Dermatological conditions in military conscripts

W. H. Gan¹, R. Low¹ and D. Koh²,³

¹Singapore Armed Forces Medical Corps, Singapore 778910, Singapore, ²PAPRSB Institute of Health Sciences, Universiti Brunei Darussalam, Jalan Tungku Link, Brunei 1410, Negara Brunei Darussalam, ³Saw Swee Hock School of Public Health, National University of Singapore, Singapore 117597, Singapore

Background
Published studies regarding skin conditions in the military are mainly cross-sectional studies from clinical encounters during war campaigns and military training.

Aims
To determine the incidence and spectrum of dermatological conditions in a cohort of military conscripts in Singapore. Soldiers diagnosed with contact dermatitis (CD) were further analysed for body area involvement, possible occupational and/or environmental causative agent and restrictions issued.

Methods
Retrospective cohort study. Subjects' diagnoses and demographic variables were extracted from electronic medical records. Medical records of CD cases were reviewed to characterize the nature of exposure and operational impact on training.

Results
The incidence of reporting of new dermatological complaints was 24.5 per 100 military conscripts per year. Dermatological conditions with the highest incidence over the period of full-time military service included fungal skin infection (6.7/100 conscripts/year), non-specific dermatitis (4.9/100 conscripts/year) and insect bite reaction (1.8/100 conscripts/year). The annual incidence of contact dermatitis over the same period was 0.4/100 conscripts.

Conclusions
In a military population based in the tropics fungal skin infections, non-specific dermatitis and insect bite reactions were the commonest reasons for dermatological consultation. CD incidence was 0.4 per 100 conscripts per year.

Keywords
Contact dermatitis; military dermatology; military personnel.

Introduction
Skin disorders in military personnel are a significant cause of morbidity that weakens combat effectiveness through service days lost or degraded performance [1]. Much of military dermatology knowledge is derived from cross-sectional studies in war and peacekeeping operations. Few cohort studies have examined the incidence and spectrum of new dermatological conditions during training. In Singapore all fit young males are conscripted for 2 years of full-time military service. We studied the incidence and spectrum of dermatological conditions in a cohort of military conscripts over their 2 year service and characterized in detail a subgroup diagnosed with contact dermatitis (CD).

Methods
This retrospective cohort study followed a group of conscripts enlisted for military service in 2007 for 2 years until its completion. As there is universal conscription, the cohort was representative of male Singaporeans of enlistment age. Conscripts were seen by primary care military doctors, with clinical encounters documented in an electronic medical records (EMR) system. Cases were defined as conscripts presenting with a new medical complaint for which the principal diagnosis was a dermatological condition listed in the International Classification of Diseases, Ninth Revision. Cases were identified through review of the EMR system. Inclusion criteria included ‘Full-time National Serviceman’ and clinical consultations registered as ‘Initial Consultation’. Exclusion criteria included all other military service groups (regulars and reservists), follow-up medical reviews and medical screening. The case notes of subjects with the diagnosis of CD were reviewed for body area involvement, possible occupational and/or environmental causative agent and restrictions issued. The Singapore Armed Forces Institutional Review Board approved the study.
Results

The cohort comprised 18,749 conscripts. Their mean age was 20.5 ± 1.4 years. The majority were Chinese (83%), followed by Malays (8%), Indians (5%) and other ethnicities (4%). Five thousand nine hundred and twenty-two (32%) subjects had at least one initial consultation with a principal dermatological diagnosis. They recorded 9,176 initial clinical encounters (5% of initial consultations for all causes) for new dermatological complaints over their 2 year period of military service (24.5 per 100 conscripts/year). The commonest new dermatological presentations (Figure 1) over the 2 year period were fungal skin infection (2,526 cases; annual incidence 6.7/100 conscripts), non-specific dermatitis (1,832 cases; 4.9/100 conscripts) and insect bite reaction (657 cases; 1.8/100 conscripts). CD contributed 176 initial consultations, all from different subjects. Of these, 34 were excluded after reviewing the EMR as they were considered more compatible with other dermatological conditions. The ethnic groups for the 142 CD cases were: Chinese 123 (87%), Malays 10 (7%), Indians 5 (3%) and others 4 (3%). There was no significant difference between those with or without CD by ethnicity. CD incidence was 0.4/100 conscripts/year. Affected sites were hands (25%), lower limbs (27%), upper limbs (21%), back (19%), trunk (11%) and feet (9%). Occupational and/or environmental causative agents identified included combat uniform (8%), camouflage cream (6%) and topical medicaments (6%) (Figure 2). No specific causative agent was identified in 48% of cases. Three cases were permanently reassigned to non-combat status (two cases of irritant contact dermatitis (ICD) to grass and 1 case of ICD to combat uniform). Operational downtime included temporary restrictions from exposure to camouflage cream (104 man-days/year), combat uniform (102 man-days/year) and boots (25.5 man-days/year). There were only 2 days of sick leave granted in all the cases.

Discussion

Fungal skin infections, insect bite reactions and friction-related skin injuries were the commonest dermatological

![Figure 1. The spectrum of dermatological conditions in military conscripts diagnosed by primary care military doctors (n = 9176 initial consultations).](image-url)
conditions reported in this cohort of Singaporean military conscripts. The overall incidence of CD was 0.4/100 conscripts/year. Conscripts have free primary healthcare services, with access to specialist healthcare through referral by primary care doctors. Thus the study provides a representative view of the incidence and spectrum of new dermatological conditions in the military conscript population in Singapore.

A limitation of the study is the use of consultation records as the data source, as the data quality depends on the extent of clinical documentation (such as occupational exposure history) recorded by different doctors. Additionally, the cases offer a military primary care perspective of CD without the benefit of specialist opinion or investigations such as patch testing.

The profile of dermatological conditions in this study is similar to the disease profile in cross-sectional studies of soldiers deployed in Timor Leste and Panama [2,3], which have similar tropical, humid environments. In contrast dermatological cases seen in troops based in the Middle East during the Gulf War, in a hot and arid climate, were predominantly eczema and benign neoplasms [4–6]. Thus deployment in different geographical regions affects dermatological disease patterns. The condition with the highest incidence was fungal infection. In studies from other military populations length of military service [7] and military training setting [8] were associated with tinea pedis. As fungal infection can be prevented, it may be possible to significantly reduce its incidence. Causative agents for CD in the military can be either occupational or environmental. Military personnel may be exposed to oils, fuels, solvents (vehicle and aircraft mechanics); paints (ship repair and painting); detergents (cooks) and military-specific causative agents, e.g. explosives, munitions, fuses, combat gases [9]. Plants and insects are examples of environmental causative agents. An earlier study of occupational skin diseases in military personnel in Singapore indicated oil/grease, wet work and solvents as the most common irritants, and food and chromates being the most common allergens [10].

The results from our study suggest that there may have been a shift in skin exposure patterns within the Singaporean military. Combat uniform, camouflage cream and topical medicaments, e.g. muscle relaxant spray, are now more frequently attributed as the cause of CD in conscripts compared to ‘industrial’ causative agents. This may reflect the outsourcing of selected functions, including vehicle and aircraft maintenance and catering services, by the military within the last decade.

No causative agent could be identified in 48% of cases. This may reflect the difficulty in pinpointing the culpable agent among the myriad of new occupational and environmental exposures that conscripts were simultaneously exposed to during military training, or inadequate training of primary care military doctors in performing occupational medical surveillance.

The findings of this study offer insights to aid understanding of the development and impact of dermatological diseases in a military conscript population in a tropical environment.
Key points

- In this study, 32% of subjects had one or more consultations for a skin condition over the 2 year study period.
- Fungal skin infection was the commonest new dermatological presentation, a condition amenable to primary prevention with rigorous practice of field hygiene.
- Causative agents for contact dermatitis have shifted from ‘traditional’ industrial agents such as grease, solvents and chromates, to combat uniform, camouflage cream and topical medicaments.

References


Funding

None declared.

Acknowledgements

The authors would like to thank the Singapore Armed Forces Medical Corps for granting permission to access the data for this study and Ms Janet Lim from HQ Medical Corps for her assistance in data-mining. The opinions and recommendations expressed in this paper are those of the authors and do not represent official policy of the Ministry of Defence, Singapore or the Singapore Armed Forces.

Conflicts of interest

None declared.

Filler Articles

Occupational Medicine seeks authors to write interesting or amusing filler articles for its white spaces. We welcome contributions on any topic but preferably those related to occupational medicine or medical matters. Or you may have an interesting story to tell about why you became an occupational physician. All contributions must be less than 500 words. If you have something to contribute please contact us at omjournal@som.org.uk