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BACTERIOLOGICAL AND MYCOLOGICAL PROFILE OF TOE WEB SPACE INFECTIONS: A CLINICO EPIDEMIOLOGICAL STUDY

Dermatology

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ABSTRACT

Background: Dermatophytic fungi are more commonly associated with interdigital toe web space infections. However, the disease pertains to other pathogens also. In recent years, there has been an increasing number of reports concerning non-dermatophytic fungal infections and mixed infections with gram negative bacteria.

Objectives :

1)To study the clinical profile of toe web space infections

2) To know the aetiology of toe web space infections

Materials and Methods : 50 clinically suspected adult cases (18-60 years) of toe web space infections were included in the study. Detailed history was taken and clinical examination was performed. Specimen samples were collected from toe web space and Gram staining, KOH mount, bacterial and fungal culture were done. **Results:** Majority of study subjects belonged to 40-60 years age group with no gender difference. Housewives by occupation constituted for 34% of study subjects. Diabetes can be considered as an important risk factor in the etiology (21%). 85% participants presented with maceration, 70% with scaling, 65% with erythema, 35% with pruritus. 4th toe web space was commonly involved (40%). Tinea pedis, psoriasis and cellulitis are most commonly associated cutaneous diseases among the study participants. Among the fungal species isolated, candida (39%) fusarium (34%) and trichophyton (30%) were the common ones Staphylococcus aureus (35%) klebsiella (16%) pseudomonas (12%) were the common bacterial organisms isolated. **Conclusion:** Fourth toe web space infection was most commonly noted and majority of study subjects belonged to 40-60 years age group, among whom housewives were predominantly affected. Candida, Fusarium, Trichophyton, Staphylococcus aureus, Klebsiella and Pseudomonas were the most common species isolated. There are many etiological factors responsible for toe web space infections, which are usually over diagnosed, underdiagnosed/ misdiagnosed. Hence proper clinical approach and laboratory investigations would yield definitive diagnosis resulting in appropriate treatment.

KEYWORDS

Toe web space infection, Candida, Staphylococcus aureus, Intertrigo, KOH mount, Gram stain

INTRODUCTION

Foot diseases usually present in adults and are influenced by various environmental factors. Intertrigo is a cutaneous inflammatory process developing on opposing skin surfaces.[1]

Common clinical presentations of toe web space infections(TWSI) include erythema, desquamation, erosion, maceration, malodour, sometimes associated with burning sensation and purulent discharge. Overweight and diabetes are risk factors for cellulitis in patients with severe toe web space intertrigo.[2]

Heat, perspiration, poor hygiene, obesity, immune suppression, drug intake and co morbidities contribute to the complex aetio-pathology of toe web space infections.[3]

Dermatophytes, pseudomonas aeruginosa, staphylococcus aureus are common microbes complicating foot intertrigo.[4-5,6]

Interdigital space is inhabited by polymicrobial flora which trigger pathogenic organisms resulting in clinical symptoms associated with TWSI.[7]

Normal foot microbiome like pseudomonas species may undergo alterations in number and distribution resulting in disease states, reason being unknown.[8]

KOH mount and gram staining help in identifying etiological agents and culture helps in confirmation of the same.[9-10]

Preventive measures include proper hygiene and avoidance of ill-fitting shoes, frequent change of shoes and usage of absorbent socks or drying agents.[11]

AIMS AND OBJECTIVES

1) To study the clinical profile of TWSI
2) To know the aetiology of TWSI

MATERIALS AND METHODS

50 clinically suspected cases of TWSI in 18-60 years age group were included. Detailed history taking and examination was performed. Routine blood investigations were done. Specimens from skin lesions were examined for fungal elements using 1-2 drops of 10% KOH. Sabouraud's dextrose agar was used for fungal culture. Gram staining was done to detect polymorphs and bacteria. Culture for bacteria was done using blood agar and McConkey's agar plate. Biopsy was done when tests for bacteria and fungi came negative.

Microsoft excel was used for data entry and analysis.

RESULTS

50 cases of TWSI were studied. The cases were selected from patients attending department of dermatology OPD at Navodaya medical college hospital research centre, Raichur, Karnataka.

Age Distribution

Of the 50 cases studied, cases belonging to age group 40- 60 years were maximum (64%), followed by age group 31-40 years (18%), the youngest case was 18 years and oldest 60 years.

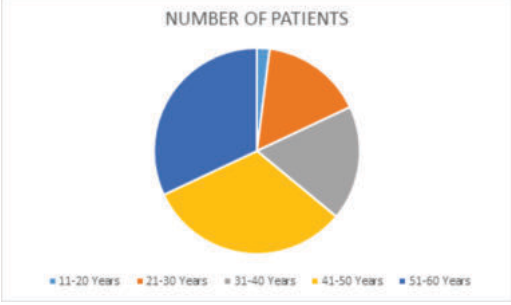

Chart 1: Age Distribution

Table 1: Age Distribution

AGE GROUP	NUMBER OF PATIENTS	PERCENTAGE
11-20 Years	1	2
21-30 Years	8	16
31-40 Years	9	18
41-50 Years	16	32
51-60 Years	16	32
TOTAL	50	100
MEAN	43	

Gender Distribution

In the study, out of 50 patients, 25(50%) were males and 25(50%) were females. Male to female ratio -1:1.

Table 2: Gender Distribution

GENDER	NUMBER OF PATIENTS	PERCENTAGE
Male	25	50
Female	25	50
TOTAL	50	100

Table 3: Occupational Distribution

OCCUPATION	NUMBER OF PATIENTS	PERCENTAGE
Housewife	17	34
Agriculture	12	24
Retired	10	20
Business man	5	10
Student	3	6
Others	3	6
TOTAL	50	100

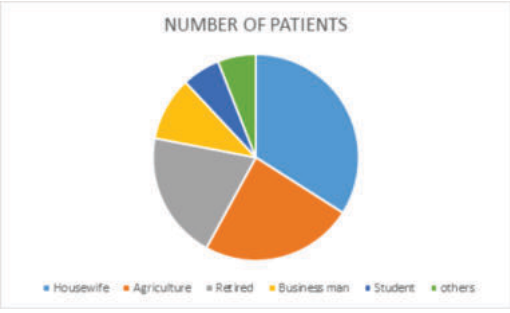

Chart 2: Occupational Distribution

Involvement Of Toe Web Spaces

In our study, fourth toe web space was the most commonly involved in 23 patients (46%) followed by combined involvement of third and fourth toe web space in 19 patients (38%) , second, third and fourth web spaces together involved in 4 patients (8%) , 2 patients (4%) had involvement of third web space alone , a single patient had involvement of all web spaces and second and third web spaces together was involved in 1 patient(2%).

Table 4: Toe Web Space Involvement

WEB SPACE	NUMBER OF PATIENTS	PERCENTAGE
1st, 2nd,3rd,4th web spaces	1	2
2nd,3rd,4th web spaces	4	8
2nd,3rd web spaces	1	2
3rd,4th web spaces	19	38
3rd web space	2	4
4th web spaces	23	46
TOTAL	50	100

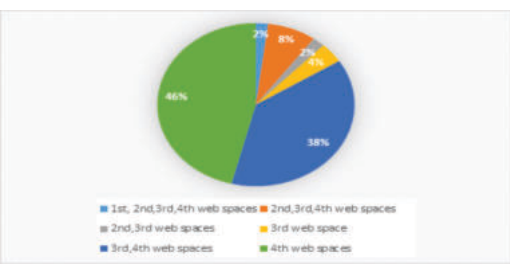

Chart 3: Toe Web Space Involvement

Table 5: Gram Staining Results

ORGANISM	NO OF CASES	PERCENTAGE
Gram positive cocci	12	24
Gram negative bacilli	1	2
Mixed : cocci+ bacilli	12	24
Candida	3	7
Candida+cocci/bacilli/both	13	26
No organism	8	17
TOTAL	50	100

Table 6: Bacterial Culture Results(n=45)

BACTERIAL CULTURE	NO OF PARTICIPANTS	PERCENTAGE
Staphylococcus aureus	14	32%
Klebsiella sp	8	18%
Pseudomonas sp	6	13%
E.coli	5	11%
Acinetobacter sp	4	8%
Others	8	18%
TOTAL	45	100

KOH Mount And Fungal Culture Test

KOH was positive in 46 patients while in 4 patients, it was negative.

Table 7: KOH Mount Results

KOH MOUNT	NUMBER OF PARTICIPANTS	PERCENTAGE
Negative	4	8
Positive	46	92
TOTAL	50	100

Most Common Fungal Species Identified In The Study

Fungal culture revealed candida species in 37%, Fusarium sp 30%, Trichophyton sp 26% Epidermophyton sp 4%, Aspergillus sp 4% respectively.

Table 8: Fungal Culture Results

FUNGAL SPECIES	NUMBER OF PARTICIPANTS	PERCENTAGE
Epidermophyton sp	2	4
Fusarium sp	15	30
Trichophyton sp	13	26
Aspergillus sp	2	4
TOTAL	50	100

DISCUSSION

In our study majority of study participants belonged to age group of 40-60 years which correlates with a study conducted by Lin JY et al.[12]

There was no gender predisposition in our study as also found by Ahmed et al. Majority of patients were housewives and agriculturists with constant exposure to water during household activities/ field work leading to maceration similar to Ahmed et al's study.[13]

Clinically patients presented with scaling (70%), erythema (65%), maceration (85%), fissuring with pruritus (35%) and malodour (12%). Merlin et al found erythema in 84.6% cases and scaling in 90.2 % cases.[14]

4th toe web space was most commonly involved in our study participants (46%) in par with a study conducted by Ahmed et al.[13]

Commonly associated cutaneous diseases were fungal infections like tinea unguium seen in people walking barefoot or from wet floors of bathrooms or shower stalls. Cellulitis was noted in a minority of study subjects.

Dermatophytes can lead to TWSI; first, by damaging the stratum corneum, making it convenient for bacterial invasion, and second, by producing natural substances with antibiotic properties that alter the composition of the resident bacterial flora, encouraging the proliferation of antibiotic-resistant strains.[15]

KOH mount was positive in (92%) and fungal culture revealed candida (37%) , Fusarium (30%),Trichophyton (26%). Lestringant et al found that Candida was most common species isolated (57.7%) followed by Aspergillus (28.8%) and Fusarium (11.1%) [16]

On bacteriological examination, staphylococcus aureus was the most common gram positive organism isolated (32%), Kate et al also found

similar results.[17]Among gram negative organisms, Klebsiella (18%), Pseudomonas (13%) were isolated compared to a study conducted by lestrigant et al.[16]

Figure 1: Tinea Unguium Affecting 2nd Toe Web Space

Figure 2: Erythema And Scaling Noted Over The 4th Toe Web Space

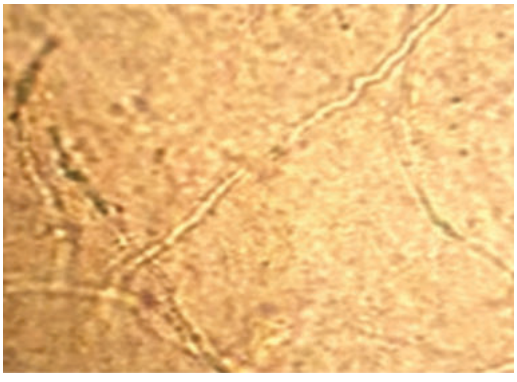

Figure 3: Koh Mount Showing Fungal Septate Hyphae

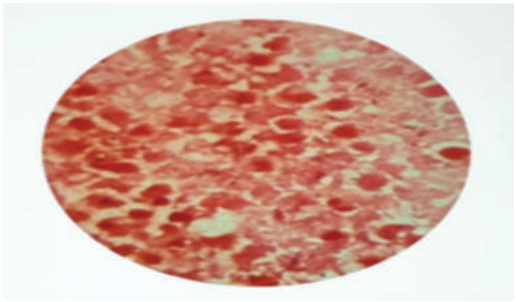

Figure 4: Gram Stain Showing Gram Positive Cocci In Pairs/ clusters And Pus Cells

CONCLUSION

Majority of the study participants belonged to 40-60 years age group with gender predilection. Housewives were commonly affected. concomitant fungal infection of other body areas were noted with cellulitis as a common complication. 4th TWSI was commonly seen with scaling, erythema, maceration, fissuring with pruritus and malodour. Common isolated microbial species included Candida, Fusarium, Trichophyton, Staphylococcus aureus, klebsiella and Pseudomonas.

Many cases of TWSI can be over diagnosed/ misdiagnosed/ underdiagnosed leading to inadequate treatment and recurrences. Diagnostic procedures can act as an aid to help in proper diagnosis and management of TWSI.

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