

Scabies Update

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BIOLOGY OF SCABIES MITE

Sarcoptes scabiei infests 40 different hosts and seems to be predominantly specific.¹ It shows pronounced peaks at 30 years intervals and it became increasingly prevalent since 1964.²

Incidence and Epidemiology

The incidence of scabies often increases when guerrilla or military activity results in population shifts, enforced crowding or refugee status. Such increase in incidence occurred in Europe in the Second World War, in Vietnam and in Falkland.³

Sarcoptes scabiei is transmitted by contact with infested persons. Scabies was associated with sexual promiscuity, poor hygiene, overcrowding, close association of persons in schools and similar institutions.

The disease may spread also by contact with contaminated fomites or premises.^{4,5} In vivo studies showed that all life stages of the mite frequently leave the burrow and wander around on the skin and become dislodged from the skin to infest Fomites.⁵

Live mites were recovered from bedroom, floors, chairs and couches. The density of the mites, live or dead, varied between 1-5 mites / 0.1gm of dust samples. Forty-four percent of the dust samples collected from infested persons' homes contained scabies mites, 64% of which were alive.

The dislodged mites live 36 hours at room

condition. The nymphs survive 2-5 days at 20-25°C and relative humidity of 45-75%. Higher temperatures and lower humidity speeds desiccation and death of mites.⁶

All dislodged life stages will seek a host. The mites respond to hunger and thirst drive and are attracted by host odour and temperatures. They usually avoid temperature below 25°C and stop moving at temperature below 18°C.⁷ The mites penetrate the host skin normally in 11-44 minutes.

Clinical Features

Signs and symptoms of primary scabies infestations appear 4-6 weeks¹ as a result of immune hypersensitivity reaction to these mites. Cell-mediated and humoral immune reactions are responsible for the disease manifestations,⁸ as well as control of mite proliferation.⁹

Atopic patients who are sensitive to house dust mites become symptomatic 10 - 14 days after infection because scabies cross reacts with other mites.

Clinically, the patient presents with pruritic generalized eruption. The majority of lesions appear as papules with surrounding areas of erythema. It seems that differences in body temperature play a role in selection of sites for burrowing. The lesions are typically seen on wrists, elbows, finger webs, intergluteal clefts and genitalia.

In Women, lesions are typically seen at

wrists, axillae, inner thighs, lower abdomen, and back. Secondary infections was present in 10% of women.¹⁰

Other lesions of scabies are nodules, eczematized plaques, crusted and impetiginized lesions.¹¹ Sometimes the lesions resemble folliculitis, tinea, psoriasis, pityriasis rosea, syphilis, contact dermatitis, urticaria, dermatitis herpetiformis, insect bites or may present as bullous pemphigoid.¹²

Scabies lesions in infants and small children are characterized by frequent involvement of face, retroauricular area, scalp, palms, soles and most of the trunk and back. The commonest lesions are papules, pustules, nodules, eczematization in 25% of cases, and impetiginization in 20% of cases.¹⁰⁻¹³ Bullous lesions suggest staphylococcal infection. Scabies is an important factor in genesis of infantile acropustulosis.¹⁴ Burrows are difficult to find in infants living in hot climate.¹⁵ Scabies in infants has to be differentiated from atopic dermatitis, contact dermatitis, seborrhoeic dermatitis, papular urticaria, insect bites, and pyoderma.

Norwegian scabies is an overwhelming infestation that was first described in a Norwegian leprotic patient in 1848.¹⁶ Clinically, the eruption is papular, nodular, crusted or hyperkeratotic psoriasiform lesions. The keratotic scales contain thousands of mites. This form of scabies is highly contagious and is the source of epidemic outbreaks. Study of the mites populations is one case of crusted scabies¹⁶ showed that each one gram of the following items had huge number of mites: keratotic debris from bed linen 6312; dust samples from bed sheets 900-2154; floor dust 840; dust from curtains 666; and dust from chairs 333.

Crusted scabies was reported in association with the following conditions:^{17,18}

1. Neurologic or mental disorders: Down syndrome, senile dementia, syringomyelia, Tabes dorsalis, Parkinson's disease and cerebrovascular accident with quadriplegia.

2. Nutritional disorders: vitamin A deficiency, beriberi, and malnutrition.
3. Infections: leprosy, tuberculosis, and bacillary dysentery.
4. Immunosuppression: Bloom syndrome, topical or systemic steroids, immunosuppressive drugs, radiotherapy, lymphoreticular disease and acquired immunodeficiency syndrome. There is no report that *Sarcoptes scabiei* from HIV AIDS patients can transmit HIV.¹⁹
5. Miscellaneous: Diabetes mellitus, chronic renal failure, systemic vasculitis, poor hygiene, connective tissue disorder and rheumatoid arthritis.

Scabies is a common problem in chronic health care institutions and nursing homes. The diagnosis and management may be difficult. The lesions may look like papular urticaria. The sites affected are the back, buttocks, axillae, groin, face, and scalp.²⁰

Zoonotic Scabies²¹

Sarcoptes mite is generally species specific. Canine scabies affecting dogs may be transmitted to their owners in 33% of cases. Human beings develop erythematous papular eruption mainly on abdomen or shoulder. The rash is itchy and sometimes becomes vesicular, urticarial or lichenified. No burrow or mites are found in affected human skin.

Scabies of rabbits can propagate on man and on rabbits. The rash occurs within 4 days of infestation. Mites and eggs are recovered from human skin.

Feline scabies affecting cats may cause in their owners a rash similar to that of canine scabies. Both canine and feline scabies can be treated in dogs and cats by intramuscular ivermectin which is commonly used now in veterinary medicine.

Pig-handlers' scabies, goats, and water buffalo scabies are major problems in certain areas of the world. Human-beings start to itch within few minutes of handling infested pigs which, when treated with malathion, the rash clears from the animal and their handlers.

TREATMENT OF SCABIES

A. Sulfur²²

Sublimed sulfur is obtained from crude sulfur. If sublimed sulfur is boiled with lime, water and hydrochloric acid, we get precipitate sulfur which has a smaller size particle. The action of sulfur depends on the direct interaction with the skin. So the smaller the sulfur particle the greater will be the skin area interacting with sulfur and the greater the effect.

Precipitate sulfur is used as 5-10% ointment in petrolatum to treat scabies and is applied after bath for 3 successive nights.

The mode of action of sulfur in scabies is not known. Its scabicial activity has been attributed to formation of hydrogen sulfide and polythionic acid. The keratolytic effect of sulfur may dislodge the mite from its burrow. It is estimated that 1% of the topically applied sulfur is absorbed.

The side effects of sulfur are mainly limited to the skin rarely causing contact irritation. Infant death occurred after extensive sulfur application. This was reported in older German literature (1893 - 1926) which was interpreted by some investigators as being not documenting sulfur induced death in humans.^{22,23}

Sulfur is safe to use in adults, infants, small children, pregnant and lactating women.

B. 1% Gamma Benzene Hexachloride (Lindane)

Lindane has been in use since 1948 to treat scabies affecting children of all ages and nursing mothers with no report of abortion or fetal malformation.²⁴ There are potential toxicological problems associated with excessive exposure.²⁵ It is estimated that 10% of Lindane applied is absorbed.²⁶ The central nervous system is the most important site of toxic action of organic chlorine pesticides (Lindane and DDT). Acute toxic reactions include nausea, vomiting, diarrhoea, colic, stomatitis, liver affection, blood dyscrasia and

neurotoxicity (headache, vertigo, convulsions, mental confusion and dysarthria).²⁷

Miscellaneous conditions may occur such as cardiac arrhythmias, myalgia, cyanosis, blindness, and respiratory failure. Lindane poisoning after ingestion was reported in one case who ingested 392 grams of Lindane.²⁸ He developed coma and convulsions but recovered after treatment. Another 53-year-old woman died after two weeks from accidental ingestion of Lindane. One premature infant two months old was found dead after Lindane application. Lindane concentration in his brain was three times the blood level.

Lindane 1% is an effective therapy for scabies but development of drug resistance is reported.^{2,25,26} To minimize the side effects of Lindane it is advisable to do the following recommendations:

1. Thirty grams of Lindane lotion can cover an average adult.
2. Avoid application of Lindane after hot bath because the resultant hydration and dermal vasodilatation may facilitate Lindane absorption.
3. Avoid or cautiously use Lindane in infants, children, pregnant women, patients with massive excoriation, and patients with epidermal barrier dysfunction (as atopic dermatitis, psoriasis, ichthyosis), or better avoid such extensive severe cases.
4. Wash Lindane after 6 hours. This period is as effective as longer ones. In a trial using three treatment schedules, Lindane 1% was applied head to toe for 6, 12 and 24 hours. Examination after one month showed a cure rate of 96-98%.⁷ So 6 hour's application is as adequate as the standard practice of keeping it for 12 hours. It is assumed that washing with soap and water is able to remove the drug. Such ability must be experimentally studied because of the potential risk of neurotoxicity.

C. Permethrin

Is a photostable synthetic pyrethroid with potent insecticidal activity and low mammalian toxicity.²⁹ Flowers of the genus

chrysanthemum were found to have insecticidal properties.

The dried flowers are named pyrethrum whose insecticidal property is due to its content of the active ingredient pyrethrin. The natural extract of prethrum is called oleoresin which contains 30% pyrethrin.

Natural pyrithrin products are synergistic with piperonyl butoxide (PBO) and are used to kill lice (e.g. RID, Triplex contain pyrethrin 0.17-0.33% and PBO 2-4%). Its ovicidal activity is incomplete (70-75%) and is comparable to 1% Lindane lotion. The treatment is repeated after one week.

In 1947, synthetic pyrethroids were developed as shown in the next table:

Name of Pyrethroid	Year	Insecticidal Activity
Allethrin (Pynamin)	1949	Good
Resmethrin (Chrysron)	1967	Greater than allethrin
Unstable to light		
D-Phenathrin (Sumithrin)	1973	Greater than allethrin and less than Resmethrin
Unstable to light		
Permethrin		Greater than allerthrin, resmethrin
Photostable		D-phenathrin
Deltamethrin (Decamethrin)	1974	Greatest activity of all
Fenvalerate	1974	Greater activity than allethrin, resmethrin, D-phenathrin, permethrin

Permethrin is three times less toxic than malathion and 15 times less toxic than carbamate and 40 times less toxic than Lindane and DDT. Permethrin is safe to apply up to 2-3 times per month. Five per cent permethrin cream applied overnight (8-12 hours) gives 89%-92% cure of scabies and treatment is repeated after one week.

The most frequent side effect reported with permethrin was mild transient burning sensation and increased pruritus.³⁰ The attribution of the itching to the drug is

uncertain since itching is also a primary symptom of scabies and may persist as disease manifestation for several weeks after treatment due to development of acquired sensitivities to the mite. As Permethrin preparations have formaldehyde as a preservative the chance of causing contact sensitization is possible.

Comparing Lindane 1% lotion with 5% permethrin cream,³¹ it was found that after one week 33% of patients were cured. By the fourth week permethrin had cured 91% and Lindane 86.3%. The difference is not significant. Permethrin causes paralysis and death of the parasite³¹

D. Crotamiton

Is a synthetic chlorofromate salt. It is available as a colourless or slightly yellowish oil that is miscible with alcohol and slightly soluble in water.³² It is used in the form of 10% lotion or cream. It should be stored in tight and light resistant containers at temperature less than 40°C.¹⁵⁻³¹ Its mechanism of action as scabicide is not known. The cream or lotion is applied after the bath, and treatment is repeated after 24 hours. Patients take a bath 48 hours after treatment. Treatment may be repeated after one week. Five daily applications are reported to give the best results and is better than the two days treatment schedule.³¹ The drug is preferred for treatment of scabies in infants, children, pregnant, and lactating women. Resistance of *sarcoptes scabiei* to crotamiton has not been conclusively demonstrated. The drug should not be used in acutely inflamed skin. No information on systemic absorption of crotamiton is available. It appears to have a low order of toxicity. Local irritation may occur, therefore local contact with face, eyes, mucous membranes and urethral meatus should be avoided.

E. Benzyl Benzoate

It is prepared by esterification of benzoic acid with benzyl alcohol. It is a clear oily liquid, insoluble in water but miscible with

glycerine. It should be kept in light resistant containers and should not be exposed to excessive heat.

Its mechanism of action as scabicide is not known. One treatment is usually highly effective in treating scabies. It may cause skin irritation specially of the genitalia and allergic contact sensitivity may occur. Twenty five per cent benzyl benzoate is the concentration used. Usually 30ml is sufficient for an adult for one application.

General recommendations for treatment of scabies

1. Confirm the diagnosis by finding the parasites, eggs or excreta. Burrows are sometimes difficult to find in hot climate. Ink may be applied to visualize the burrows. This procedure is successful in two out of a 100 trial. More than one trial may be tried for each patient with the help of mineral oil scraping.¹⁵ Nevertheless, laboratory diagnosis still depends on individual skills. The laboratory diagnosis is important for diagnosis of epidemic from nursing homes or hospitals.

2. In dealing with epidemics in nursing homes or hospitals, 6,31 it is advisable to:

- a) Identify the worst 10 cases and document the diagnosis with microscopic examination.
- b) Explain the treatment plan to doctors, nurses, hospital staff and their families, and asymptomatic patients. Because of the relatively long asymptomatic period of incubation before signs and symptoms appear, it is important to treat the entire population at risk.
- c) All must be treated at the same time and treatment must be properly applied.
- d) Visitors to patients may be treated.
- e) Provide treatment at no cost.
- f) Screen all new admissions.
- g) For large scale eradication Permethrin is ideal.

3. Treatment should be applied from head to toes avoiding eyes and mouth.

- a) A hot bath is recommended before treatment except if Lindane is used.

b) Apply medicine to trunk, extremities, behind ears, neck, hands, finger webs, umbilical area, groin, between buttocks, feet, and between toes. This is particularly indicated in crusted scabies. Nails must be soaked by the medicine because nails act as a source of reinfection.³³ In case of infants and small children scalp and face are also treated.

4. In crusted scabies, sequential treatment is advisable, e.g. use permethrin followed by crotamination for five days and repeat after one week.

5. Patients and family members must be re-examined after two and four weeks for assessment keeping in mind the following points:

a) Reinfection relates to patients who completely cleared at two weeks and get new lesions with positive microscopic examination at four weeks.

b) Treatment failure relates to patients who were not considered to be cured at two weeks and had positive scraping at four weeks.

Failure of treatment may be due to:

- i- Development of resistance^{6,25,26} which is encountered due to lack of:
 - Proper diagnosis.
 - Proper treatment.
 - Proper follow-up.
 - Exclusion of reinfection.
- ii- Inadequate treatment especially in crusted or infected scabies.
- iii- Lack of fumigation.
- iv- Lack of information about scabies.

6. If scabies is infected treat infection first.

7. Post scabietic nodules clear spontaneously and no specific antiscabietic treatment is needed. Local steroids may be used.

8. Fumigation of fomites: clothing, bedding and towels should be exposed to heat 50°C for 10 minutes before washing and boiling for at least five minutes,⁶ or store for seven days before use because mites die within four days without continued contact with human being.¹⁰

9. Health education.
10. One application of treatment is usually safe for infants, pregnant women, and nursing mothers.

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