeavoring to recognize the proximal reason, prompting their understandings of skin debris as living beings producing the stings, prickling, nibbles, or slithering sensations ^[3]. Pruritus is the most generally reported sensation, regularly found in over 80% of sufferers ^[20], with different feelings portrayed as creeping, tunneling, and gnawing ^[21, 22]. Obviously, there is a distinction between feeling odd sensations in or on the skin and presuming that they are created by imperceptible bugs. Thus, while sufferers react legitimately by endeavoring, to view and gather the causative agent, their determined declarations that scabs and hair are to be insects is demonstrative of delusion ^[11, 23].

4.1 Behaviors

Sufferers endeavor to expel parasites by picking and delving into the skin, creating abrasion, scarification, lacerations, and different sores ^[24, 25]. Self-mutilation to remove the parasites is inflicted by fingernails or teeth ^[23], as well as mechanical executes, for example, needles ^[26], tweezers, knives ^[27], razor blades and other sharp instruments ^[21, 25, 28]. One lady had her sister rub her body with a blade after each shower to expel the parasites, with the scrapings deliberately discarded by burning ^[5]. Another lacerated her conjunctiva while endeavoring to extricate a "worm" from her eye with tweezers ^[29]. One man went through 25 years burrowing "worms" out of his scrotum with disposable cutters; he was occasionally hospitalized and given blood transfusions to neutralize the resultant anemia ^[28]. This self-mutilation may result in extreme blood loss, contaminations and permanent scarring ^[28, 30]. Since they perceive the parasites as attempting to rise up out of the skin, sufferers regularly cut openings to allow escape ^[8]. The patient's presentation may likewise excoriations, bruising, traumatic hair loss, and contact dermatitis because of medications ^[21] or pesticides ^[14, 31]. Regularly, the sufferer confuses these scabs, scraped areas, or skin irritation as indications of invasion ^[32]. Since these conditions regularly have existed for a considerable length of time or years, the person's body shows scarring from old extraction sites, showing up as lichenified (thickened and weathered), excoriated (scraped), ecthymatous (solidified, aggravated, and pustular) crusts and scabs ^[23, 28]. Patients extract the parasites, check them tediously, and describe in insight about the morphology, lifecycle, and propensities for these culpable parasites as well as their approaches to get rid of them. Numerous patients gather bits of skin, hair, paper, and other example, asserting such scratches to be parasites, a phenomenon characteristic for this disorder generally called as "box of matches signal".



Fig 1: Ekbom syndrome patient spent hours every evening removing scabs with tweezers. She explained that she had to help the “bugs” emerge from the skin [9].



Fig 2: Lesions produced by an Ekbom syndrome patient attempting to remove “bugs” from under his skin [23].



Fig 3: Various bruised lesions produced due to severe itching on the superior portion of the dorsum [21].



Fig 4: Bruised lesions produced on the legs, being some deeper ulceration [21].



Fig 5: Lichenified nodules resulting from chronic scratching to root out “parasites” [21].



Fig 6: Bundles of nail clippings brought by a patient, purported to be “parasites” [21].



Fig 7: Scalp abrasions inflicted with a razor blade to rid the head of “parasites” [21].

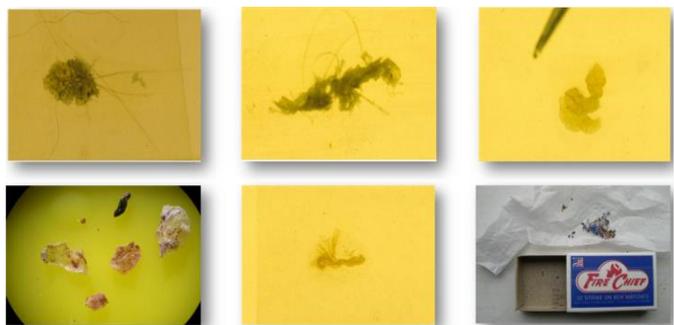


Fig 8: Some samples given by the patients perceived to be “parasites” [33].

5. Causes of Ekbom syndrome

An analysis of primary DP can be made only after other fundamental medical or mental conditions have been rejected,

because ES symptoms can be related with various physical stimuli, illnesses, psychiatric disorders, or intoxications [34-38].

5.1 Physical causes

Physical reasons for ES include real arthropods and different factors as examined by Blum [39], particularly natural particulate matter [40]. Some DP cases might be accelerated by genuine physical causes, for example, protection causing dermal aggravation or static electricity attracting fibers or fragments that vibrate like stings [25, 39, 40, 41, 42, 43]. Different allergens and natural materials, for example, formaldehyde can deliver dermatitis [44]. Various parts of sick building syndrome have been related with side effects of imperceptible bugs [36, 42, 45]. Conditions delivered by genuine physical causes are alluded to as illusions of parasitosis; these people recognize the genuine reason for their distress once it is clarified.

5.2 Physiological causes

A few health conditions produce indications that imitate ES, representing the requirement for an intensive medical test for underlying conditions that may be dependable [46]. For example, a brain tumor delivered paresthesia in a patient who griped that ants were creeping on and gnawing her [47]. Inadequately managed diabetes mellitus can result in diabetic neuropathy, prompting paresthesia, which might be misjudged as bites or stings [48, 49]. Other endocrine and metabolic issue can create pruritus too [49]. The greater part of Ekbohm's [2] patients showed hypertension, yet he failed to connect this basic disease with the symptomatology observed. Cerebral infarction scan produces brain injuries that result in neurological sensations saw as insect movement, or the pruritus going with interminable renal failure may incite ES [48, 50]. Organic brain infection should always be considered in delusion cases [47, 51, 52, 53]. Ekbohm perceived that specific medications, specifically cocaine, could mimic a large number of the skin vibes of which his patients whined, so he noticed that substance misuse was absent in any of these cases.

5.3 Psychological causes

Despondency, nervousness, stress, and other mental conditions are known to start the tingle scratch cycle [24] and to show as dermal conditions [54, 55]. Lepping *et al.* [54] classified and provided instances of psychoses comorbid (occurring simultaneously with another medical condition) to secondary delusional parasitosis. The most widely recognized basic psychopathologies incorporate schizophrenia, paranoid states, bipolar disorders, depression, anxiety disorders, and obsessive-compulsive conditions [21, 23, 24, 30, 54, 56, 58]. To resolve the hallucination, the underlying psychological sickness must be addressed psycho pharmacologically [34, 38, 59, 60]. A few antidepressants combine antipruritic and antihistamine impacts too as are especially appropriate for use in ES cases [24, 57].

6. Treatments

6.1 Entomological/Pest control

The job of entomologists in Ekbohm Syndrome circumstances is to inspect proffered specimens, to decide whether an arthropod is included, and, assuming this is the case, to make recommendations for concealment [45]. It ought to be stressed that merely finding an arthropod does not demonstrate an invasion or that the species is related with the condition [61]. Ethical pest control organizations decline to make insecticidal

applications until they identify a target pest [25, 36, 41, 45]. Since most ES sufferers have their homes repeatedly treated with insecticides, either by pest control companies or without anyone else's input, there is danger of pesticide over-burden [41, 62, 63, 64].

6.2 Clinical control

The clinical management of patients with delusional parasitosis is a challenge, as patients are regularly hesitant to participate in a significant therapeutic relationship because of their substantial idea of the sickness. Therefore, they look for assistance from general specialists, dermatologists or pest control organizations yet decline psychiatric referral or treatment. Normally, it is difficult to treat patients with delusional parasitosis with antipsychotics. In this way, experienced clinicians tell their patients that the antipsychotics are successful 'against the itch' or the 'problems with the pests' in order not to need to lie [26, 35, 65].

Another approach to accomplish a superior therapeutic relationship was developed in the late 1980s. Specialized out-patient clinics were situated in dermatology clinics to recognize the patients' non-psychiatric idea of their ailment [17, 35]. In any case, even these 'low threshold' settings have regularly failed to permit the establishment of an adequate therapeutic collusion. In spite of all these endeavors, numerous patients lose confidence in expert medication and resort to hazardous self-treatments, for example, inordinate skin cleaning with chemicals or pesticides [65].

6.3 Antipsychotic treatment

Antipsychotic medications, sometimes alluded to as neuroleptics or real tranquilizers, are recommended to treat schizophrenia and to diminish the side effects related with psychotic conditions, for example, bipolar, psychotic wretchedness, senile psychoses, different organic psychoses, and medication-initiated psychoses. Individuals encountering psychosis are once in a while, yet not generally, a peril to themselves as well as other people. Antipsychotic drugs have both a transient narcotic impact and the long-haul impact of decreasing chances of psychotic episodes. Most medications are accessible in oral dose frames (tablets, dry powder, and capsules), while some can be given in parenteral structure (intramuscular and intravenous infusions).

6.3.1 Typical antipsychotics, or first-generation antipsychotic drugs

The typical, or conventional, antipsychotics were first created during the 1950s. Haldol (haloperidol) and Thorazine (chlorpromazine) are the best-known typical antipsychotics. They keep on being valuable in the treatment of extreme psychosis and behavioral problems when more up to date drugs are ineffectual. Nonetheless, these medications do have a high danger of symptoms, some of which are very serious. Because of the genuine reactions of numerous run of the typical antipsychotics, medicate makers built up another classification alluded to as atypical antipsychotics.

6.3.1.1 Commonly prescribed typical antipsychotics include

Haldol (haloperidol)
Loxitane (loxapine)
Mellaril (thioridazine)
Moban (molindone)
Navane (thiothixene)
Prolixin (fluphenazine)

Serentil (mesoridazine)
 Stelazine (trifluoperazine)
 Trilafon (perphenazine)
 Thorazine (chlorpromazine)

6.3.2 Atypical antipsychotics, or second-generation antipsychotic drugs

These new drugs were affirmed for use during the 1990s. Clozapine, asenapine, olanzapine, quetiapine, paliperidone, risperidone, sertindole, ziprasidone, zotepine, and aripiprazole are atypical antipsychotic drugs. With the revelation of clozapine in 1959, it ended up clear that this medication was less inclined to deliver extrapyramidal impacts (physical side effects, for example, tremors, paranoia, anxiety, dystonia, and so on because of ill-advised portions or unfriendly responses

to this class of medication) in people at clinically viable dosages than some different sorts of antipsychotics. Clozapine was arranged as the primary atypical antipsychotic medicate. This classification of drugs has likewise been of incredible incentive in examining the pathophysiology of schizophrenia and different psychoses.

6.3.2.1 Commonly prescribed atypical antipsychotics include

Abilify (aripiprazole)
 Clozaril (clozapine)
 Geodon (ziprasidone)
 Risperdal (risperidone)
 Seroquel (quetiapine)
 Zyprexa (olanzapine)

Table 1: Effect of typical antipsychotics [34].

Antipsychotic	Dosage (mg/day)	No. of patients	Outcome			
			Full remission	Partial remission	No effect	Non-adherence
Pimozide	1-12	53	24	26		3
Haloperidol	1-10	6	4	2		
Chlorpromazine	150-300	4		2	2	
Perphenazine	4-12	3	1	2		
Sulpiride	50-150	2	2			
Perithiazine	5	1	1			
Thioridazine	75	1	1			

Table 2: Effect of atypical antipsychotics [34].

Reference	Age (years)	Gender	Treatment	Dosage (mg)	Outcome
Gallucci & Beard (1995)	72	F	Risperidone	1-6	Partial remission
Slaughter <i>et al.</i> (1998)	32	F	Olanzapine (+Nefazodone)	5-20	Non-adherence
Freyne <i>et al.</i> (1999)	81	M	Risperidone	0.5-1.0	Full remission
Kim <i>et al.</i> (2003)	33	M	Risperidone	1-3	Partial remission
Kim <i>et al.</i> (2003)	55	F	Quetiapine, then pimozide	Upto 800 3-4	Partial remission (quetiapine) Full remission (pimozide)
Pacan <i>et al.</i> (2004)	56	M	Olanzapine then risperidone	10-20 4-8	No effect (olanzapine) Partial remission (risperidone)
Pacan <i>et al.</i> (2004)	54	F	Risperidone (later +sertraline + diazepam)	1-3	Full remission
Freudenmann <i>et al.</i> (2007)	77	F	Olanzapine	2.5-7.5	Partial remission

7. Determine if arthropods are involved or not

7.1 If arthropods are involved

Before expecting that an individual experiences ES, it is essential to determine that no invasion exists [39, 66, 67, 68]. There are few arthropods that can cause the physical symptoms and that have the characteristics with which they are depicted [42, 69]. The differential analyses will incorporate lice (head, body, and pubic), mites, bed bugs, thrips, insects, and springtails [21, 36, 39, 45, 68, 70, 71, 72]. Altschuler *et al.* [73] implied to indicate Collembola in skin samples taken from people determined to have DP, yet the work has not gotten across the board acknowledgment and anticipates extra research to affirm or decline these discoveries. In one investigation [63], 13% of the reviewed premises had genuine arthropods representing the distress.

Notwithstanding reliable diagnostics, scabies is routinely over analyzed [71, 74, 75]. Tragically, when the analysis of a scabies or lice invasion progresses toward becoming settled in after the doctor affirms it, the patient continues trusting that these creatures are living on the skin [23, 65, 76]. If the patient's complaint is pruritus and the clinical introduction is steady with scabies, "the analysis is scabies until demonstrated otherwise" [77]. Indeed, even pruritic injuries not found in

scabies inclination destinations are thought to be scabies and treated accordingly [65, 77, 78]. In the event that treatment is started with scabicides and the patient's condition improves, the scabies analysis is thought to be affirmed [57, 71, 75]. In any case, there is a solid misleading impact in these cases, so any treatment commonly creates impermanent abatement, which is then trailed by bounce back states of more noteworthy seriousness [76, 79, 80], provoking the patient to demand that the doctor give "something more grounded" in light of the fact that the primary medicine was not sufficient [25, 28, 56, 59, 65]. Frequently the patient credits treatment inability to the eggs being impervious to the chemicals or the capacity of the creatures to tunnel in the skin and departure.

Similarly, a pesticide application is every now and again seen as succeeding, however presently the issue returns, persuading the sufferer that the pesticide was just imperceptibly powerful. The PCO is committed to react to the callback and subsequently starts the cycle of treatment and client disappointment [39, 79]. Hence, PCOs ought to dependably direct a careful assessment and recognize the pest to control before an insecticide is utilized [81]. Now and again, particularly if ES is suspected, the organization may choose to decline the account [79, 36].

7.2 If no arthropod is involved

On the off chance that, following an intensive investigation, PCOs and entomologists fail to recognize an arthropod that is creating the condition, the ES sufferer ought to be alluded to a dermatologist to guarantee they get suitable medical consideration, either in that training or by psychological/psychiatric associates [20, 26, 67, 81]. The doctor must preclude every ailment set apart by side effects of pruritus, paresthesia, urticaria, or other skin sensation [23]. Recreational medication utilize should likewise be considered [46], particularly in more young patients [82]. Since ES side effects can be demonstrative of hazardous ailments, they ought to be agreed due concern [23, 52, 83].

8. Conclusion

The role of an entomologist's is to diagnose whether really any insects or other arthropod involved in the case. In the event that no arthropod involved with sufferer, at that point Ekbohm Syndrome turns into the probable finding. The main job of entomologists or pest control organizations to give referral to a medical expert. ES is still a new subject for the nation like India. Therefore, a thorough study of patient is very useful and need of the hour.

9. References

- de Leon J, Antelo RE, Simpson G. Delusion of parasitosis or chronic tactile hallucinosis: hypothesis about their brain physiopathology. *Compr. Psychiatry*. 1992; 33:25-33.
- Ekbohm KA. Der präsenile dermatozoenwahn. *Acta Psych. Neurol. Scand*. 13:227-59. Reprinted. 2003. The pre-senile delusion of infestation. (Classic Text No. 54). *Hist. Psychiatry*. 1938; 14:232-56.
- Slaughter JR, Zanol K, Rezvani H, Flax J. Psychogenic parasitosis: a case series and literature review. *Psychosomatics*. 1998; 39:491-500.
- Brosig B, Kupfer J, Kohnlein B, Niemeir V, Gieler U. Atopic dermatitis in psychoanalytic psychotherapy—a psychobiological case study. *Dermatol. Psychosom*. 2000; 1(1):19-26.
- Wilson JW, Miller HE. Delusion of parasitosis (Acarophobia). *Arch. Dermatol. Syphilol*. 1946; 54:39-56
- Donabedian H. Delusions of Parasitosis. *Clinical Infectious Diseases*. 2007; 45:e131-4.
- Zanol K, Slaughter J, Hall R. An approach to the treatment of psychogenic parasitosis. *Int. J. Dermatol*. 1998; 37:56-63.
- Koblentz CS. The clinical presentation, diagnosis and treatment of delusions of parasitosis: a dermatologic perspective. *Bull. Soc. Vector Ecol*. 1993; 18:6-10.
- Hinkle NC. Ekbohm Syndrome: the challenge of invisible bugs. *Ann Rev Entomol*. 2010; 55:77-94.
- Savely VR, Leitao MM, Stricker RB. The mystery of Morgellons disease: infection or delusion? *Am. J Clin. Dermatol*. 2006; 7:1-5.
- Dunavan CP. Bugs are crawling in my skin. *Discover Dec*. 2006; 26-27.
- Koblentz CS. The challenge of Morgellon's disease. *J Am. Acad. Dermatol*. 2006; 55:920-22.
- Murase JE, Wu JJ, Koo J. Morgellons disease: a rapport-enhancing term for delusions of parasitosis. *J Am. Acad. Dermatol*. 2006; 55:913-14.
- Robles DT, Romm S, Combs H, Olson J, Kirby P. Delusional disorders in dermatology: a brief review. *Dermatol. Online J*. 2008; 14:2
- Thibierge G. Les acarophobes. *Ann. Dermatol. Syphilograph*. 1894; 5:730-31.
- Freudenmann RW, Lepping P. Delusional Infestation. *Clinical Microbiol Rev*. 2009; 22(4):690-732.
- Trabert W. 100 years of delusions of parasitosis: meta-analysis of 1223 case reports. *Psychopathology*. 1995; 28:238-46
- Hunt NJ, Blacker VR. Delusional parasitosis. *Br. J Psychiatry*. 1987; 150:713-14
- Freudenmann RW, Lepping PL. Second-generation antipsychotics in primary and secondary delusional parasitosis: outcome and efficacy. *J Clin. Psychopharmacology*. 2008; 28:500-8.
- Zomer SF, de Wit RFE, van Bronswijk JE, Nabarro G, van Vloten WA. Delusions of parasitosis: a psychiatric disorder to be treated by dermatologists? An analysis of 33 patients. *Br. J Dermatol*. 1998; 138:1030-32.
- Aw DCW, Thong JY, Chan HL. Delusional parasitosis: case series of 8 patients and review of the literature. *Ann. Acad. Med. Singap*. 2004; 33:89-94.
- Goddard J. Imaginary insect or mite infestations. *Infect. Med*. 1998; 15:168-70
- Dunn J, Murphy MB, Fox KM. Diffuse pruritic lesions in a 37-year-old man after sleeping in an abandoned building. *Am. J Psychiatry*. 2007; 164:1166-72.
- Koo J, Lee CS. Delusions of parasitosis: a dermatologist's guide to diagnosis and treatment. *Am. J Clin. Dermatol*. 2001; 2:285-90.
- Lyell A. Delusions of parasitosis: the Michelson Lecture. *Br. J Dermatol*. 1983; 108:485-99.
- Driscoll MS, Rothe MJ, Grant-Kels JM, Hale MS. Delusions of parasitosis: a dermatologic, psychiatric, and pharmacologic approach. *J Am. Acad. Dermatol*. 1993; 29:1023-33
- Meehan WJ, Badreshia S, Mackley CL. Successful treatment of delusions of parasitosis with olanzapine. *Arch. Dermatol*. 2006; 142:252-55
- Goi PD, Scharlau CT. Ekbohm's syndrome followed by self-mutilation. *Rev. Psiquiatr. Rio Gd. Sul*. 2007; 29:97-99
- Sherman MD, Holland GN, Holsclaw DS, Weisz JM, Omar OH, Sherman R. Delusions of ocular parasitosis. *Am. J Ophthalmol*. 1998; 125:852-56
- Wenning MT, Davy LE, Catalano G, Catalano MC. Atypical antipsychotics in the treatment of delusional parasitosis. *Ann. Clin. Psychiatry*. 2003; 15:233-39.
- Kim C, Kim J, Lee M, Kang M. Delusional parasitosis as 'folie à deux.' *J. Kor. Med. Sci*. 2003; 18:462-65.
- Matthews AM, Hauser P. A creepy-crawly disorder. *Curr. Psychiatry*. 2005; 4:88-93.
- Hinkle NC. Ekbohm Syndrome: A Delusional Condition of Bugs in the Skin. *Curr Psychiatry Rep*, 2011. DOI 10.1007/s11920-011-0188-0
- Hinkle NC. Delusory parasitosis. *Am. Entomol*. 2000; 46:17-25
- Musalek M, Bach M, Passweg V, Jaeger S. The position of delusional parasitosis in psychiatric nosology and classification. *Psychopathology*. 1990; 23:115-24
- Potter MF. Your guide to mystery bites: diagnosis and management. *PCT*. 2006; 34:1-7.
- Prakash R, Sachin G, Singh LK, Das B, Lakra A. Rapid resolution of delusional parasitosis in pellagra with niacin augmentation therapy. *Gen. Hosp. Psychiatry*. 2008; 30:518-84.

38. Räsänen P, Erkonen K, Isaksson U, Koho P, Timonen M. Delusional parasitosis in the elderly: a review and report of six cases from Northern Finland. *Int. Psychogeriatr.* 1997; 9:459-64
39. Blum S. Mystery bugs. *Pest Manage.* 1986; 5:12-13.
40. Scott HG, Clinton JM. An investigation of "cable mite" dermatitis. *Ann. Allergy.* 1967; 25:409-14.
41. Pinto L. Paper mites, cable mites and other mystery bugs. *Pest Control.* 1989; 57(24):16.
42. Simpson WJ. Cable bugs-mysterious biting insects or faulty diagnosis? *Parasitol. Today.* 1987; 3:323-24.
43. Waldron WG. The entomologist and illusions of parasitosis. *Calif. Med.* 1972; 117:76-78.
44. Carlson R, Smith MMC, Nedorost ST. Diagnosis and treatment of dermatitis due to formaldehyde resins in clothing. *Dermatitis.* 2004; 15:169-75.
45. November J. Nothing to fear but fear itself. *Pest Control Technol.* 1988; 16:60-64.
46. Huber M, Kirchler E, Karner M, Pycha R. Delusional parasitosis and the dopamine transporter. A new insight of etiology? *Med. Hypotheses.* 2007; 68:1351-58.
47. Murthy P, Jayakumar PN, Sampat S. Of insects and eggs: a case report. *J Neurol. Neurosurg. Psychiatry.* 1997; 63:522-23.
48. Belmin J, Valensi P. Diabetic neuropathy in elderly patients. What can be done? *Drugs Aging.* 1996; 8:416-29.
49. Baldry RJ, Harries MJ, Nayeemuddin F, Rhodes LE. Disorders of aging skin. *Rev. Clin. Gerontol.* 2006; 16:165-77
50. Yorston G. Treatment of delusional parasitosis with sertindole. *Int. J Geriatr. Psychiatry.* 1997; 12:1127-28.
51. Berrios GE. Delusional parasitosis and physical disease. *Compr. Psychiatry.* 1985; 26:395-403.
52. Edison KE, Slaughter JR, Hall RD. Psychogenic parasitosis: a therapeutic challenge. *Mo. Med.* 2007; 104:132-38.
53. Nagaratnam N, O'Neile L. Delusional parasitosis following occipito-temporal cerebral infarction. *Gen. Hosp. Psychiatry.* 2000; 22:129-32.
54. Lepping P, Russel I, Freudenmann RW. Antipsychotic treatment of primary Delusional Parasitosis. *British Journal of Psychiatry.* 2007; 191:198-205, DOI: 10.1192/bjp.bp.106.029660
55. Hashiro M, Okumura M. Anxiety, depression, psychosomatic symptoms and autonomic nervous function in patients with chronic urticaria. *J Dermatol. Sci.* 1994; 8:129-35.
56. Bhatia MS, Jagawat T, Choudhary S. Delusional parasitosis: a clinical profile. *Int. J Psychiatry Med.* 2000; 30:83-91.
57. Le L, Gonski PN. Delusional parasitosis mimicking cutaneous infestation in elderly patients. *Med. J Aust.* 2003; 179:209-10.
58. Mahler C, Macqueen G, Samaan Z. A postmenopausal woman presenting with Ekbom syndrome associated with recurrent depressive disorder. *Case Journal.* 2008; 1:54. DOI: 10.1186/1757-1626-1-54.
59. Hillert A, Gieler U, Niemeier V, Brosig B. Delusional parasitosis. *Dermatol. Psychosom.* 2004; 5:33-35.
60. Lopes Rocha F, Hara C. Aripiprazole in delusional parasitosis: case report. *Prog. Neuro-Psychopharmacol. Biol. Psychiatry.* 2007; 31:784-86.
61. Gieler U, Knoll M. Delusional parasitosis as 'folie a trois.' *Dermatologica.* 1990; 181:122-25.
62. Colombo G, Caimi M, Donà GP. Shared Ekbom's syndrome: a case study. *Eur. Psychiatry.* 2004; 19:115-17.
63. Kushon DJ, Helz JW, Williams JM, Lau KMK, Pinto L, St. Aubin FE. Delusions of parasitosis: a survey of entomologists from a psychiatric perspective. *Bull. Soc. Vector Ecol.* 1993; 18:11-15.
64. Waldron WG. The problem of delusory parasitosis (entomophobia) in arthropod control work. *Proc. Pap. 31st Annu. Conf. Calif. Mosq. Control Assoc,* 1963, 75-76.
65. Friedmann AC, Ekeowa-Anderson A, Taylor R, Bewley A. Delusional parasitosis presenting as folie à trois: successful treatment with risperidone. *Br. J Dermatol.* 2006; 155:841-65.
66. Gauge RW. What to do about insect phobias. *Pest Control.* 1957; 25:42-47.
67. Goddard J. Creepy crawlers. *Pest Control Technol.* 2001; 29:36, 38, 41.
68. Guarneri F, Guarneri C, Mento G, Ioli A. Pseudo-delusory syndrome caused by *Limothrips cerealium*. *Int. J Dermatol.* 2006; 45:197-99.
69. Poorbaugh JH. Cryptic arthropod infestations: separating fact from fiction. *Bull. Soc. Vector Ecol.* 1993; 18:3-5
70. Childers CC, Beshear RJ, Frantz G, Nelms M. A review of thrips species biting man including records in Florida and Georgia between 1986-1997. *Fla. Entomol.* 2005; 88:447-51.
71. Flinders DC, De Schweinitz P. Pediculosis and scabies. *Am. Fam. Physician.* 2004; 69:341-48.
72. Meinking TL, Elgart G, Eyerdam DH, Rivera J. Thrips mistaken for headlice or Ekban [sic] Syndrome. *Int. J Dermatol.* 2006; 45:327-28.
73. Altschuler DZ, Crutcher M, Dulceanu N, Cervantes BA, Terinte C, Sorkin LN. Collembola (springtails) (Arthropoda: Hexapoda: Entognatha) found in scrapings from individuals diagnosed with delusory parasitosis. *J N. Y. Entomol. Soc.* 2004; 112:87-95.
74. Pariser RJ, Pariser DM. Primary care physicians' errors in handling cutaneous disorders. *J Am. Acad. Dermatol.* 1987; 17:239-45
75. Webb JP. Case histories of individuals with delusions of parasitosis in southern California and a proposed protocol for initiating effective medical assistance. *Bull. Soc. Vector Ecol.* 1993; 18:16-25.
76. Daniel E, Srinivasan TN. Folie a Famille: delusional parasitosis affecting all the members of a family. *Indian J. Dermatol. Venereol. Leprol.* 2004; 70:296-97.
77. Karthikeyan K. Scabies in children. *Arch. Dis. Child. Educ. Pract. Ed.* 2007; 92:65-69.
78. Chosidow O. Scabies and pediculosis. *Lancet.* 2000; 355:819-26
79. Pomerantz C. Arthropods and psychic disturbances. *Bull. Entomol. Soc. Am.* 1959; 5:65-67.
80. Wurtz R. Psychiatric diseases presenting as infectious diseases. *Clin. Infect. Dis.* 1998; 26:924-32.
81. Elliott GR. Entomophobia. *Soap Sanit. Chem.* 1944; 20:105.
82. McGuinness T. Methamphetamine abuse. *Am. J Nurs.* 2006; 106:54-59.
83. Frean J, de Jong G, Albrecht R. Imaginary bugs, real distress: delusional parasitosis. *S. Afr. Med. J.* 2008; 98:784-86.