

A retrospective study on the prevalence of tinea (ringworm) infections in patients who attended halibet national referral hospital, dermatologic clinic from 2014 to 2018 Asmara, Eritrea.

Abstract

Introduction: Skin fungal diseases pose a significant burden on the health care system of a country. Superficial fungal skin infections are caused by dermatophytes. Dermatophytes are classified as one of the groups of Fungi. The three genera of dermatophytes grow in keratinized environments such as hair, skin, and nails. Anthropophilic dermatophytes are restricted to human hosts; zoophilic dermatophytes to pets, livestock, and horses; and geophilic dermatophytes, from soil, only occasionally infect humans and animals.

Objective: The aim of the study was to determine the prevalence of Tinea (Ringworm) infections in patients who attended Halibet National Referral Hospital, Dermatologic Clinic from 2014 to 2018 Asmara, Eritrea.

Methods: A five year retrospective study on the prevalence of superficial fungal skin infections was conducted in the outpatient department in patients who attended dermatologic Clinic at Halibet National Referral Hospital, Asmara, Eritrea from 2014 to 2018. A review of clinical cards / medical records was conducted and the data was analyzed using SPSS version 22.

Results: During the five years period (2014- 2018) the Dermatology clinic of Halibet Hospital had a total visit of 32,153 patients who were treated as outpatients. Out of these patients who came from the whole country as referral and self-referral, 5524 (17.18%) were diagnosed clinically as cases with different types of Tinea infections. The number of females (2791, 50.5%) and males (2732, 49.5%) was almost the same. The highly infected body site was the head (77.5%) followed by the body (11%), face (6%) and hand (3%). And the most common type of Tinea that clinically identified was Tinea capitis 58% (n=4426) as it is compared to other types of Tinea. The other types of Tinea species that were found as comorbid with others were Tinea faciei, Tinea corporis, Tinea pedis, Tineamanuum, Tinea cruris and Tineaunguim as prevalent as 26.8%, 6.6%, 3.5%, 3.4%, 1.2% and 0.3%, respectively

Conclusion: The study concludes the overall prevalence of superficial Tinea skin fungal infections was found to affect mostly the head (77.0%), body (11%), face (6%) and hand (3%), foot (2%) and groin (1%), respectively. And the most common type of Tinea that clinically identified was Tinea capitis 58%. The other types of Tinea species ere found as comorbid with others Tinea faciei, Tinea corporis, Tinea pedis, Tineamanuum, Tinea cruris and Tineaunguim as prevalent as 26.8%, 6.6%, 3.5%, 3.4%, 1.2% and 0.3%, respectively.

Keywords: dermatophytes, tinea, Africa, Eritrea

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Introduction

The skin is the human body's largest organ, which is included in the integument system with its accessory organs like the hair, hair follicle, pili arrector muscle, sebaceous gland, sudoriferous gland, nails and mammary gland, covering 1.6 m² of surface area and accounting for approximately 16% of an adult's body weight. The skin helps to maintain retention of moisture and prevention of permeation or loss of other molecules, regulation of body temperature, and protection of the body from microbes and harmful external influences, and sensation.

Skin generally consists of a three-layer tissue: The outer epidermis (made of stratified squamous epithelium), the middle dermis (made of fibrous connective tissue), and the inner subcutaneous layer or hypodermis (made of adipose tissue and loose connective tissue).¹

Fungi belong to eukaryotic, non-photosynthetic, unicellular or multicellular organisms; they reproduce by asexual and sexual spores. Most scientists put fungi into four categories namely Zygomycota, Chytridiomycota, Ascomycota and Basidiomycota. Fungi can be useful or harmful to human beings. They may cause diseases of plants, human beings, and animals; spoilage of food etc.²

One of the harmful effects that can be caused due to fungal interaction with human beings and other living organisms are skin infections. It may lead to superficial, systemic and deep mycoses. Superficial fungal infections of the skin can be caused by dermatophytes, yeasts and non-dermatophytes. The various fungal organisms that cause skin infections are constantly competing with each other for their particular environmental niche, which can result in the emergence of a dominant species.³

Dermatophytes are classified as unique group of aerobic Fungi that infect keratinous tissue and are able to invade the hair, skin, and nails of a living host.

There are different types of Tinea infections that include:- Tinea barbae that refer specifically to infection within the beard area. It is an infection of the beard area in adult men usually, inflammatory and pustular with crusting^[4]. Tinea barbae is caused mainly by the microorganisms *Trichophyton mentagrophytes* and *T. verrucosum*. Tinea capitis is the most common fungal infection of the scalp hair follicles and the surrounding skin. It is commonly known as ringworm of the scalp. Infection is often asymptomatic and undiagnosed, with consequent spread to close contacts, especially siblings.

The common causes of Tinea capitis are *Microsporum audouinii*, *M. canis*, *Trichophyton soudanense*, *T. tonsurans*, *T. verrucosum* and *T. violaceu*.⁵ Tinea corporis refers to dermatophytosis of the trunk. It has a clinical manifestation of ring-shaped lesions with an advancing scaly border and central clearing or scaly patches with a distinct border. The main causes of Tinea corporis are *Microsporum canis*, *Trichophyton mentagrophytes*, *T. rubrum*, and *T. tonsurans*. Clinically it is presented by pruritic erythematous rash with an active scaly palpable edge with pustules or vesicles. It is most commonly seen in children, young adults and people with low immunity.^{6,7} Tinea cruris that refers to dermatophytosis of the groin. Infection of it involves the inner thigh and genital areas. Tinea cruris lesions are confined to the groin and gluteal cleft, usually it occurs in men and often tolerated for some time before presentation.⁸

Tinea faciei refers to dermatophytosis on the face, chin and lip. It is caused by *Microsporum canis*, *Trichophyton rubrum*, *T. tonsurans*, *T. mentagrophytes*, and *T. verrucosum*. Tinea manuum is usually observed along with Tinea pedis; distinctively it just affects one hand. Tinea manuum is a contagious fungal infection on the hands. The noticeable symptoms are scaling and redness and infection. The common skin diseases that look like Tinea manuum are contact dermatitis, eczema, keratoderma, keratolysis exfoliativa and psoriasis.⁶ Tinea pedis are basically infections at the webs of the toe, in an area where there is a macerated and erythematous skin.

It is frequently known as athlete's foot. It is divided into four categories- i) chronic interdigital athlete's foot, ii) plantar athlete's foot, iii) acute ulcerative Tinea pedis and iv) vesiculo bullous athlete's foot. Adult men have more chance and are more likely to have an athlete's foot than adult women and children. People with Diabetes mellitus (DM), HIV/ AIDS and weakened immune system are more susceptible for having an athlete's foot.^{4,6} **Tinea unguium** is a dermatophyte infection of the nails. The chronic fungal nail infections are commonly referred as onychomycosis. The prevalence of onychomycosis is often atypical and aggressive in patients with untreated HIV infection. Currently five major presentations of Tinea unguium are documented. These divisions include; i) distal and lateral subungual, ii) proximal subungual, iii) superficial white, iv) endonyx and v) total dystrophic onychomycosis.⁹ The main causes for Tinea unguium are *E. floccosum*, *T. interdigitale*, *T. rubrum* and *T. verrucosum*

The most common features of dermatophytosis are the inflammation with erythematous sign that is more severe at the edge of lesion, itching and odour at the site of infection.¹⁰ Whereas the Tinea infections are transmitted easily from human to human by direct skin-to-skin contact, or with contaminated skin cells or hairs and indirect by sharing of **objects**.¹¹ Hence, if proper personal hygiene, sterilization or using individual materials, avoidance of direct contact and proper treatment are practiced the infection will not spread.¹²

Therefore, this study is first in its kind and it was conducted to understand the prevalence and type of Tinea (Ringworm) infections in male and female patients who attended Halibet National Referral Hospital, Dermatologic Clinic from 2014 to 2018 Asmara, Eritrea. The study results will help for policy makers, mainly pharmacist and those who work in the field of antifungal drugs dispensing and preparation.

Objective of the study

The main objective of the study was to determine the Tinea (Ringworm) infections in patients attending Halibet National Referral Hospital, Dermatologic Clinic from 2014 to 2018 Asmara, Eritrea.

Methodology

Study design and area

A five years hospital based retrospective clinical card/record review study was conducted to assess the prevalence of superficial fungal skin infections among outpatients who attended Halibet National Referral Hospital, Dermatologic Clinic from 2014 to 2018, and Asmara, Eritrea.

The following key words were used for searching the reference in the electronic databases: Dermatophytes, Tinea, Africa and Eritrea. Boolean search strategy was applied to retrieve relevant research done, using the terms "Dermatophytes" AND "Tinea" OR "Africa" AND/OR "Eritrea". Additional literatures were obtained by retrieving publications that were relevant to the study.

Inclusion Criteria

All patients who visited Halibet Hospital dermatologic clinic in the study period (2014-2018) were included.

Data processing/Data entry

Data cleaning was performed to check for accuracy, consistency and for avoidance of missed values during data collection and entry. The collected data was entered into Microsoft excel.

Data analysis

The collected data was analyzed using SPSS version 22. After analysis data was presented using descriptive statistics, frequency, percentage, mean and standard deviation. Then the variables were presented in tabular and graphic form.

Results

Distribution of general skin disease and Skin fungal infections

During the past five years Period (2014, - 2018) the Dermatology clinic of Halibet Hospital had a total visit of 32,153 patients who were treated as out patients.

Out of these patients who came from the whole country as referral and self-referral, 5524 (17.18%) were diagnosed clinically as cases with different types of Tinea infections. As it is indicated in the study results in the past five years the trend of skin diseases was observed to increase from 956 in 2014 to 1219 in 2018 (Table 1).

Distribution of Skin fungal infections by year and sex: 2014 – 2018

In general in the study period (2014 - 2018) Tinea skin infections were almost the same in female (N=2792; 50.5%) and males (N=2732; 49.51%) (Table 2).

Table 1 Epidemiologic data, patients with skin diseases who visited the dermatology clinic from: 2014 -2018

Year	Total number of patients with skin diseases (Frequency; N)	Patients with skin fungal infection (Frequency; N)	Patients with skin fungal infection (Percent; %)
2014	5373	956	17.3
2015	7388	1046	18.9
2016	6344	1082	19.6
2017	6048	1221	22.1
2018	7000	1219	22.1
Total	32,153	5524	100

Table 2 Epidemiologic data of patients with Tinea infections who visited the dermatology clinic from 2014 -2018: by year and sex

Year	Frequency (N)		Total
	Male	Female	
2014	496 (51.9%)	460 (48.1%)	956
2015	470 (44.9%)	576 (55.1%)	1046
2016	542 (50.1%)	540 (49.9%)	1082
2017	569 (46.6%)	652 (53.4%)	1221
2018	655 (53.7%)	564 (46.3%)	1219
Total	2732	2792	5524

Socio-demographic characteristics of patients with skin fungal infections: 2014– 2018

The study results showed that the frequency of Tinea skin infections in males (49.5%) and females (50.5%) was more or less similar (Table 3).

Table 3 Epidemiologic data of patients with Tinea infections, who visited the dermatology clinic from 2014 -2018: by gender and age

Characteristics	Frequency (N)	Percent (%)
Gender		
Male	2732	49.5
Female	2792	50.5
Total	5524	100

Distribution of superficial Skin fungal infections in patients who visited the dermatology clinic from: 2014 -2018 by site of body

The study results indicated that the most affected area of the body with Tinea skin infection was Head (77.0%), where as the least affected area was found to be the Groin (1.0 %) (Figure 1).

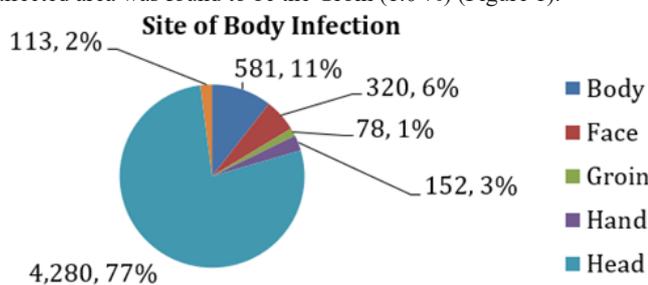


Figure 1 Site of body infection in patients with Tinea infection who visited the dermatology clinic from: 2014 -2018.

Cause of skin fungal infections in patients who visited the dermatology clinic from: 2014 -2018 as multiple species/diseases agents

The most common type of Tinea that clinically identified was Tinea capitis 58% (n=4426) as it is compared to other types of Tinea.

The other types of Tinea species that were found as comorbid with others were Tinea faciei, Tinea corporis, Tinea pedis, Tineamanuum, Tinea cruris and Tineaunguium as prevalent as 26.8%, 6.6%, 3.5%, 3.4%, 1.2% and 0.3%, respectively (Table 4).

Table 4 Diagnosis of disease as multiple Tinea Infections in patients who visited the dermatology clinic from 2014 -2018: By Tinea type and sex

Characteristics	Frequency		Total
	Male	Female	
Diagnosis			
Tinea barbae	0 (0.0)	0 (0.0)	0
Tinea capitis	2090 (47.2%)	2336 (52.8%)	4426 (58.0%)
Tinea corporis	301 (59.4%)	206 (40.6%)	507 (6.6%)
Tinea cruris	86 (90.5%)	9 (9.5%)	95 (1.2%)
Tinea faicei	936 (45.9%)	1105 (54.1%)	2041 (26.8%)
Tinea manuum	170 (64.6%)	93 (35.4%)	263(3.4%)
Tinea pedis	133 (49.8%)	134 (50.2%)	267(3.5%)
Tinea unguium	2 (7.7%)	24 (92.3%)	26(0.3%)
Total	3718	3907	7625

Discussion

The study analyzed clinical cards of patients who attended Halibet Regional Referral Hospital, Dermatology Clinic, for five years (2014 - 2018) period, due to different types of skin diseases. During this period a total of 32,153 patients attended Halibet Regional Referral Hospital, due to different Dermatological diseases, out of these 5,524 (17.18%) were identified to have problems related to Tinea (skin fungal infections).

As the study results indicated, dermatologic problems in general and skin fungal infections in particular were observed to increase by 27.6% from 2014 to 2018. This increase in the number of patients may be due to an increased awareness of health care seeking behavior, increased use of corticosteroids among females that causes changes of the skin face and neck.¹³ A study on the prevalence of dermatological conditions in mountainous area of North India reported a higher prevalence of skin diseases such as eczema (10%), scabies (4.4%) and acne as 3.9% which is with a lower prevalence than this study with 17.18% .¹⁴ There was no great variation in the number of male (49.51%) and female (50.5%) patients with skin fungal infections, who visited the hospital during the study period.

Out of the total Tinea skin fungal infections that were clinically identified at Halibet National Referral Hospital Dermatology Clinic, the study results showed that the most affected area of the body with Tinea skin infection was Head (77.0%), whereas the least affected area was found to be the Groin (1.0 %), respectively. And the most common type of Tinea that clinically identified was Tinea capitis 58% (n=4426) as it is compared to other types of Tinea. The other types of Tinea species that were found as comorbid with others were Tinea faciei, Tinea corporis, Tinea pedis, Tineamanuum, Tinea cruris and Tineaunguium as prevalent as 26.8%, 6.6%, 3.5%, 3.4%, 1.2% and 0.3%, respectively.

An epidemiological and aetiological study on Tinea pedis and onychomycosis in Algeria noted a different prevalence rates of superficial fungal infections which is inconsistent with this study results indicating that a higher rate of Tinea pedis (19.9%), Tinea unguium (5.5%), Tinea cruris (2.5%) and especially lower rate of Tinea capitis (0.7%) of the study subjects which were expected to be the most common superficial skin fungal infections which were reported from other papers.¹⁵

Out of the clinically diagnosed patients those with Tinea skin fungal infection 3.4%, were diagnosed as cases with Tinea manuum. This study results are similar with the study findings that were reported in Syria as of the cases that were clinically diagnosed and positively identified by direct examination.¹⁶ In general, head skin fungal infection was observed to be highly prevalent (77.0%) in the study population.

Conclusion

In conclusion, the overall prevalence of superficial Tinea skin fungal infections was found to affect the head (77.0%), body (11%), face (6%) and hand (3%), foot (2%) and groin (1%), respectively. And the most common type of Tinea that clinically identified was Tinea capitis 58% (n=4426) as it is compared to other types of Tinea. The other types of Tinea species that were found as comorbid with others were Tinea faciei, Tinea corporis, Tinea pedis, Tineamanuum, Tinea cruris and Tineaunguium as prevalent as 26.8%, 6.6%, 3.5%, 3.4%, 1.2% and 0.3%, respectively. Hence, from the above study results we can assume that if someone is diagnosed with one type of Tinea there is a chance to have at least one from the remaining types of fungal infections.

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Conflicts of interest

Author declares there is no conflict of interest.

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