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Insects and Spiders: Infestations and Bites

SUMMARY

Despite successful eradication techniques and specific effective therapies, insect bites and infestations remain a source of great human misery. The current scabies pandemic shows no signs of abating. Bed bugs, which through the ages have been second only to the malarial mosquito as an insect vector of fatal infection, have now been implicated in the transmission of Hepatitis B and possibly African acquired immune deficiency syndrome (AIDS). The incidence of head- and pubic lice is on the rise, the latter paralleling, and often co-existing with, other sexually transmitted diseases. Black widow spiders are native to many populous areas in southern Canada, and the brown recluse spider's range now encompasses Canada, thanks to moving vans and central heating. (*Can Fam Physician* 1987; 33:2369-2373.)

RÉSUMÉ

Malgré des techniques d'éradication ayant fait leurs preuves et certaines thérapies particulièrement efficaces, les piqûres et infestations d'insectes demeurent une source de grande misère humaine. La pandémie actuelle de gale ne donne aucun signe de régression. La punaise de lit, qui au fil des années s'est classée bon deuxième derrière le moustique de la malaria comme insecte vecteur d'infection fatale, est maintenant impliquée dans la transmission de l'hépatite B et possiblement du syndrome d'immuno-déficience acquise (SIDA) en Afrique. L'incidence de poux pubiens et de tête va en augmentant, et les premiers sont aussi fréquents et coexistent souvent avec d'autres maladies transmises sexuellement. Les araignées « veuves noires » habitent de nombreuses régions peuplées du sud du Canada, et l'araignée brune solitaire s'est maintenant installée au Canada grâce aux camions de transport et au chauffage central.

Key words: dermatology, insect bites, insect infestations

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BY THEIR NATURE, insects that bite at night are shrouded in myth and misinformation that produces near-universal fear. Modern society links some of the perpetrators like the scabies mite, lice and bed bugs with its attitudes toward dirt, causing many victims to suffer shame that far out-

weighs the physical discomfort. Spiders have been given a "bad rap" by a sensation-seeking press that plays on one of humanity's most common phobias, araneophobia (the irrational fear of spiders). Even those enlightened individuals who, through education, have detached the emotional overburden from the truth, now have concerns that biting insects might be a possible vector in the transmission of Hepatitis B and, possibly, the acquired immune deficiency syndrome (AIDS) in Africa and elsewhere.

Scabies

The discovery of the human itch mite *Sarcoptes scabiei var hominis* by

Bonomo, in 1687, gave scabies the distinction of being the first disease with a known cause. Although scabies appears to be almost endemic under the chaotic conditions of warfare and squalor, cyclical world-wide epidemics have been noted at about 30-year intervals for the past 150 years. The last pandemic has involved Canada continuously since 1973 and to date shows no signs of abating.

Impregnated adult female mites (0.4mm long) burrow into the epidermis (see Figure 1) for about 30 days following copulation and lay eggs that hatch in three or four days. Larvae move to the surface, molt, and become adults. Young females then mate with males on the surface and

burrow back into the skin to repeat the cycle.

Scabies is spread by close personal contact, especially between sexual partners, but non-venereal transmission to other household members via clothing and bed linens is common. When a venereal source is suspected, a search for other sexually transmitted diseases is appropriate. Epidemics are common among health-care personnel and residents of hospitals, nursing homes, day-care centres, and other institutions where physical contact is a routine part of care.

Because symptoms are the result of a delayed immune reaction to the mite and its fecal residue, there may be a four- to six-week delay after infestation before the problem is recognized. Immunocompromised patients may have thousands of mites with few symptoms and therefore are highly contagious (Norwegian or crusted scabies). The itch associated with the eventual immune response is usually intense and becomes worse at night. In the classic presentation, papules and burrows occur on the hands (especially in the web spaces and along the volar aspect of the wrist), feet, nipples, belt line and penis. In infants and children (see Figure 2), wide-spread vesicles, nodules, crusting and secondary impetiginization are common. Scabies treated with topical or systemic steroids may be minimally symptomatic with an atypical distribution.

While a straightforward presentation of nocturnal itch and a classic distribution of lesions is easy to diagnose, atypical cases may be confirmed by demonstrating the mite,

eggs, or fecal material in a burrow. After identifying a suspect lesion, the physician shaves the "roof" off the burrow or papule with a scalpel. The burrow is then scraped vigorously, and the scrapings are placed on a glass slide, covered with oil and a cover slip, and examined under the low-power microscope lens (see Figure 3). Scabies tracks may be identified by placing ink on a papule and then wiping the surface clear with alcohol. Ink flowing along the track forms a dark zigzag line away from the papule.¹ A punch biopsy is helpful when suspected cases cannot be confirmed by the above techniques.

In the past 25 years, lindane (Kwellada) has been the treatment of choice for scabies. This medication gives a cure rate of 95% following a single 12-hour application. Adults should apply the medicine from neck to toes, and children should have the entire body treated, except for the skin immediately adjacent to the eyes. All family members and close contacts should be treated simultaneously. Patients are asked to ensure that clothing, bed linens, and other such items are washed in hot water immediately following treatment, and any materials that will not tolerate such washing must be dry cleaned or set aside in a plastic bag for two to four weeks. A hot bath prior to the lindane application, as formerly recommended, may increase percutaneous absorption and does not improve the cure rate.

In the past 15 years, there have been many anecdotal reports and editorials questioning the safety of topical lindane, most citing neurotoxicity and bone-marrow suppression. Most of these reports were based on cases

of ingestion or agricultural exposure to the chemical. Several recent comprehensive reviews of cases of suspect toxicity have concluded that lindane is a remarkably safe medication, and that there have been only six possible and no definite reports of toxicity in over 40 million uses in 20 years. Lindane has not been proven safe for use in infants or pregnant women, but there are no reports of fetal malformation, and the medication has not been shown to be a teratogen or a mutagen.

Infants and pregnant or lactating women are often treated with two applications of 10% crotamiton (Eurax), but while its antipruritic properties help to control the itch, the cure rate can be less than 40%. Further, its safe use in children and in pregnant women has not been established. A mixture of 6 to 10% precipitated sulphur in petrolatum is also commonly prescribed for infants and pregnant women, but it is messy, has a failure rate approaching 50%, and, most important, its safe use in pregnant women and children has never been established.

Following adequate scabidical therapy, a mild topical steroid in a lubricating base is soothing, and oral antihistamines are useful, especially at night. Secondary infection is common and always requires oral antibiotics using agents such as cloxacillin or erythromycin, which are effective against Group A Streptococci and Staphylococcus aureus. Treatment failures are usually the result of poor compliance (usually an asymptomatic family member who refuses treatment) or reinfestation. As the dead mites, eggs, and fecal residue may not be shed from the skin for up to

Figure 1
Scabetic burrow



Figure 2
Widespread infantile scabies



four weeks, residual itch is to be anticipated, and retreatment, in the absence of proof of reinfestation, is discouraged because of possible irritation from overuse of the scabicides.

Lice

Through the ages lice, acting as disease vectors, have killed more people than any other insect, except for the malaria-bearing mosquito. Following a relatively stable period after the Second World War, the incidence of head- and pubic lice has increased world wide from the mid-1970s on, but body lice appear to be on the decline. Lice are host specific and thus do not infest house pets or other animals. All are voracious blood suckers that frequently distend with overfeeding until they literally explode!

Head lice

The head louse (*Pediculus humanus capitis*) is a 2mm-4mm wingless gray/brown insect. The eggs or nits are firmly glued to hairs close to the scalp and are carried farther out with hair growth (see Figure 4). How far along the hair shaft they appear indicates the duration of the infestation. Nits must be distinguished from dandruff and hair "casts" which readily slide along the hair shaft or can be flicked off. There are only a few adult lice present on any given victim.

Many minor infestations are asymptomatic, but patients with heavier infestations present with excoriation and secondary infection. Lice are usually spread by direct head-to-head contact, but can survive

long enough to be transmitted by hats, combs, and other articles that touch the head. Treatment consists of shampooing with lindane (Kwellada) lotion or shampoo, which must be left on the scalp for five to 10 minutes on two occasions, seven to 10 days apart, as it may not be fully ovicidal. Given this limited area of application, there are no reported cases of neurotoxicity from this preparation. Pyrethrins (e.g., Rid) shampoos are also very effective. The entire family and their close contacts should undergo simultaneous therapy, and their clothing and grooming aids must be washed in hot water. Nits can be removed by a fine-toothed comb, and vigorous brushing is helpful.

Body lice

The "vagabond's disease" or body lice (*Pediculus humanus corporis*) is now rare in Canada except for isolated pockets where a few truly dispossessed individuals wear the same clothes for weeks without a change. The body louse lives in clothing seams and forages only occasionally for a blood meal. Massive infestations produce constitutional symptoms of malaise, headache, fever, and joint pain; hence the origin of the expression "feeling lousy". In developing nations the body louse is still a major vector in epidemic typhus.

Once clothing has been sterilized, regular laundering is all that is required to prevent re-infestation. Clothes dusted with a 10% lindane powder will remain louse free for one month, despite continuous wearing.

Pubic lice

Although pubic lice (*Phthirus pubis*) are usually localized to the pubic area, they frequently wander to the axilla and in children to the eyebrows and eyelashes. The short (1 mm) crab-shaped adults frequently escape detection because they are translucent and seldom active, but nits firmly glued to hair shafts in the affected area confirm the diagnosis. Individual bites are painless, but pruritis associated with heavier infestations eventually forces most patients to seek help. Although indirect transmission via toilet seats, towels, and other articles is frequently offered as an "explanation", transmission is usually by direct contact, that is, a sexual contact in most adult cases. One-third to one-half of all patients with *pediculosis pubis* have co-existent venereal diseases such as gonorrhea, trichomonas, chlamydia, and syphilis,² and appropriate investigation including syphilis serology should be considered mandatory in all cases.

A five-minute application of lindane shampoo applied to the pubic area, adjacent abdominal wall, inner thighs, and axillae is simple, fast and very effective. Pyrethrins preparations (e.g., Rid) may be preferable for children and pregnant or lactating women. (See scabies therapy, above.) Nits can be removed with a fine-tooth comb, and contaminated clothing and bed linens can be washed in hot water or dry cleaned. As lindane and pyrethrins are too irritating to be applied to the eyelashes, this site requires a thick application of petrolatum three or four

Figure 3
Adult female scabies mite scraped from burrow

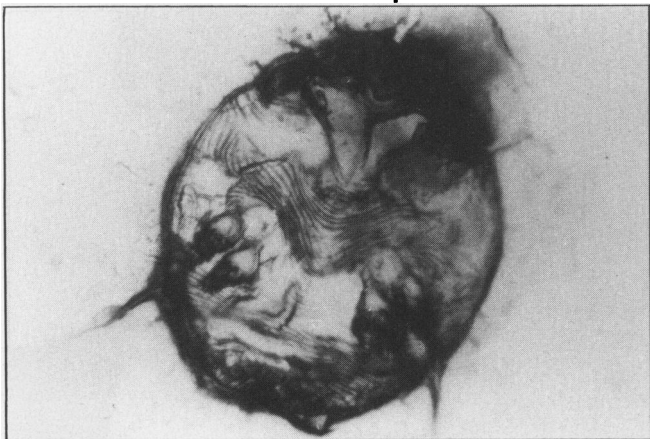


Figure 4
Nits in scalp hair



times a day for a week, followed by combing for nits.

Bed Bugs

Bed bugs (*Cimex lectularius*) are nocturnal foragers that seek a blood meal by biting several times close together, often in a line. This insect is reddish brown, 5 mm in length, and lives in bedding or crevices within the bedroom. The victim does not waken with the bite itself, but develops itchy wheals with a diagnostic central punctum that is frequently hemorrhagic. Bites are usually clustered where the body is in contact with the bed (see Figure 5), and they soon show evidence of excoriation, often with secondary infection.

Bed bugs are usually, but not exclusively, associated with over-crowded dirty conditions. They can easily be killed with lindane, pyrethrins, or malathion. There is strong evidence that the lowly bed bug is a vector for Hepatitis B, and transmission of the human immuno-deficiency virus (HIV) has recently been postulated as a mechanism of transmission of AIDS in Africa following the demonstration of the survival of HIV in the bed bug.³

Fleas

Although flea populations fluctuate regionally and seasonally, few areas in Canada are spared. The flea family Pulicidae includes *Pulex irritans* (human flea), *Ctenocephalides felis* (cat flea), and *C. canis* (dog flea). As human fleas prefer crowded unhygienic conditions, they are far less of a problem in Canada than are dog and cat fleas. Fleas are not completely host specific, and although dog and cat fleas prefer

the environment of their usual host's furry coat, they will attack humans, particularly in the absence of other animals. In the process of biting to obtain a blood meal, fleas inject saliva to act as an anticoagulant. Although this injected material is moderately antigenic, often only one or two family members will be sensitized and will develop a local reaction. Adult fleas can survive many months between blood meals, and eggs are resistant to temperature fluctuations and insecticides.

Fleas are wingless, but jump up to 20cm vertically, an amazing feat for a 3mm creature. Bites that occur from fleas located primarily at ground or floor level are concentrated on the lower extremities, but bites may appear anywhere if furniture or bedding is infested, or if the victim has been lying within their jumping range. Fleas usually bite several times in one area; hence lesions often appear clustered in a row (see Figure 6). In sensitized individuals, pruritic wheals and papules appear, and most have a visible, slightly hemorrhagic punctum. As this reaction is an allergic response, repeated bites may produce progressively more severe reactions, with bullae and occasionally with generalized urticaria, as well as secondary impetiginization from scratching.

Bites respond to standard antipruritic therapy. Following the treatment of household pets in consultation with a veterinarian, fleas and larvae must be controlled by spraying and mechanical removal (i.e., cleaning and vacuuming). Do-it-yourself insecticide sprays for the home often include chemicals like pyrethrins and malathion. I

usually recommend Vaporette Flea and Tick Pump Spray, as it can be used safely on pets and premises. I have found that well-motivated patients who simply follow the instructions on the label can achieve as high a success rate as professional exterminators.

Spiders

Of the more than one hundred thousand species of spiders, only 60 species in North America have been shown to be capable of biting humans. While almost all spiders kill their prey by injecting venom, most lack fangs capable of penetrating human skin.

Spiders try to avoid contact with humans and in lab conditions tolerate extreme provocation prior to striking. Only when the spider is startled is it likely to bite a human. Only black widow and brown recluse spiders are known to have caused human fatalities in North America. Agriculture Canada has reports of bites from both of these types of spiders in Canada, but no reported deaths.

Black widow spider

The black widow spider (*Latrodectus mactans*) is a shiny black spider which never appears furry (see Figure 7). The male spider is only one-quarter the size of the female and has small fangs incapable of penetrating human skin. Contrary to the name, female black widows usually do not devour their mates, as copulation leaves them in a trance that allows the male to escape. Females are up to 35mm long and have prominent hour-glass-shaped markings on the underside (Figure 8). Black widow spiders are found in

Figure 5
Bed bug bites on area in contact with bed



Figure 6
Flea bites in linear distribution



southwestern Ontario including the Great Lakes area as far north as the Bruce Peninsula, southern Saskatchewan, Alberta, and British Columbia including Vancouver Island.

The black widow prefers dark, dry places, such as wood piles, basement corners and outdoor privies (an ideal spot full of flies, the spider's natural food). Most bites occur on the buttocks and genitalia. The bite is relatively painless and leaves a pair of tiny red spots. The site shows little local erythema and swelling and is frequently overlooked because of the dramatic neurotoxic symptoms that follow. Pain soon spreads from the site of inenommation to involve the entire body, but is usually more intense in the abdomen where rigidity often mimics an acute abdomen and gives rise to unnecessary exploratory surgery. In a minor reaction, ice applied to the site, non-narcotic analgesics, and tetanus prophylaxis suffice. More severe reactions require narcotic analgesics, muscle relaxants, and calcium gluconate, 10ml of a 10% solution intravenously, which provides immediate but temporary pain relief. Specific antivenin relieves symptoms within two hours, but may not be readily available in time because of the low demand in Canada. Without it the pain worsens for three to four hours, then

resolves gradually over the next 24 to 48 hours.

Brown recluse spider

The brown recluse spider (*Loxosceles reclusa*) is a small, fuzzy, brown spider up to 15mm long with a fiddle- or pear-shaped darker marking (see Figure 9) on the dorsum of the cephalothorax. (Hence the other common name of fiddleback spider.) Being extremely secretive, shy—hence the name—and light sensitive, these spiders hide in dark places. Although they are most heavily concentrated in the southern United States, they have been transplanted accidentally as far north as Alaska in storage crates and packing materials. Most Canadian reports are from the Western provinces. These spiders survive indoors in colder climates, thanks to central heating, and they have been found in attics, basements, and seldom-used dark bedrooms.

With mild bites, there may be little local reaction. More severe bites produce a blue halo at the site (caused by hemolysis and vasoconstriction) that slowly enlarges and becomes a black, necrotic eschar that may take months to heal. Systemic reactions include fever, weakness, emesis, and joint pain. Severe systemic reactions may result in intravascular hemolysis and

acute renal failure.

Treatment of significant bites remains highly controversial. Earlier approaches involving the application of heat have given way to the application of ice packs. Intralesional and systemic steroids have been used, but have not been proven to lessen necrosis in animal studies. A recent prospective study⁴ comparing the treatment of early surgical excision with Dapsone and delayed surgical excision found the latter to be superior. Antibiotics and analgesics are often required, and tetanus prophylaxis is indicated. ●

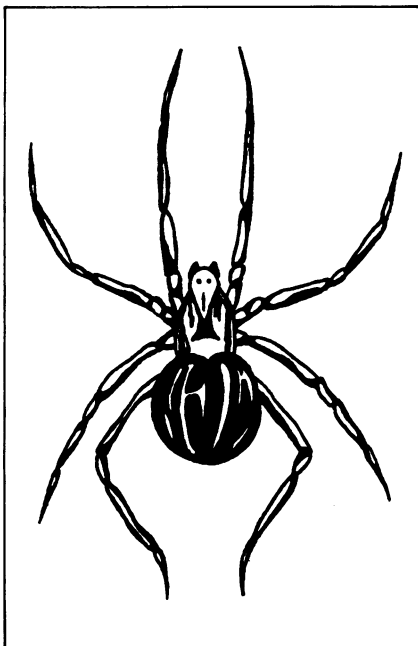
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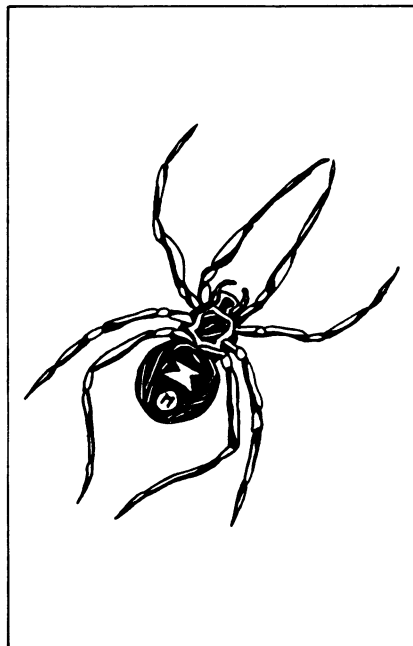
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Figure 7
Black Widow Spider



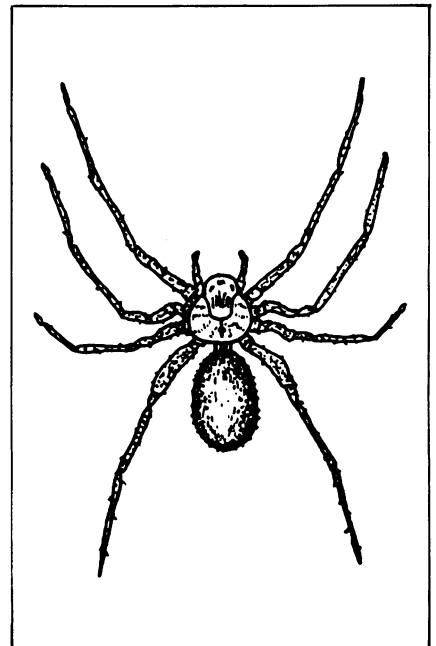
A dorsal view

Figure 8
Black Widow Spider



Ventral view showing hour-glass shaped markings

Figure 9
Brown Recluse Spider



Dorsal view showing violin-shaped markings