

TREATMENT OF SCABIES INFESTATIONS

MUMCUOGLU K.Y.* & GILEAD L.**

Summary:

Scabies is an intensely pruritic disorder induced by an immune allergic response to infestation of the skin by the mite *Sarcoptes scabiei*. The biology of the mite, the clinical aspects and diagnosis of scabies infestations as well as the treatment of choice with 5 % permethrin dermal cream and the use of scabicides based on other chemical substances are reviewed.

KEY WORDS: scabies, treatment, permethrin, crotamiton, sulphur, benzyl benzoate, gamma benzenehexachloride, ivermectin.

Scabies is an intensely pruritic disorder induced by an immune allergic response to infestation of the skin by the mite *Sarcoptes scabiei*. The female mite penetrates the skin and excavates a burrow in the stratum corneum/epidermal junction. During the next 2-3 weeks it lays 3-4 eggs daily, which hatch after 3-4 days. Newly hatched larvae exit the burrows and appear on the surface of the skin where they continue their development until they reach the adult stage.

Generally, prolonged skin-to-skin contact is required for transmission (a quick handshake or hug will not usually spread infestation). Infestation is easily spread to sexual partners and household members. Infestation may also occur by sharing clothing, towels and bedding.

The burrows of the female are found mainly on hyperkeratotic areas on the sides of hands and fingers, finger webs and flexural areas of wrists but also on elbows, feet (mainly infants), genitalia, buttocks, around nipples and in axillae. The allergic response usually starts 3-4 weeks after initial infestation with mites and is accompanied by intense pruritus. The itching may affect all parts of the body and is particularly strong at night. Those who are infested more than once begin to show symptoms within a day or two.

A papular polymorphic rash may be visible in areas such as around the waist, inside the thighs, on the lower buttocks, lower legs, ankles and wrists. Secondary infections are common.

Nodular lesions develop in about 7 % of scabietic patients. The lesions appear during active scabies and consist of itchy, round, reddish-brown, smooth nodules, 5-8 mm in diameter. They characteristically persist after the rest of the eruption has cleared with treatment. Such nodules may develop on the front folds of the axillae and around the naval and in males also around the groin. Nodules have been regarded as a reaction of the reticuloendothelial system to mite antigens.

Crusted scabies is characterized by the involvement of all parts of the head and neck. The nails are often affected, resembling onychomycosis. Crusted scabies may begin as ordinary scabies with burrows, papules and vesicles in the same places but later a keratotic reaction develops. The patient is usually suffering from Down's syndrome, mental deficiency, neurological disorders, immuno-suppression due to corticosteroid treatment, radiation or AIDS. The burden of mites can reach several thousands in people who are severely immuno-compromised.

The diagnosis of scabies is commonly made clinically by examining the burrows or rash. The diagnosis is confirmed by scraping the burrows with a scalpel blade and identifying the mites or eggs under a microscope. A positive diagnosis may also be made without scraping, using a dermatoscope surface microscopy. A negative result on skin scraping is not always conclusive as the infested person may have few mites (on average 10-15). It should be emphasized that scabies may be difficult to recognize, particularly if scratching, inflammation or infection have obscured the presentation (Alexander, 1984).

* Department of Parasitology, Hebrew University-Hadassah Medical School, Jerusalem, Israel.

** MD, Department of Dermatology, Hadassah University Hospital, Jerusalem, Israel.

Correspondence: Kosta Y. Mumcuoglu, PhD, Department of Parasitology, Hebrew University-Hadassah Medical School, P.O. Box 12272, Jerusalem 91120, Israel.

Tel.: 02/675-8093 – Fax: 02/67507425 – E-mail: kostam@cc.huji.ac.il

PERMETHRIN, THE TREATMENT OF CHOICE

5 % permethrin dermal cream is the treatment of choice (Schultz *et al.*, 1990; Purvis *et al.*, 1991; Paller, 1993; Brown *et al.*, 1995; Usha *et al.*, 2000; Buffet *et al.*, 2003; Scheinfeld, 2004). It is important to

pay attention to the following points when treating the patient:

- Apply the cream to clean, dry and cool skin. A bath or shower immediately prior to treatment is not necessary.
- Ensure that the entire surface of the body is covered from the hairline on the head to the soles of the feet. Remember to remove watches and rings.
- Pay special attention to the areas behind the ears, between the fingers and toes, wrists, under the arms, external genitalia, buttocks and under finger and toe nails.
- Do not over-treat by applying the cream until detectable layers remain on the surface.
- Wash the whole body thoroughly 8 -12 hours after treatment.
- Reapply any cream washed off during the treatment period *e.g.*, after hand washing.
- Where possible, ask someone else to apply the medication on the skin as this makes it easier to get to difficult to reach all parts of the body.
- Immediately after treatment, change bed linen and wear freshly laundered clothes.

FURTHER MEASURES REGARDING THE TREATMENT

5 % permethrin dermal cream is suitable for use by adults, including the elderly and children. However, children between two months and two years and pregnant women should be treated under medical supervision.

It is important that all household members and close contacts be treated at the same time.

When treating children apply the medication to the face, avoiding the area around the eyes.

For severe infections a second treatment after 7-8 days might be necessary.

It may be necessary to prescribe two tubes of cream to ensure all areas of the body are covered thoroughly because very dry areas of skin will absorb more cream.

The itch may persist for a week or more after treatment. This does not necessarily imply a failure of treatment or re-infestation. However, if fresh spots appear or lesions still remain after four weeks after treatment, a second treatment should be considered.

Permethrin formulations could lead to irritation. The use of moisturizer and emulsifiable oil baths can help settle this type of itch. Special care should be taken in those with allergy to Chrysanthemum or permethrin. Clothing, towels and bed-clothes used by the infested person in the 48 hours prior to treatment should be laundered using the hot cycle or dry cleaned. Alternatively, items may be placed in a dry place for about one week

before they are reused as mite cannot survive lengthy periods off the human body.

The treatment in those with crusted scabies should also include their face, neck, scalp and ear.

For crusted scabies, the treatment with an oral ivermectin may also be considered.

Secondary infections should be treated with appropriate oral antibiotics.

Sarcoptes scabiei of animal origin such as from dog, cow or goat may penetrate the human skin. However, it can not develop and dies within few days without reproducing itself. Accordingly, it is necessary to treat the animal with scabicides and the patient with antipruritic medication.

OTHER SCABICIDES

• Crotamiton

Crotamiton (10 %) was effective after two applications over a 24 h period, but the success was not 100 % (Burckhardt *et al.*, 1946). Poor results were obtained by several authors (Balfanz, 1978; Cubela *et al.*, 1978; Konstantinov *et al.*, 1979). Crotamiton is odorless, non-greasy, non-irritating and has antipruritic properties and accordingly is a good medication for the persistent post-scabietic itch. It has been advocated for the treatment of children (Hurwitz, 1977), but appeared to require prolonged application. According to the instructions, the application of Eurax Lotion or Cream (10 % crotamiton) (Novartis, Switzerland) should be repeated once daily, preferable in the evening, for 3-5 consecutive days. The patient could take a bath between application and at the end of the treatment.

• Sulphur

According to the literature a 10 % sulfur ointment is an effective treatment for scabies (Alexander, 1984). One of the scabicides in the Israeli market is Duo-Scabil (Agis, Israel), which is a combination of 10 % crotamiton and 8 % sulfur. To our knowledge, there is no published data about the clinical efficacy of such a combination. The cream should be applied once daily for 3-5 days. 48 hrs after the last application the entire body should be washed in a warm bath. Local irritation, rash or inflammation was rarely observed.

• Benzyl benzoate

It is generally accepted that 25 % of an aqueous emulsion of benzyl benzoate gives reliable results. The emulsion should be applied to the body after a bath or shower and left for 5-10 min to dry before dressing. Benzyl benzoate could cause scrotal irritation and should not be used if there is any broken surface on the skin. It is also a conjunctival irritant and should not be used in infants and young children (Alexander, 1984).

- Gamma benzene hexachloride (Lindane)

Earlier clinical trials showed that three applications of lindane were 100 % successful (Wooldridge, 1948; Cannon *et al.*, 1948). More recent studies showed however that the cure rate was around 85 % (Schultz *et al.*, 1990; Amer *et al.*, 1981). Eleven instances of aplastic anaemia and two of leukaemia caused by contact with lindane was reported (Hans, 1976). Lee & Groth (1977) reported nine instances of systemic toxic effects in humans caused by lindane, seven of which resulted from its therapeutic application to the skin, some of them after a single application. Rasmussen (1981) reviewed the literature on lindane and came to conclusion that its benefits probably outweighed its risks, taking into consideration that 30 million units were sold over a five years period. It is recommended to apply on a cool dry skin for 30 min to 6 hrs (Maibach *et al.*, 1977; Pramanik *et al.*, 1979). It is not recommended for infants, small children and in pregnancy. Should not be used on inflamed, secondarily infected or heavily excoriated skin and the treatment should not be repeated within eight days (Solomon *et al.*, 1977). Resistance of scabies mites to lindane was reported (Purvis *et al.*, 1991).

- Ivermectin

Ivermectin is a chemically modified avermectin. It has a broad spectrum of activity against numerous nematodes and arthropod parasites. It has been widely used for treatment of sarcoptic mange in animals in topical, oral and parenteral preparations. In humans, oral ivermectin for scabies is increasingly used worldwide, particularly for crusted scabies (Meinking *et al.*, 1995) and was recently approved for treatment of ordinary scabies in France (del Giudice *et al.*, 2003).

In the Cochrane Database of Systematic Reviews (Strong M. & Johnstone P.W., 2007), 20 small trials involving 2,392 scabiotic patients were included. One trial was placebo controlled, 16 compared two or more drug treatments, two compared treatment regimens, and one compared different drug vehicles. Fewer treatment failures occurred by day seven with oral ivermectin in one small trial (55 participants). Topical permethrin appeared more effective than oral ivermectin (85 participants, one trial), topical crotamiton (194 participants, two trials), and topical lindane (753 participants, five trials). Permethrin also appeared more effective in reducing itch persistence than either crotamiton (94 participants, one trial) or lindane (490 participants, two trials). One small trial did not detect a difference between permethrin (a synthetic pyrethroid) and a natural pyrethrin-based topical treatment (40 participants). No significant difference was detected in the number of treatment failures between crotamiton and lindane (100 participants, one trial), lindane and sulfur (68 participants, one trial),

benzyl benzoate and sulfur (158 participants, one trial), and benzyl benzoate and natural synergized pyrethrins (240 participants, one trial); all were topical treatments. No serious adverse events were reported. A number of trials reported skin reactions in participants randomized to topical treatments. It is concluded that topical permethrin appears to be the most effective treatment for scabies. Ivermectin appears to be an effective oral treatment.

REFERENCES

- ALEXANDER J.O.D. Arthropods and human skin. Springer-Verlag, Berlin, 1984, 227-292.
- AMER M., EL-BAYOUMI M. & RIZK M.K. Treatment of scabies; preliminary report. *Int. J. Dermatol.*, 1981, 20, 289-290.
- BALFANZ U. Antipruriginosum auch bei Skabies effektiv. *Artz. Praxis*, 1978, 30, 245-247.
- BROWN S., BECHER J. & BRADY W. Treatment of ectoparasitic infections: review of the English-language literature, 1982-1992. *Clin. Infect. Dis.*, 1995, 20, 104-109.
- BUFFET M. & DUPIN N. Current treatments for scabies. *Fundam. Clin. Pharmacol.*, 2003, 17, 217-225.
- BURCKHARDT W. & RYMAROWICZ R. Erfahrungen mit dem neuen Antiscabiosum "Eurax". *Schweiz. Med. Wochenschr.*, 1946, 47, 1213-1214.
- CANNON A.B & McRAE M.E. Treatment of scabies: report of one hundred patients treated with hexachlorocyclohexane in vanishing cream base. *JAMA*, 1948, 138, 557.
- CUBELA V. & YAWALKER S.J. Clinical experience with crotamiton cream and lotion in treatment of infants with scabies. *Br. J. Clin. Pract.*, 1978, 32, 229-231.
- DEL GIUDICE P., CHOSIDOW O. & CAUMES E. Ivermectin in dermatology. *J. Drugs Dermatol.*, 2003, 2, 13-21.
- HANS R. Aplastic anaemia associated with gamma benzene hexachloride. *JAMA*, 1976, 236, 1009-1010.
- HURWITZ S. Scabies in infants and children, *in*: Scabies and Pediculosis. Orkin M., Maibach H.I. Parish L.C. & Schwartzman R.M. (eds), Lippincott, Philadelphia, 1977, 31-38.
- KONSTANTINOV D., STANOEVA I. & YAWALKAR S.J. Crotamiton cream and lotion in treatment of infants and young children with scabies. *J. Int. Med. Res.*, 1979, 7, 443-448.
- LEE B. & GROTH P. Scabies-transcutaneous poisoning during treatment. *Paediatrics*, 1977, 59, 643.
- MAIBACH H.I. & ORKIN M. Adverse reactions to treatment, *in*: Scabies and Pediculosis. Orkin M., Maibach H.I., Parish L.C. & Schwartzman R.M. (eds), Lippincott, Philadelphia, 1977, 17-124.
- MEINKING T., TAPLIN D., HERMIDA J., PARDO R. & KERDEL F. The treatment of scabies with ivermectin. *New England J. Med.*, 1995, 333, 26-30.
- PALLER A.S. Scabies in infants and small children. *Semin. Dermatol.*, 1993, 12, 3-8.
- PRAMANIK A.K. & HANSEN R.C. Transcutaneous gamma benzenehexachloride absorption and toxicity in infants and children. *Arch. Dermatol.*, 1979, 115, 1224-1225.

- PURVIS R.S. & TYRING S.K. An outbreak of lindane-resistant scabies treated successfully with permethrin 5 % cream. *J. Am. Acad. Dermatol.*, 1991, 25, 1015-1016.
- RASMUSSEN J.E. The problem of Lindane. *J. Am. Acad. Dermatol.*, 1981, 5, 507-516.
- SCHEINFELD N. Controlling scabies in institutional settings: a review of medications, treatment models, and implementation. *Am. J. Clin. Dermatol.*, 2004, 5, 31-37.
- SCHULTZ M.W., GOMEZ M., HANSEN R.C., MILLS J., MENTER A., RODGERS H. & JUDSON A. Comparative study of 5 % permethrin cream and 1 % lindane lotion for the treatment of scabies. *Arch. Dermatol.*, 1990, 126, 167-170.
- SOLOMON L.M., FAHRNER L. & WEST D.P. Gamma benzene hexachloride toxicity. *Arch. Dermatol.*, 1977, 113, 353-357.
- STRONG M. & JOHNSTONE P.W. Interventions for treating scabies. *Cochrane Database of Systematic Reviews*, 2007.
- USHA V. & GOPALAKRISHNAN-NAIR T.V. A comparative study of oral ivermectin and topical permethrin cream in the treatment of scabies. *J. Am. Acad. Dermatol.*, 2000, 42, 236-240.
- WOOLDRIDGE W. The gamma isomer of hexachlorocyclohexane in treatment of scabies. *J. Invest. Dermatol.*, 1948, 10, 363-366.