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A Study of the Clinico-Bacteriology and Antibiotic Sensitivity Profile of Plantar Ulcers in Leprosy

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Abstract: ***Introduction: Leprosy is a chronic granulomatous disease with widespread involvement of the body including peripheral nerves. Chronic ulcers are among the most dreaded complications of leprosy with high bacterial load resulting in delayed wound healing.The ulcers are recurrent, which increase the physical disability and mortality due to leprosy. The secondary bacterial infection in the plantar ulcers and antimicrobial profile in leprosy can vary from region to region hence this study is essential to identify the organisms and to deliver appropriate and adequate treatment. Aims and objective: To identify the organism from the leprosy ulcer isolates and its antibiotic sensitivity profile. Materials and Methods: Data will be collected from 30 diagnosed Hansen's patients.A detailed history and clinical examination will be carried out.Demographic data of the subjects shall be obtained with respect to age, sex, disease duration and activity, history of deformities and type of leprosy. Clinical evaluation will be performed to gain information about extent and severity of ulcer such as size and depth of ulcer, discharge and extent of cellulitis.The organism isolated is noted along with the antibiotic sensitivity pattern. Results: 30 culture and sensitivity tests from leprosy afflicted plantar ulcers revealed a majority of the ulcers harbouring organisms such as staphylococcus, enterococcus and methicillin resistant staphylococcus variety. A proportion of the wounds showed mixed infection with two or more organisms.Ulcers often affect the quality of life of patients suffering from leprosy where the productivity of life is observed to be hampered. This study would enable us to manage leprosy ulcers better with appropriate antibiotics.***

Keywords: plantar ulcers, Hansen's disease, clinicobacteriology, antibiotic sensitivity

1. Introduction

Leprosy is a chronic granulomatous disease with widespread involvement of the body including peripheral nerves [1].

The lepromatous and the tuberculoid poles of the disease spectrum can have skin manifestations such as chronic ulceration [2]. Chronic ulcers are among the most dreaded complications of leprosy with high bacterial load resulting in delayed wound healing.

The ulcers are recurrent, which increase the physical disability and mortality due to leprosy [3].

Plantar ulcers comprise 92.7% of ulcers described in patients suffering from leprosy . Most common cause of ulceration is described as "spontaneous" or traumatic in 56.7% patients which has been attributed to hypoaesthesia or anaesthesia of the foot owing to neuropathy [4].

The nerve damage results in diminished sensation which is subject to ulcer formation due to external and internal factors such as xerosis and trauma. Management of plantar ulcers can drain the patient financially due to inappropriate antibiotic usage, chronic nature and recurrence of these ulcers requiring prolonged treatment. If left untreated plantar ulcers lead to morbidity and poor quality of life of leprosy patients [5]. This study would enable us to manage leprosy ulcers better with appropriate antibiotics.

2. Methods and Methodology

Type of Study
It is a descriptive cross-sectional prospective study over a period of 6 months with the objective of identifying bacterial organisms from isolates of plantar ulcers in leprosy patients and identifying the antibiotic sensitivity patterns in these patients. Patients receiving antibiotics 2 weeks prior to date of sample collection were excluded from the study.

Source of Data
All clinically diagnosed and cured cases of leprosy with plantar ulcers attending the Dermatology out-patient department and admitted patients at Father Muller Medical College Hospital, Mangalore constituted the subjects for the study. Purposive sampling technique was used. Etical clearance was obtained.A written informed consent was taken from each individual taking part in the study

A detailed history and clinical examination was carried out. Demographic data of the subjects was obtained with respect to age, sex, disease duration and activity, history of deformities and type of leprosy.

Clinical evaluation was performed to gain information about extent and severity of ulcer such as size and depth of ulcer, discharge and extent of cellulitis. The organism isolated was noted along with the antibiotic sensitivity pattern.

Sample Collection
The sample was collected using a sterile swab from deeper aspect of the plantar ulcer where the serous, purulent or serosanguinous discharge was obtained after cleansing the surrounding skin with povidone iodine and clearing the slough from the ulcer.

Species Identification And Antibiotic Sensitivity Testing:
The specimen from swab was used for gram stain and culture using nutrient agar, blood agar. Biochemical tests further helped in species identification. Culture sensitivity tests were done using Kirby –Bauer disc diffusion method using the National Committee for Clinical Laboratory standards [6].

Data Analysis:
The data were analyzed using statistical software SPSS 21, excel spreadsheet using mean, standard deviation, frequency, percentage, fischer's exact and chi square test.

3. Results

Table 1: showing distribution of clinical characteristics of limb associated with the ulcer.

Clinical characteristic	Frequency n=30	Percentage
Duration>2 years	15	50%
Erythema	25	83.30%
Limb edema	18	60%
Sensory deficits	29	96.70%

Thirty patients were recruited into the study. Seven (23.3%) were between 30-50years of age, thirteen(43.3%) were between 51-70 years and ten patients(33.3%) were above 70 years. Twenty six(86.7%) out of 30 individuals were males and 4(13.3) were women

Table 2: showing the clinical features with frequency and percentage distribution

Ulcer characteristic	**Frequency n=30**	**Percentage**
Multiple ulcers	21	70%
Base soft tissue	24	80%
Bone	6	20%
Foul odour	20	66.70%
Induration	23	76.70%
Cellulitis	19	63.30%

Twenty two(73.3%) patients had lepromatous leprosy and 8(26.7%) were seen to have borderline leprosy. Autonomic changes such as xerosis, hairloss, change in limb colour, peripheral cold extremities were seen in 23(76.7%), 13(43.3%), 9(30%) and 9(30%) respectively .Nine(30%) patients had associated deformities which was mostly(64%) grade 2 in severity.

Among the individuals with ulcer duration of <2 years, 6 (40%) of patients showed heavy growth of bacteria whereas 13(8.7%) patients with more chronic ulcers showed heavy growth and the difference was statistically significant with a p value at 0.028 showing a bearing of harbouring of more organisms with longer duration of ulcer.

Table 3: showing the isolation of bacteria with percentage of strains growing the organism.

Organism isolated	*Percentage of strains*
Staphylococcus aureus	8 (26.7%)
Pseudomonas aeruginosa	7(23.3%)
Proteus species	5(6.7%)
Corynebacterium & skin commensals	5(16.7%)
Enterococcus	2(6.7%)
E.coli	2(6.7%)
Arcanobacterium harmolyticum.	1(3.3%)

Patients with Lepromatous leprosy ulcers with size>2cms, presence of induration and larger number of palpable nerves showed a statistically higher chance of antibiotic resistance than with patients in the borderline spectrum, smaller ulcers without induration, <2 palpably thickened peripheral nerves with p values <0.05 respectively.

Figure 1: Infected ulcer with slough and granulation tissue.

It was observed that ulcers with a foul odour showed heavier bacterial growth which was statistically significant with a p value of 0.03.

The isolates of Staphylococcus aureus showed maximum sensitivity to amikacin, piperacillin and levofloxacin, 50% strains showed resistance to cefuroxime , amoxicillin and ceftriaxone, the strains were seen to show most resistance to ampicillin(100%), ciprofloxacin, imipenem, meropenem and colistin at 87.5% respectively.

All isolated strains of Pseudomonas showed sensitivity to ceftazidime, piperacillin+tazobactam, imipenem and colistin, intermediate resistance were seen to meropenem and amikacin at 42.9%, gentamycin, ceftriaxone, ciprofloxacin and levofloxacin at 79.4% and 100% resistance was seen to ampicillin, amoxicillin, cefazolin, cefuroxime and cotrimoxazole.

Proteus strains were seen to have less resistance to amoxicillin, ciprofloxacin, levofloxacin, piperacillin-tazobactam, impenem and meropenem.

Corynebacterium strains were least resistant to ampicillin, amoxicillin, cefazolin, cefuroxime, ceftriaxne, piperacillin-tazobactam, and impenem .

E coli and enterococci showed sensitivity to piperacillin, gentamycin, imipenem and meropenem, E coli in addition showed 100% sensitivity to colistin.

Arcanobacterium showed sensitivity to cefazolin and amoxicillin-clavulanic acid.

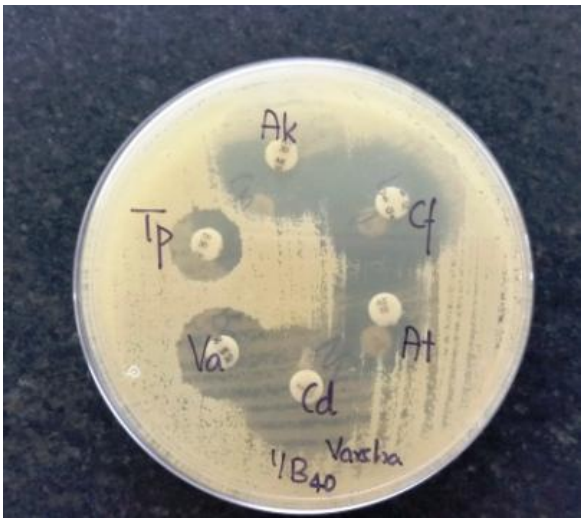

Figure 2: growth of Staphylococcus aureus with antibiotic sensitivity discs and zones of inhibition

4. Discussion

The secondary bacterial infection in the plantar ulcers and antimicrobial profile in leprosy can vary from region to region. Hence, this study is essential to identify the organisms and to deliver appropriate and adequate treatment.

In a study conducted in Ethiopia, the main organism isolated was Proteus spp (30.9%), followed by Escherichia coli (21.0%), Staphylococcus aureus (18.5%) and Pseudomonas aeruginosa (9.9%). Grampositive and Gram-negative bacteria accounted for 24.6% and% 70.5% respectively [3].

In concordance with our study where 22(73.3%) patients showed isolation of more than one organism another Indian study by Manjumdar M et al., showed *S. aureus, E. coil, Proteus sp.* and *Pseudomonas sp.* isolates in 32, 16, 22 and 4 cases respectively and growth of more than one organism in 20 (36%) samples [5].

This can be explained by the difference in sample collection where in one study swabs were utilized for surface collection of specimen whereas in the latter study the sample was obtained from depth of the wound after clearing off the slough and cleaning the surrounding skin to avoid contamination with skin commensal organisms and from the environment which however is still unavoidable in some circumstances. In addition the factor of polymicrobial growth needs to be considered.

This finding is also indicative of regional variations in cultured organisms from plantar ulcers in leprosy thus making it imperative to address the issue of using empirical antibiotics for leprosy ulcers with secondary bacterial infection.

The isolation of Arcanobacterium haemolytium can be explained by similarity in its antigenicity when compared with Mycobacterium leprae. Tolerance develops due to this similarity which causes the organism to thrive on these ulcers [7].

In conclusion, in this study Staphylococcus was the most common organism that was isolated, this needs to be interpreted with caution as this organism is known to have a nosocomial transmission among hospital inmates and had been linked to a higher occurrence of systemic complications such as osteomyelitis [3]. The limitations of the study include the lack of follow up after antibiotics to check for improvement,unaccounting for anaerobic infection and polymicrobial growth patterns. Targetting these factors and conducting the study in a larger population group will add immensely to the outcome of the study.

References

[1] L.C. Rodrigues, D.N.J. Lockwood. " Leprosy now: epidemiology, progress, challenges and research gap," Lancet Infect Dis, pp. 464-470, 2011.
[2] A.W.Sturm, B.Jamil, K.P.W.J.McAdam, K.Z.Khan, S. Parveen, T.Chiang et al. "Microbial Colonizers in Leprosy Skin Ulcers and Intensity of Inflammation," International Journal Of Leprosy, pp. 274-281,1996.
[3] J.M.Ramos, R.P.Tanoira, C.G.García, L.P.Pérez, M.C.Bellón, F. Mateos et al. "Leprosy ulcers in a rural hospital of Ethiopia: pattern of aerobic bacterial isolates and drug sensitivities," Annals of Clinical Microbiology and Antimicrobials, pp. 1-7, 2014.
[4] T.S.E.H.Lema, Y. Woldemanuel , D.Srat ,M. Hunegnaw , A.Baraki ,Y.K. Bede et al." The pattern of bacterial isolates and drug sensitivities of infected ulcers in patients with leprosy in ALERT, Kuyera and Gambo Hospitals, Ethiopia," Lepr Rev, pp. 40-51, 2012.
[5] M.Majumdar, U.Chakraborty, J. Das, J.N.Barbhuiya, G.Mazumdar , N.K.Pal. "Bacteriological study of aerobic isolates from plantar ulcers of paucibacillary leprosy patients," Indian J Dermatol, pp. 5542-5555, 2010.
[6] National Committee for Clinical Laboratory standards. Performance standards for antimicrobial Disk susceptibility Tests approved standard M2-A7. 7th edn., National
[7] Committee for Clinical Laboratory Standards,Wayne, PA, 2000.
[8] R. Laub, J.Delville, C.Cocito. "Immunological relatedness of ribosomes from mycobacteria, nocardial and corynebacteria, and microorganisms in leprosy lesions," Infect Immun, pp. 540-547, 1978.