

# PATHOGENS AND THEIR ANTIBIOTIC SENSITIVITY PATTERNS IN COMMUNITY ACQUIRED BACTERIAL INFECTIONS OF SKIN

Malik Muhammad Haneef,<sup>1</sup> Saman Zia<sup>1</sup>

## ABSTRACT

**Background:** Common infections of the skin are mostly treated empirically depending upon the personal habits or promotional efforts of the pharmaceutical industry. Scientific approach to the treatment of such infections would be either to treat the infections definitively based on the culture and sensitivity results or at least on evidence based treatment. **Objective:** To determine the pathogens involved and their sensitivity patterns in common skin infections in a tertiary care hospital. **Subjects and Methods:** This cross sectional study was conducted in Sheikh Zayed Medical College/Hospital, Rahim Yar Khan, over a period of three months from 1<sup>st</sup> September to 30<sup>th</sup> November, 2013, involving a total of 135 subjects suffering from various common bacterial infections of skin. Their pus or blister fluid samples were taken and cultured in blood agar or Macconkey's agar to determine the pathogens involved and their antibiotic sensitivity patterns by disc method. The data was entered and analyzed by using SPSS version 15. **Results:** The dominant bacteria causing skin infections remain Gram Positive cocci (37.8%) followed by Gram Negative Rods (26.7%). The most sensitive antibiotic was found to be Amikacin (20.7%), followed by sulzone/cefoparazone (19.2%), ciprofloxacin (14%), linezolid (14%) and azithromycin (9.6%) **Conclusion:** From the present study, it is concluded that Gram positive cocci continue to remain the most common pathogen in bacterial infections of the skin, followed by Gram Negative Rods. Most of the pathogens were sensitive to Amikacin followed by sulzone/cefoparazone combination, ciprofloxacin, linezolid, azithromycin, levofloxacin. The results of this study emphasize the need for checking the indigenous sensitivity patterns of the pathogens and accordingly modify our empirical prescription of the antibiotics based on such studies.

**Keywords:** Cutaneous Bacterial infections, Pathogens, Sensitivity, Antibiotics.

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## INTRODUCTION

Pathogens that cause localized infections of the skin like folliculitis, impetigo and cellulitis cannot produce infections if the integumentary system of the skin remains intact.<sup>1</sup> There is not much of a difference between the microbial organisms that cause primary infections of the skin i-e S.Aureus and S.Pyogenes, group A streptococcus in cellulitis and furunculosis<sup>2</sup> and those that cause secondary infections like infected eczema and infected ulcer. As the mainstay of the treatment remains antimicrobial therapy, the treatment of common superficial pyodermas has to be rationalized keeping in view empirical trends, epidemiological prevalence and the changing sensitivity patterns of the causative agents. Empirical prescription of antimicrobial are modified by factors like host characteristics,<sup>2,3,4</sup> demographic data of the patients,<sup>4</sup> cost-effectiveness,<sup>2,5</sup> duration of the therapy and site of

infection,<sup>2,6,7</sup> toxicity and side effects of the drugs.<sup>2,8</sup>

A definitive approach in this regard will be to order a culture sensitivity test, prior to choosing an antimicrobial for the patient, because the drug resistance of the microbes poses a threat to the empirical use of antibiotics<sup>4,9,10,11</sup> thus making adherence to the guidelines for their use difficult.<sup>4,9,12</sup>

Empirical use of the antimicrobials, however, remains and will continue to remain the routine practice but it must be rationalized by the indigenous culture and sensitivity trends.

The objective of this study was to determine the pathogens involved and their patterns of antibiotic sensitivity in community acquired skin infections in a tertiary care hospital and hence make the empirical choice of the antibiotics evidence based.

## SUBJECTS AND METHODS

### Place and duration of study

This cross sectional study was conducted in Sheikh Zayed Medical College/Hospital, Rahim Yar Khan, which is a 760-bedded tertiary care teaching hospital, over a period of three months 1<sup>st</sup> September to 30<sup>th</sup> November 2013.

A total of 135 patients with the following diagnosis were included in the study: Impetigo, Folliculitis/Furunculosis

1. Department of Department of Dermatology, Sheikh Zayed Medical College/Hospital, Rahim Yar Khan. University of Health Sciences Lahore. Pakistan.

**Correspondence:** Dr. Malik Mohammad Haneef, Associate Professor of Dermatology, Sheikh Zayed Medical College, Rahim Yar Khan. Pakistan.

Cellulitis, Infected Ulcers, Infected Eczema Acute paronychia and Erysipelas.

#### Inclusion criteria:

1. Age of the patient between 06 months to 55 years.
2. Patients not suffering from any precipitating/aggravating medical illness such as DM, Liver or Renal disease.

#### Exclusion criteria:

1. Patients who have received any antibiotic treatment for the present condition prior to visit.
2. Immunocompromised patients
3. Patients with HIV, Hepatitis B/C, diabetes mellitus, renal insufficiency and hematological malignancies.
4. Patients on prolonged cytotoxic / immunosuppressive medications.

All subjects were examined thoroughly including a detailed dermatological examination. Following laboratory tests were included in the pretreatment survey: complete blood count, blood chemistry such as (Hepatitis B surface antigen, AntiHCV, E L I S A f o r H u m a n Immunodeficiency Virus and Blood sugar random), complete urine examination and chest radiography.

#### Sample collection:

Samples were collected from the site of infection using aseptic technique. The samples collected were taken on a cotton swab, preserved accordingly and sent to the pathology laboratory for culture and sensitivity. The following samples, where appropriate, were collected: Pus or blister fluid.

#### Culture method and antibiotics used:

Standard laboratory methods/tests were used to identify the pathogens and their growth on Macconkey's agar and Blood agar

Following antibiotics were tested by disc method for sensitivity of th isolates: Amikacin, Sulzone/Cefoperazone, Ciprofloxacin, Linezolid, Azithromycin, Levofloxacin, Cefpodoxime, Amoxicillin, Sparfloxacin and Cefixime.

## RESULTS

In this study, 135 subjects were included. , 48.9%(66) were males and 51.1%(69) females.

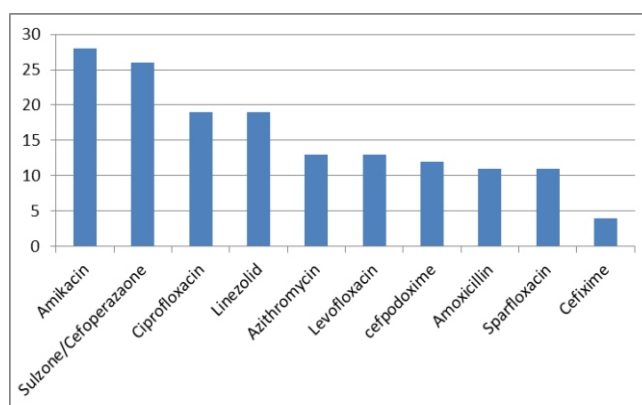
55.6%(75) of the subjects were from rural while 44.4%(60) were from urban areas. Of the total patients included in the study, 34(25%) were diagnosed as infected ulcer, 26(19.3%) as furunculosis, 23(17%) cellulitis, 24(17%) as impetigo, 16(11.9%) as infected eczema whereas acute paronychia and erysipelas were seen in 10 (7.4%) and 2(1.5%) of the subjects respectively.(Table I). Pus was collected from the site of infection in 83%(112) of the patients and blister fluid from 17%(23). Gram positive cocci were cultured from 51(37.8%) of the samples, Gram negative rods were seen in 36 (26.7%). Pseudomonas was seen in 1 (0.7%) of the subject while 47 (34.8%) of the samples did not show any growth.

**Table I: Frequency of conditions in skin infections**

Microorganism	Frequency	%age
Infected ulcers	34	25.2
Furunculosis	26	19.3
Impetigo	24	17.8
Cellulitis	23	17.0
Infected eczema	16	11.9
Acute paronychia	10	7.4
Erysipelas	2	1.5
<b>Total</b>	<b>135</b>	<b>100.0</b>

Results of the antibiotic sensitivity tests showed that 28(20.7%) of the samples were sensitive to Amikacin, 26(19.2%) to sulzone/cefoperazone. 19(14%) were sensitive to both ciprofloxacin and linezolid, 13(9.6%) to azithromycin, 13(9.6%) to levofloxacin, 12(8.9%) to cefpodoxime, 11(8.1%) to amoxicillin, 11(8.1%) to sparfloxacin and 4(3%) to cefixime. (Figure-I)

**Figure I: Sensitivity Pattern of Pathogens to different antimicrobials.**



## DISCUSSION

The infections included in our study constitute majority of the bacterial infections of the skin encountered in the clinics. A great majority of these infections continue to be caused by Gram positive cocci.<sup>13</sup> In our study too, infections in a majority of the patients (37.8%) were caused by Gram Positive Cocci. These mostly constituted *Staphylococcus Aureus* and *Streptococcus* species. One such study conducted in 2002 reported that the infections were caused by both staphylococcal and streptococcal species.<sup>2</sup> Another such study reported the similar results, but also showed that the organisms above the waist were Gram Positive, usually *Staphylococcus epidermidis*, *Corynebacteria*, *S. aureus* and *S. pyogenes* whereas below the waist, these infections were caused both by Gram Positive cocci as well as Gram negative rods.<sup>12</sup> This is partly same as in our study where 26.7%(36 patients) of the infections were caused by Gram Negative Rods. Another study also reported that the majority of the commonly acquired skin infections were caused by *Staphylococci* and *Streptococci* species.<sup>14</sup> The antibiotic sensitivity pattern of the microbes, however, keeps on changing with the passage of time and with the introduction of newer antibiotics e.g. development of MRSA strains.<sup>15</sup> In our study, the majority of the microbes showed sensitivity to Amikacin (19.2%). A fair percentage of them were also sensitive to ciprofloxacin (14%), azithromycin (9.6%) and levofloxacin (8.9%). In this study, comparatively fewer organisms responded to the most commonly prescribed amoxicillin (8.1%), which may suggest the development of resistance of the organisms to it. In a study in Africa,<sup>16</sup> in contrast to our study, 30.7% of the isolates were sensitive to amoxicillin whereas 63% showed sensitivity to amoxicillin and clavulenic acid combination. In the same study 92.4% of the isolates showed sensitivity to gentamicin and suggested that flouroquinolones as compared to pencillins were more effective in treating *Staph aureus*. Another study, conducted in Uganda, showed that 75% of the isolates were resistant to pencillins and 45.3% were resistant to tetracyclines.<sup>17</sup> These results are similar to the

present study. In yet another study,<sup>14</sup> 50% of the organisms showed sensitivity to pencillins. This is in contrast to our study where only 8.1% of the samples were sensitive to the pencillins (amoxicillin).

## CONCLUSION

From the present study, it is concluded that Gram positive cocci continue to remain the most common pathogen in bacterial infections of the skin followed by Gram Negative Rods. Most of the pathogens were sensitive to Amikacin followed by sulzone/cefoparazone combination, ciprofloxacin, linezolid, azithromycin, levofloxacin. The results of our study emphasize the need for frequently checking the indigenous sensitivity patterns of the pathogens and accordingly modify our empirical prescription of the antibiotics based on such studies.

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