

Prevalence of Athlete's Foot in Bahrain Royal Navy

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Background: Tinea pedis is a very common infection especially in the army and limited studies have been performed to establish the prevalence and associations and had never been performed in the Kingdom of Bahrain.

Objective: To evaluate the prevalence of tinea pedis in Bahrain Royal Navy.

Design: A cross-sectional study.

Setting: Bahrain Royal Navy.

Method: One hundred and eighty-three individuals were randomly selected, interviewed and examined by physicians. The result was incorporated into SPSS software to establish the prevalence and associations. Affected individuals were sent to the Naval Medical Centre for proper medical management.

Result: Sixty-four out of 183 subjects were clinically infected with tinea pedis, point prevalence of 35%. Forty-two (65.6%) were unaware of the infection, 5 (7.8%) were diabetics and 17 (26.6%) sought treatment in the past. Thirty-four (53.1%) were Bahrainis and 38 (59.4%) of the affected individuals were living in the naval base. Twenty-nine (45.3%) patients were aged 40-60 years and 34 (53.1%) patients served the military 11-20 years.

Conclusion: Tinea pedis is a very prevalent infection among Bahrain Royal Navy personnel. Maintenance of personal and environmental hygiene is crucial and must be implemented to reduce the morbidity of this disease in all army personnel.

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Athlete's foot is fungal infection of the toe-web space and the skin of the foot caused by tinea pedis; it is the commonest fungal infection among humans, which causes flaking, itching and scaling of the affected skin¹. It has been estimated that at any given time 15% to 25% of the general population is likely to have athlete's foot². Tinea pedis has been

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linked to poor personal hygiene and previous studies in the military have established the association of athlete's foot with prolonged shoe wearing habits, prolonged training and close community living, i.e. barracks and community showers³⁻⁵. Among military personnel, the prevalence of tinea pedis has been described in a limited number of studies and it was as high as 81.1% in the Japanese self-defense forces⁶. However, the prevalence of this common disease has never been studied in the Kingdom of Bahrain.

The aim of this study is to evaluate the prevalence of tinea pedis in Bahrain Royal Navy.

METHOD

The naval service working force consists of 1800 active personnel of which less than 10% are officers and the rest are non-officers and a minority of civilian workers. Almost 50% of those personnel are non-Bahrainis and the majority of those live in the naval base with suboptimal sanitary conditions.

The study was conducted in November and December 2012. We interviewed 183 candidates randomly; verbal consent was taken immediately and the following information were recorded: age, nationality, rank, living in or outside the naval base, period of shoe wearing, co-morbidities and length of military service. Individuals were clinically examined for the presence or absence of tinea pedis infection. Clinically infected individuals were requested to answer the rest of the questions which were: awareness and prior treatment for athlete's foot.

Those who were clinically infected with tinea pedis were advised to go to the Naval Medical Centre to receive treatment and proper follow-up. To have a sample size representative of the Navy population, we used the 'EPI-INFO 7' assuming that the prevalence will be at least 15%. The result was that 173 candidates must be recruited ($p=0.005$, $CI=95\%$). We ended up with 169 non-officers, 9 officers and 5 civilians who agreed to be included in the study.

Results were fed into SPSS software for analysis.

RESULT

Sixty-four out of the 183 individuals were clinically infected with tinea pedis on examination, a clinical point prevalence of 35%, see table 1. Forty-two (65.6%) of the infected individuals were unaware of the infection, 5 (7.8%) were diabetics and 17 (26.6%) had received treatment in the past. Bahrainis and non-Bahrainis were almost equally affected, 34 (53.1%) were Bahrainis, see figure 1. Living in the naval base was associated with a higher prevalence and in those wearing shoes for more than 8 hours, see figure 2. Sixty-one (95%) were non-officers, 3 officers were clinically diagnosed with tinea pedis infection and no civilian was affected, see figure 2.

Table 1: Prevalence of Tinea Pedis and Associated Findings

Variable	Number of Candidates (%)
Clinically Infected Individuals	64 (35%)
Diabetics with Tinea Pedis	5 (7.8%)
Tinea Pedis and 8 Hours Shoe Wearing	54 (84.4%)
Awareness of the Infection	22 (34.4%)
Prior Treatment for Tinea Pedis in Infected Individuals	17 (26.6%)

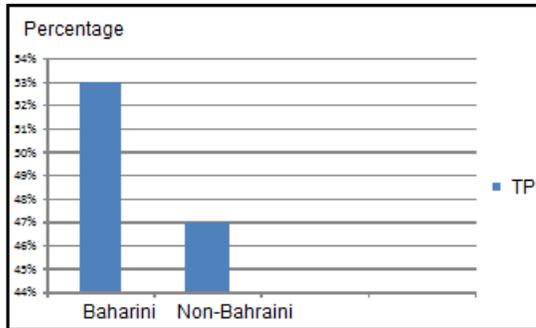


Figure 1: Distribution of Tinea Pedis Infection among Bahrainis and Non-Bahrainis

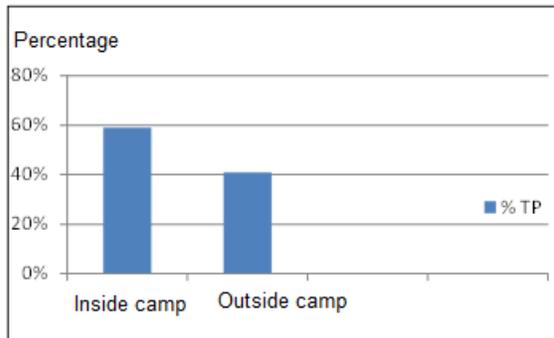


Figure 2: Distribution of Tinea Pedis Infection According to Living Place

Twenty-nine (45.3%) were between 40-60 years. The rate of infection in the remaining age groups was 25 (39.1%) in 30-45 years, 7 (10.9%) less than 30 years and 3 (4.7%) in more than 60 years.

More than half of the patients served between 11 to 20 years and those who served less than 10 years were the least affected subgroups, see table 2.

Table 2: Distribution of Tinea Pedis Infection According to Years of Military Service

Years of Service	Number and Percentage
≤ 10 Years	11 (17.2%)
11-20 Years	34 (53.1%)
≥ 21 Years	19 (29.7%)

DISCUSSION

In the current study, 35% of Bahrain Royal Navy personnel were infected with tinea pedis. This figure was higher than what was expected in the general population; nevertheless, very similar to fungal foot infection was found in other armies^{7,8}. The high prevalence is compatible with the hot and humid weather of Bahrain and it is expected to be higher in summer where the hot weather reaches its climax.

Another explanation for the high prevalence is the military shoes and the habits of wearing them. Military shoes are tight and poorly ventilated creating a hot and humid environment that favors fungal growth. In addition, most of the participants were having their shoes on for more than 8 hours, which allow the fungi to have enough time to multiply. These findings were supported by a study in the United States army which has suggested that cooler and drier foot environment reduces the incidence of athletic foot⁹. In addition, it showed that asymptomatic fungal foot infection is very common among soldiers, which in turn explained the large number of unaware individuals in our study and as a consequence, those who sought treatment were 26.6% of the clinically diagnosed tinea pedis individuals.

In our study, it was observed that the middle-aged and living in the navy base individuals were the most affected. A likely explanation of such findings is that those living in camps are mostly non-Bahrainis, non-officers, middle-aged living in barracks with suboptimal living conditions and poor personal hygiene. In addition, wearing the military shoes for most of the day makes them more susceptible to contract tinea pedis and often these patients suffer from co-morbidities, such as, diabetes mellitus.

In the current study, Bahraini military personnel were slightly more affected than non-Bahrainis. Three out of 9 officers were infected; i.e. the prevalence of tinea pedis among officers is close to that of the general navy population, military rank did not seem to be associated with lower prevalence compared to other studies³. Both observations can be explained by the fact that all military personnel share the same climactic factors in Bahrain and the shoe wearing habits.

The prevalence was highest in those who served between 10 to 20 years and lowest in those who served less than 10 years; usually they are young and fit individuals.

Finally, it is worth mentioning that military settings has been shown to favor fungal colonization among the military population and recurrence is very likely as observed from the percentage of those who received treatment in the past and still positive for tinea pedis. Moreover, medication compliance and adhering to treatment regimen add weight to the issue of

reinfection, which is why it is very important to stress medication compliance in those who suffer from athlete's foot¹⁰.

CONCLUSION

Tinea pedis is a very prevalent infection in Bahrain Royal Navy personnel. Maintenance of personal and environmental hygiene is crucial and must be implemented to reduce the morbidity of this disease in all army personnel.

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