Clinical and Microbiological Study of Intertrigo

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INTRODUCTION

The word “intertrigo” comes from the Latin word inter=between and terere=to rub and reflects the rubbing together of skin to skin, to create maceration and irritation, hence friction dermatitis or chaffing.1 Heat, moisture, and the retention of sweat produce maceration and irritation. The moisture initially comes from eccrine sweat that cannot evaporate in the intertriginous areas because of reduced air circulation following which epidermis becomes eroded.2-5 Lateral toe webs are the most common sites of infection.6 Other sites include finger web, submammary, retroauricular, vulval, and labiomental regions.7-10 Among the pathogens, Candida, Gram-negative bacteria such as Pseudomonas aeruginosa, Escherichia coli, Proteus mirabilis, Morganella morganii, and Gram-positive bacteria such as Staphylococcus aureus, Group A beta-hemolytic streptococci, Staphylococcus saprophyticus are implicated.4,5,11,12

Differential diagnosis of intertrigo includes diaper dermatitis, nutritional dermatitis, candidiasis, psoriasis, seborrhic dermatitis, congenital syphilis, granuloma gluteal infantum, Letterer-Siwe disease in infants and children and fungal infections, erythrasma, contact
dermatitis, psoriasis, pemphigus, Hailey-Hailey disease, subcorneal pustular dermatoses, acanthosis nigricans, and acrodermatitis enteropathica in adults.13

Treatment includes patient education, correcting precipitants, treating inflammation, and secondary infection. The mainstay of treatment remains topical and systemic antifungals. Most of the broad-spectrum antifungals that are available for the treatment of superficial infections belong to azole class. These include imidazoles, triazoles, and allylamines such as naftifine and terbinafine. Terbinafine exerts a primary fungicidal action against dermatophytes and a number of yeasts and molds.3,5,14,15

The present study was undertaken to study the clinical spectrum and predisposing factors of intertrigo, to identify the causative fungal or bacterial agent and to know the sensitivity pattern of isolated bacteria to antibiotics.

MATERIALS AND METHODS

A total of 150 patients with intertrigo including both sex and all age groups were included in the study. Detailed history, clinical examination, and systemic examination to rule out any systemic diseases were done. Relevant laboratory investigations such as potassium hydroxide (KOH) examination, gram staining, fungal, and bacterial culture along with antibiotic sensitivity for bacteria were done. Scrapings from the lesions were taken with the blunt edge of scalpel blade, and the specimen was used for KOH examination and gram staining.

A part of the specimen was planted for culture by furrowing it into the Sabouraud’s Dextrose Agar and incubated at 37°C for 4 weeks, and the morphology was studied. A colony of Candida from the culture medium was incubated with human serum at 37°C. This was observed after 2-4 h for the germ tube under the microscope. The presence of bacteria, their staining characteristics, and their arrangement was noted by Gram’s Method. All the organisms isolated were tested for antibiotic sensitivity by Disc Diffusion Technique.

RESULTS

The maximum number of cases, i.e., 105 (70%) cases belonged to the age group of 21-60 years. The youngest case was 17-day-old, and oldest was 83 years. Females constituted about 114 (76%) cases and males 36 (24%) with male to female ratio of 1:3.1 as depicted in Graph 1. Among the occupation, majority of patients were housewives i.e., 89 (59.33%) followed by 17 (11.33%) patients who did not belong to any occupation as they were aged less than 6 years, 16 (10.67%) servants, 12 (8%) agriculturists followed by 6 (4%) students, 4 (2.66%) clerks, 2 (1.33%) officials, and 1 (0.67%) barber, lab technician, police, and tailor.

About 115 (76.67%) cases belonged to lower, 24 (16%) middle and 11 (7.33%) belonged to upper socioeconomic status; whereas 84 (57.33%) belonged to rural areas followed by 64 (42.67%) patients were from urban areas. The majority of cases i.e., 100 (66.67%) presented with duration of more than 60 days, 26 (17.33%) with duration of 16-60 days, and 24 (16%) with duration of 1-15 days. The diseases associated with intertrigo were obesity - 18.67%, diabetes mellitus - 10%, hypertension - 5.33%, immunocompromised status - 2%, allergic contact dermatitis, and ischemic heart disease - 1.33% each. Thyrotoxicosis, atopic dermatitis, polymorphic light eruption, lichen simplex chronicus, scalp psoriasis, seborrhoeic dermatitis, carcinoma cervix, and lichen sclerosis et atrophicus accounted 0.67% each as shown in Graph 2.

In the present study, out of 150 cases, 115 (76.67%) cases were of toe web intertrigo (Figure 1) followed by 12 (8%) perianal (Figure 2), 8 (5.33%) vulval, 6 (4%) finger web, 5 (3.33%) groin, 3 (2%) retroauricular, and 1 (0.67%) submammary intertrigo. Of 150 cases, 56 (37.33%) cases showed Candida (Figure 3) followed by 28 (18.67%) gram-
negative bacilli, 21 (14%) Candida and cocci or bacilli, 16 (10.67%) gram-positive cocci, 9 (6%) mixed cocci and bacilli, and 2 (1.33%) gram-positive bacilli; whereas in 18 (12%) cases no organisms were detected as shown in Graph 3. Bacterial culture revealed 22 (14.67%) cases of Pseudomonas followed by 16 (10.67%) Staphylococci, 9 (6%) E. coli, 6 (4%) Klebsiella, 2 (1.33%) Streptococci, and 1 (0.66%) Proteus. Mixed growth was seen in 13 (8.67%) cases, whereas normal skin commensals were found in 7 (4.67%) cases. No growth was seen in 74 (49.33%) cases.

Of 31 isolates of Pseudomonas, 29 (93.55%) were sensitive to piperacillin-tazobactam followed by 27 (87.09%) to amikacin, and 21 (67.74%) each to ciprofloxacin and cefoperazone. Resistance was highest to gentamicin, i.e., 17 (54.84%) isolates as depicted in Graph 4. In the present study, amoxicillin-clavulanic acid and gentamicin sensitivity were seen in all 28 (100%) isolates of Staphylococci, and no resistance was observed. With respect to cefotaxime, ciprofloxacin, and cotrimoxazole; 24 (85.71%), 22 (78.57%), 21 (75%) isolates were sensitive, and 4 (14.29%), 6 (21.43%), 7 (25%) isolates were resistant, respectively. The highest resistance was noted for erythromycin (35.71%) followed by clindamycin (32.14%).

**DISCUSSION**

The Majority (70%) of patients belonged to the age group of 21-60 years in the present study, which correlates with the study of Ahmad et al., (21-50 years).6 Whereas Lin et al.,
Aste et al., and Keita et al., found that foot intertrigo was common in the age group of 36-81 years, 19-74 years, and 12-48 years, respectively.\textsuperscript{3,16,17} The age variations signifies that intertrigo is a common disorder that can affect any individual from infancy to old age. Female preponderance was seen which is consistent with the study of Keita et al., (1:2.1) which can be attributed to housewives (59.33%), who constituted majority group.\textsuperscript{16}

Lower socioeconomic class patients comprised 76.67% of the total. The low income, poor nutritional status, poor hygiene, overcrowding could be factors that contribute to intertrigo. The majority of patients, i.e., 89 (59.33%) were housewives. This is on par with the study of Ahmad et al., which showed 33.3% housewives, who engaged themselves in household activities resulting in maceration of toe webs followed by servants and agriculturists.\textsuperscript{6} About 66.67% cases of intertrigo cases had a duration of more than 60 days which is in accordance with other studies which makes it a chronic recurrent condition.

Obesity was seen in 18.67% cases in the present study, which is not consistent with the study of Keita et al., which showed 68.8% cases, which can be attributed to racial and geographical differences.\textsuperscript{10} Association with obesity in the present study is due to more numerous and deeper skin folds in obese patients. Diabetes was seen in 10%, which is consistent with the studies of Ahmad et al., (6.66%) and Keita et al., (8.88%).\textsuperscript{6,18} Increased incidence in diabetics may be due to increased glucose levels in urine, tissue fluids, and sweat, which make them more prone to candidiasis.

There are no studies available in the literature for the comparison of region wise distribution of intertrigo. Toe web space was involved in 76.67% of the cases, in the present study. This is due to the reason that the majority of the study population in the present study constituted females (76%) who engaged in household work, which is an important predisposing factor for toe web intertrigo. In the present study, 4\textsuperscript{th} and 5\textsuperscript{th} toe web space were involved bilaterally in the majority (40.87%) of patients. This is in accordance with the study of Ahmad et al. in which bilateral 4\textsuperscript{th} and 5\textsuperscript{th} toe web space were involved in majority (41.76%) of patients.\textsuperscript{5}

In the present study, the predominant organism isolated was \textit{Candida}, which accounted for 51.33%. This is consistent with the studies of Leestringant et al., Ahmad et al., Goto et al., and Soghaix et al., which showed 57.7%, 60%, 60%, and 88.9% cases of \textit{Candida}, respectively.\textsuperscript{18-20} The predominance of \textit{Candida} in the present study can be attributed to retention of moisture as seen in housewives, increased temperature and maceration in body folds particularly during the summer and monsoon, along with other predisposing factors.

Pseudomonas was isolated in 14.67% of cases, which correlates with the studies of Ahmad et al., and Karaca et al., who isolated in 10% and 16.7% of cases; but is lesser compared to Lin et al., and Aste et al., who isolated in 55% and 46.4% cases.\textsuperscript{3,6,17,21} Klebsiella isolated (6%) is on par with the studies of Aste et al., (6.2%) and Lin et al., (3.44%).\textsuperscript{3,17} Predominance of gram-negative bacteria in the above studies include hot weather, tight-fitting shoes, as well as previous prolonged antibiotic or antifungal therapy. \textit{Staphylococci} were seen in 10.67% cases followed by 1.33% cases of beta hemolytic streptococci. This is consistent with the study conducted by Karaca et al., in which the isolated pathogens were \textit{S. aureus} in 11.9% cases followed by beta hemolytic streptococci in 2.4% of cases.\textsuperscript{21} Culture negative cases were 10% in the present study, which can be explained by the fact that intertrigo is mainly of mechanical origin and infection is a secondary phenomenon, which may have not settled yet. Mixed growth can be explained on the basis of the development of complex with time.\textsuperscript{22}

In the present study, all isolates of \textit{Staphylococci} (100%) were sensitive to amoxicillin-clavulanic acid and gentamicin, which correlates with the study of Niebuhr et al., which showed 97% and 84% sensitivity, respectively.\textsuperscript{23} Least sensitivity (64.29%) was seen for erythromycin, which correlates with Ghadage et al.,\textsuperscript{24} (41%). The high proportion of strains showing resistance to antibiotics may be explained by the practice of self-medication by patients. All three isolates (100%) of \textit{Streptococci} were sensitive to ampicillin/amoxicillin and ciprofloxacin, which is in accordance with the studies of Malhotra et al., and Ghadage et al.\textsuperscript{24,25} \textit{Pseudomonas} was the predominant bacteria isolated in present study, most of them (93.55%) were sensitive to piperacillin/tazobactam, which is consistent with studies of Sharma VK et al., (100%) and Asati DP et al., (77.5%).\textsuperscript{26,27} With respect to amikacin sensitivity, the present study was not correlating with the studies of Sharma et al., and Asati et al., who reported less sensitivity to amikacin.\textsuperscript{26,27} These variations can be attributed to variations in the study populations.

**CONCLUSION**

Intertrigo is more common in the age group of 21-60 years, with a female preponderance. Among all occupations, housewives are more commonly affected by intertrigo. The majority of patients present with duration of illness of more than 60 days suggesting its chronicity. Predisposing factors contributing are patients with obesity, diabetes, and patients belonging to lower socioeconomic status, rural areas with seasonal aggravation in the rainy season. Toe web space is the most common region involved with
4th and 5th toe web space being more common. Common organisms causing intertrigo are Candida, Pseudomonas, and S. aureus. The majority isolates of Pseudomonas are sensitive to piperacillin-tazobactam and amikacin. All isolates of S. aureus are sensitive to amoxicillin-clavulanic acid and gentamicin.

REFERENCES


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