Skin diseases in war and peacekeeping

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Abstract

- Skin diseases, including environmental injuries, infectious diseases and common problems such as acne, are an important cause of morbidity among military personnel.
- Field conditions such as heat, humidity and poor hygiene can exacerbate these disorders.
- A comprehensive and in-depth knowledge of skin diseases is not necessary for the defence force medical officer, but an understanding of common skin problems and their management is vital.

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SKIN DISEASES have long been recognised as important causes of morbidity in military personnel, irrespective of their geographic location. These diseases include environmental injuries, infectious diseases and the common skin disorders that would be instantly recognised by most patients before they even see a doctor. An understanding of skin diseases, especially the common ones, is indispensable for the military doctor. In addition to describing the more common skin disorders that may be seen by military doctors, we present some of the history of dermatology in conflicts over the past hundred years.

Skin diseases in 20th-century conflicts

During the 20th century, every conflict has presented particular dermatological conditions in addition to the common disorders. In the First World War, cold immersion injury (or "trench foot") incapacitated thousands of men. The Second World War saw large deployments of troops to Asia, and tropical diseases were prominent. In spite of their experiences in the First World War, the United States armed forces did not contain a single qualified dermatologist at the beginning of the Second World War.[1] This situation was soon rectified. In 1942, the *Manual of Dermatology* was published, under the auspices of the National Research Council, to provide medical officers in the field with the principles of diagnosis and treatment of the more common skin disorders. The preface to this text notes that skin diseases produced 9.8% of all admissions to sick lists and accounted for 10.41% of all days lost by personnel.[2]

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In the Vietnam War, tropical skin diseases were again prominent. Following their tours of duty, two American dermatologists, Harvey Blank and David Taplin, published a manual of dermatology for their times *(Skin Diseases in Vietnam)*.[3] Accounts from the Vietnam era refer to over-stretched dermatology clinics serving a displaced civilian population. Large gaps in service existed. For example, the entire Mekong Delta, at that time home to 6 million people, had no dermatologist.[4]

In the First Gulf War, it was noted that, in spite of rigorous predeployment screening, patients still presented to combat support hospitals with common disorders such as impetigo, acne, warts, psoriasis and chickenpox. Impetigo was often managed with brief hospitalisation and intravenous antibiotics, followed by oral antibiotics to rapidly and predictably control the disease. At times, soldiers were sent home early from the Gulf with skin diseases that, in hindsight, a dermatologist could have diagnosed and cured.[5]

Skin diseases in the 21st century

Terrorism and the two recent Gulf Wars have highlighted the threat of biological agents such as anthrax (caused by *Bacillus anthracus*). Cutaneous anthrax has much lower mortality (< 10%) than inhalational anthrax (> 90%), but it is more easily diagnosed with its characteristic black necrotic central eschar.[6] In spite of the eradication of smallpox in 1980, this is also considered a potential biological agent. The rash of smallpox is the most important feature, allowing early recognition of the disease;[7] however, few (if any) doctors practising today would have ever seen a case.

1: Aggravating factors in tropical skin diseases

- Heat
- Humidity
- Occlusive clothing
- Inappropriate or inadequate therapy
- Poor skin hygiene
- Secondary infection
- Inadequate nutrition
- Ultraviolet light

Common skin conditions seen in military settings

A study of 1360 patients at the Oslo Military Clinic (Norway) found that skin disorders made up 16.3% of all consultations. Of these presentations, eczema accounted for 18.9%, acne vulgaris 10.4%, and common warts 5.9%.[8] These proportions are similar to those seen in Australian general practice. The adage that "common disorders occur commonly" remains true whether the patient is presenting to a doctor in the defence force or to a general practitioner in the community. During the screening of new recruits, it is important to check for a history of the common skin disorders, such as acne, atopic eczema or psoriasis, as these common and usually benign conditions can become incapacitating if aggravated during deployment.

All the conditions listed below, with the exception of the tropical infections (leishmaniasis, cutaneous larva migrans, schistosomiasis), are seen commonly in civilian practice. Field conditions (Box 1) such as heat, humidity and suboptimal hygiene may cause dramatic exacerbations of these conditions.

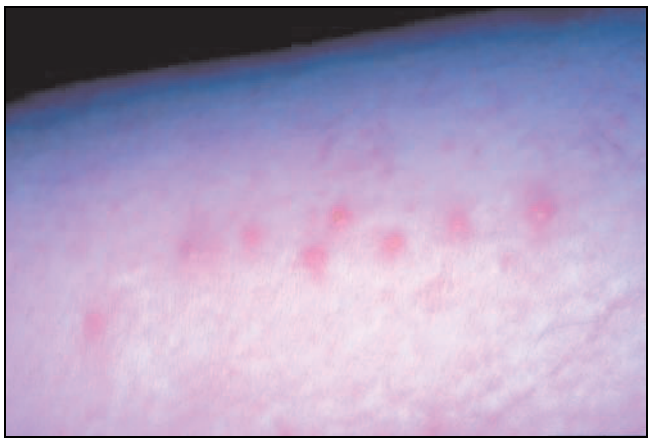
Infections, infestations and insect bites

Minor cuts and abrasions can quickly develop into impetigo and cellulitis because of heat, humidity and poor hygiene, and may require oral or intravenous antibiotic therapy. Fungal infections include tinea pedis, tinea cruris or tinea corporis. Dengue fever and malaria are tropical mosquito-borne diseases. Thirty per cent of patients with dengue fever present with exanthem, whereas malaria does not usually present with rash.[5] Dengue fever has been a significant problem in deployments to South East Asia, including East Timor.

Insect bites can produce a variety of clinical lesions; they can produce immediate or delayed hypersensitivity reactions or become secondarily infected. The skin eruption may occur some days after the bite has occurred. Insect bites often present as grouped papules (Box 3), but may also be vesicular (blistered) or cause a generalised papular urticaria. It is therefore not surprising that insect bites can present a diagnostic dilemma.

Scabies caused by the mite *Sarcoptes scabiei* var. *humanus* and pediculosis caused by *Pediculus capitis* (head louse), *P.*

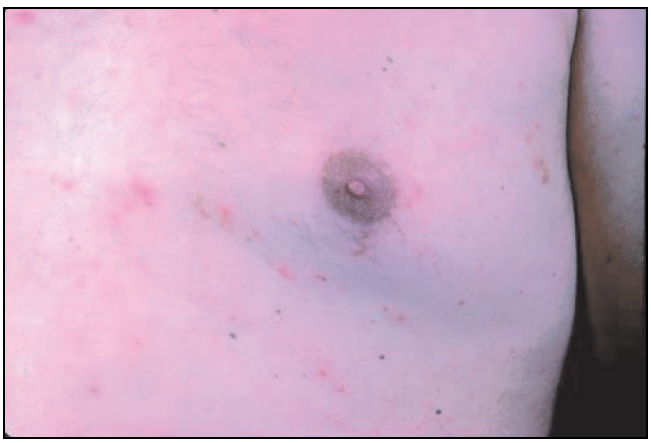
3: Insect bites



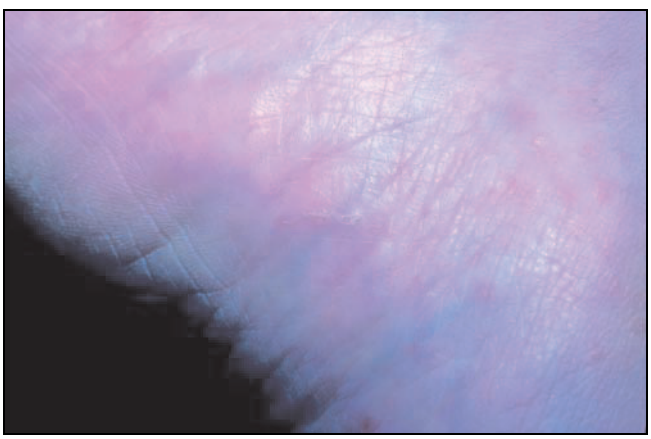
Characteristic grouped papules are visible.

3: Typical manifestations of scabies

A Papules



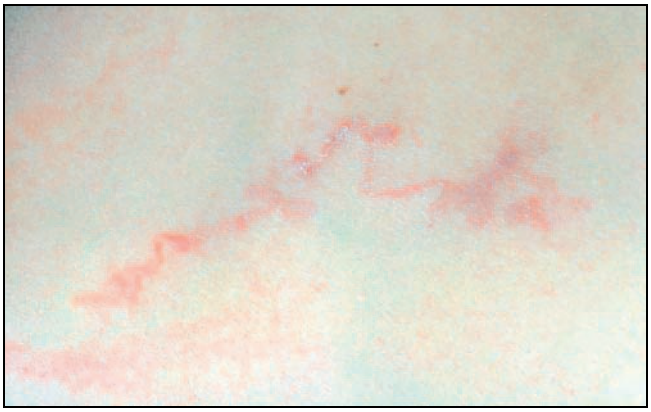
B Burrows



Burrows are usually 1–10 mm long, and are diagnostic of scabies.

4: Tinea pedis

5: Cutaneous larva migrans, showing characteristic serpiginous track



humanus (body or clothing louse), or *Phthirius pubis* (pubic or crab louse)[9] are most commonly seen in refugee populations where hygiene is poor. These populations are commonly encountered in war and peacekeeping operations. Scabies usually presents as extremely itchy and excoriated papules (Box 3A). Classical burrows are usually best seen on the hands and feet (Box 3B), especially in the web spaces. Scrapings taken from these burrows and examined by microscopy (which can be performed in a well-equipped field hospital) will reveal the mite.

Tinea pedis (Box 4), tinea corporis and tinea cruris are dermatophyte infections of the feet, body and groin, respectively, and are extremely common. Causative organisms include *Trichophyton rubrum*, *T. mentagrophytes* and *Epidermophyton floccosum*. Diagnosis is clinical, but, as with scabies, confirmation may even be made in the field from skin scrapings digested in 10% potassium hydroxide and examined under a microscope, where fungal hyphae can be identified.

Leishmaniasis is an infection with a protozoan of the genus *Leishmania*. It is transmitted by sand flies, which are small enough to pass through ordinary mesh screens and mosquito netting. Infections cause a wide spectrum of clinical changes that are divided into four broad categories, based on the extent and severity of involvement in the human host: cutaneous leishmaniasis, diffuse cutaneous leishmaniasis, mucocutaneous leishmaniasis, and visceral leishmaniasis.[10]

Cutaneous larva migrans (Box 5) is a serpiginous skin eruption usually caused by penetration and migration of hookworm larvae through the epidermis. It occurs worldwide, but is more common in warm climates. Causative organisms include *Ancylostoma* species. The larvae rarely escape from the skin, so systemic manifestations are rare. Treatment by freezing the larva (found at the leading edge of the eruption) with liquid nitrogen is challenging and impractical in the field. Oral treatment with albendazole or ivermectin is effective. The disease is self-limiting.

Although they may not present with skin manifestations, sexually transmitted diseases have traditionally been included with dermatological conditions and have always been important causes of morbidity in wars throughout the ages. A study of 376 Australian soldiers returning home after 12 months' service in Vietnam revealed that 65.5% had had sexual intercourse while in Vietnam, 27% of whom developed venereal disease.[11]

6: Treatment of tinea pedis

Mild infection

Topical treatments are applied twice a day, continuing for 14 days after resolution of symptoms:

- clotrimazole cream 1%
- terbinafine cream 1%

Moderate to severe infection

Terbinafine 250 mg orally daily for 2 weeks

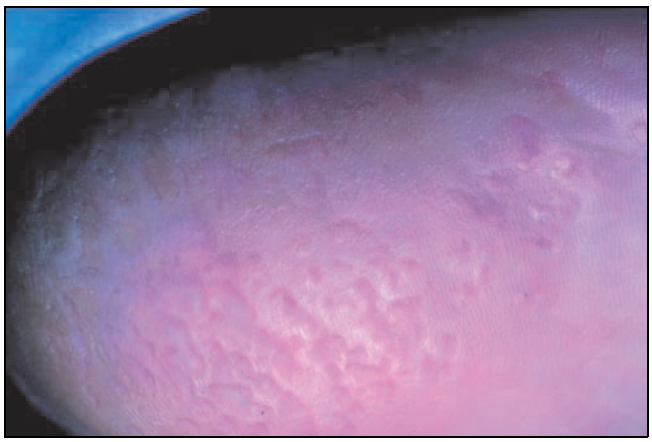
Griseofulvin 330 mg (ultrafine particles) orally daily for 4 weeks

Management and prevention

Prevention of fungal and bacterial skin infections is very important, and includes wearing appropriate footwear in showers and regularly changing socks when in the field. Treatment is usually topical, but oral antifungal medications may be required (Box 6). Keeling et al noted that antifungal medications ran out several times during a United Nations deployment to Haiti.[5] Treatment of leishmaniasis would require specialist advice and pharmaceuticals.

Insect bites are usually easily identified and symptomatic treatment is generally unnecessary. However, avoidance is important, as biting insects may be vectors for debilitating infections such as dengue fever and malaria. Insect repellents containing diethyltoluamide should be used, along with permethrin-treated mosquito netting at night. Scabies is treated with topical creams containing permethrin.

7: Pitted keratolysis, showing mulitiple shallow pits over pressure-bearing areas



8: Useful Internet dermatology resources

An online dermatology textbook: www.emedicine.com/derm/contents.htm

An online dermatology atlas with over 6000 images: www.dermatlas.org

Australian therapeutic guidelines for common dermatological diseases: www.tg.com.au/home/index.html

Environmental injury

Cold immersion injury ("trench foot") was first recognised in the First World War. Various conditions predispose the soldier to developing this injury, including a cold (but not freezing), wet environment, constrictive boots, and venous stagnation.[12]

Corns and blisters are commonly found on the feet of soldiers, caused by ill-fitting boots in combination with long marches. Calluses and other effects of foot trauma are common in new recruits marching long distances in new or ill-fitting boots.

Sunburn is an avoidable environmental injury, with both short-term effects (the burn itself) and possible long-term sequelae (skin cancer).

Management and prevention

Prevention of environmental injury is achieved through the use of correct footwear, clothing and care in extreme weather conditions. Cold, wet footwear should be changed at the earliest opportunity, as the duration of cold injury is an important determinant of the long term outcome of trench foot.

Miliaria

Miliaria is a condition of sweat retention and has three major clinical manifestations: miliaria rubra, miliaria crystallina, and miliaria profunda. The cause of sweat duct obstruction is unknown, but it is a condition that is most likely to occur after 2–3 months of exposure to persistently hot and humid conditions. It may be seen at all ages, and there is no sex or racial predisposition.[13] Miliaria rubra is the most important subtype. The lesions consist of small, punctate vesicles surrounded by an erythematous macule, associated with an intense prickling sensation. The significance of this condition is the effect that extensive skin involvement can have on thermoregulation. An inability to sweat greatly increases the risk of hyperthermia.

Management and prevention

Prevention of miliaria consists of periodically placing the affected individual in an air-conditioned room to permit relief from sweating, as well as the wearing of loose clothing, and gradually acclimatising the patient to the tropical heat and humidity. Treatment involves a longer period of confinement to an air-conditioned environment.

Pitted keratolysis

This common condition is caused by a bacterial infection of the horny layer of the skin of the soles of the feet (Box 7). Both *Micrococcus* and *Corynebacterium* have been implicated.[14,15] The bacteria invade macerated feet and form coalescing pits, usually over pressure-bearing areas. Affected feet are often malodorous. This condition is more common in the tropics; an incidence of 48.5% was found in subjects taking part in combat tests in Vietnam.[16]

Management and prevention

Treatment of pitted keratolysis consists of keeping the feet as dry as possible with the use of cotton socks, leather footwear whenever possible, and antiperspirants. Topical miconazole (an antifungal agent with antibacterial properties) or clindamycin 1% solution, applied twice a day, may be used.

Acne vulgaris

Acne is a common condition affecting young men and women. Severe nodulocystic acne on the back and chest can be aggravated by wearing a backpack or webbing. Such acne is now readily treatable with isotretinoin under a dermatologist's supervision.

Contact dermatitis

Contact dermatitis may be caused by contact with irritants or allergens. Contact irritant dermatitis commonly affects the hands and occurs as a subacute or chronic problem. Common causes are soap, detergents and solvents. Contact allergic dermatitis presents more acutely with intense erythema, vesiculation and itching. The causative contact allergen is usually easily identifiable. Black rubber face masks used in the Gulf War to protect against possible gas attacks caused acute urticaria in some soldiers.[5]

Management and prevention

Treatment and prevention requires the removal of the irritant or allergen that is precipitating the contact dermatitis, and treating the rash with potent topical steroids or systemic steroids for severe contact allergic eruptions. Secondary infection is common and should be treated with wet compresses and oral antibiotic therapy. Patch testing may determine the agent responsible, or at least exclude other suspected allergens, allowing the patient to continue using them.

Drug reactions

Healthy service personnel are unlikely to be taking medications. However, drugs used as prophylaxis for malaria can cause a number of skin reactions, such as doxycycline-induced phototoxicity and chloroquine-induced urticaria or erythema multiforme.

Conclusion

History has shown that skin diseases are an important and often underestimated cause of morbidity in wartime. Many of the conditions we have mentioned can be prevented with adequate hygiene or by supplying properly fitting and appropriate clothing and footwear.

Doctors treating refugees and civilians as part of a peace-keeping mission may be confronted by a bewildering array of unusual, debilitating and advanced skin diseases.

Teledermatology, while still in its infancy, may provide an important diagnostic back-up to the doctor in the field. A digital camera should therefore be considered an important inclusion in the "military doctor's bag". Useful Internet resources are shown in Box 8.

A comprehensive and in-depth knowledge of skin diseases is not necessary for the defence force medical officer, but an understanding of common skin problems and their management is vital.

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