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In Vitro Antibiotic Resistance in Bacterial Infected Eczema at Ho Chi Minh City Hospital of Dermatology

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Abstract

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Keywords: Infected eczema; Antibiotics resistance

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BACKGROUND: Infected eczema is one of the most common complications of eczema. The progression and treatment of infected eczema have become more complex and difficult due to the antibiotic resistance of bacteria and the abuse of antibiotics in treatment.

AIM: Our research was conducted with the aim of investigating the severity of *in vitro* antibiotic resistance in patients with bacterially infected eczema at Ho Chi Minh City Hospital of Dermatology.

METHODS: We studied 40 cases of patients, suffering from atopic dermatitis, contact dermatitis, vesicular palmoplantar eczema, with positive results of infected eczema.

RESULTS: *S. aureus* accounted for 82.5%, followed by *S. epidermidis* (15%), *P. aeruginosa* (12.5%), *S. pyogenes* (5%) accounted for a small percentage. *E. coli* (2.5%) and *M. morgani* (2.5%) accounted for the lowest percentage. Both MSSA and MRSA were completely resistant to penicillin. MRSA is completely resistant to penicillin, erythromycin, and cefuroxime, highly resistant to clindamycin (82.35%). Our research showed that *Pseudomonas aeruginosa* was not resistant to a variety of antibiotics. It was completely resistant to tetracycline, trimethoprim/sulfamethoxazole (100%). Most bacteria are highly sensitive to linezolid, vancomycin as other studies in the world shown. There are also rifampicins, pristinamycin. Hence, it's prioritised to be used for only patients with eczema infected with multidrug-resistant bacteria.

CONCLUSION: Penicillin is not recommended for the treatment for infected eczema. Linezolid, vancomycin has a high sensitivity to bacteria including multidrug-resistant bacteria like MRSA.

Introduction

Eczema is a common and recurrent disease making up a large percentage among patients who come for dermatological examination and treatment. The disease greatly affects patients' life quality. In the current context of industrialisation, the percentage of patients tends to increase, creating a burden for the patients, families and whole society.

One of the common reasons why eczema is becoming more prevalent is bacterial superinfection. Particularly with the emergence of multidrug-resistant bacteria at present, it's becoming increasingly difficult

to treat eczema.

Therefore, our research was conducted with the aim of investigating the severity of *in vitro* antibiotic resistance in patients with bacterially infected eczema at Ho Chi Minh City Hospital of Dermatology. With this research, we hope to support the treatment for patients with eczema.

Population and Method

Research design

Our research was designed as a case series

report to investigate the prevalence of in vitro antibiotic resistance in bacterially infected eczema in atopic dermatitis, contact dermatitis, vesicular palmoplantar eczema at Ho Chi Minh City Hospital of Dermatology, from October 2014 to May 2015. Patients presented at least 1 out of 3 clinical features of bacterial superinfection: Fluid leakage and signs of acute inflammation, like swollen, hot, red, painful; Yellow flakes; Pustules combines with positive bacteria culture results. Exclusion criteria included: patients who are not diagnosed to get one of the three types of eczema analyzed through clinical examination; Patients drank or applied antibiotics a month ago; Patients immunodepressed.

Results

In our study there were 40 infected eczema patients with positive bacterial culture results, in which the group aged between 13 and 37 accounted for the highest percentage (35%); Male (65%) accounted for a higher percentage than female (35%); The number of patients living in cities (52.5%) was higher than in rural areas (47.5%); Patients with a history of allergy accounted for 45%. Atopic dermatitis accounted for the highest percentage (70%), in which patients in the acute stage made up a higher percentage (65%). The symptoms of itching (100%) and pain (100%) accounted for the highest percentage. The symptom of fever accounted for the lowest percentage (17.5%). Lesions on limbs accounted for the majority (77.5%), in which the lower limbs accounted for a higher percentage than the upper limbs.

Among transplantable bacteria in the patients with infected eczema, *S. aureus* accounted for 82.5%, followed by *S. epidermidis* (15%), *P. aeruginosa* (12.5), *S. pyogenes* (5%) accounted for a small percentage. *E. coli* (2.5%) and *M. morganii* (2.5%) accounted for the lowest percentage. MRSA occupied 51.52% that was higher than MSSA with the percentage of 48.48%.

MRSA is completely resistant to penicillin, erythromycin, cefuroxime, highly resistant to clindamycin (82.35%), lowly resistant to gentamycin (58.82%), ciprofloxacin (52.91%), chloramphenicol (23.53%), cotrimoxazole (5.88%), no resistance to tetracycline, vancomycin, linezolid, rifampicin, pristinamycin.

MSSA is also completely resistant to penicillin (100%), erythromycin (50%), clindamycin (43.75%), gentamycin (31.25%), ciprofloxacin (12.5%), tetracylin (6.25%), chloramphenicol (6.25%), no resistance to chloramphenicol, ciprofloxacin, vancomycin, linezolid, rifampicin, pristinamycin.

S. epidermidis was also resistant to penicillin

at a high rate (83.33%). MRSA had the highest percentage of resistance to antibiotics in comparison with MSSA and *S. epidermidis*. MRSA, MSSA, *S. epidermidis* was completely non-resistant to vancomycin, linezolid, rifampicin, pristinamycin.

In our study, 5 cases *Pseudomonas aeruginosa* was completely resistant to tetracycline, trimethoprim/sulfamethoxazole (100%), in which only one case was resistant to ceftriaxone (20%). *Pseudomonas aeruginosa* was completely non-resistant to the remaining antibiotics

Discussion

In our study, among transplantable bacteria in patients with infected eczema, *S. aureus* accounted for the highest percentage (82.5%), followed by *S. epidermidis* 15% and *P. aeruginosa* 12.5% and *S. pyogenes* 5%, *E. coli* 2.5%, and *M. morganii* 2.5% (82.5%), accounted for the lowest percentage. This finding is consistent with conclusions of the study of Hon KL1 and et al., [1] were the most common bacterium in eczema from the moderate to severe levels was *S. Aureus*. MRSA rate in our study was higher than other researches on bacterially infected eczema in literature. In our opinions, the purchase and sale of antibiotics are not carefully regulated in Vietnam. According to the survey on the sale of antibiotics in rural and urban drug stores in the Northern provinces done by the University of Pharmacy and Agency of Health Examination and Treatment, most of the antibiotics are sold without prescriptions, 88% in the urban areas and 91% in the rural areas [2].

Moreover, drug sellers and citizens have low awareness of antibiotics and antibiotic resistance. The increased rate of MRSA infection, apart from the hospital-acquired MRSA (HA-MRSA), also includes Community-associated MRSA (CA-MRSA). This CA-MRSA is different from the previous strains of MRSA, which is closely related to health care, age, and rapidly transmits to healthy individuals in the community and frequently causes infectious diseases outside the hospital environment. This explains why MRSA increases rapidly even without the nosocomial infection. We need further research to clarify this issue.

The results showed that both MSSA and MRSA are completely resistant to penicillin (100%). *S. epidermidis* was also highly resistant to penicillin (83.33%). Compared to MRSA, MSSA was sensitive to a variety of antibiotics. In a study by Horvath A et al., [3], all strains of MSSA were highly sensitive to vancomycin, except penicillin, but other antibiotics were still susceptible to MSSA.

MRSA is completely resistant to penicillin, erythromycin, cefuroxime, highly resistant to clindamycin (82.35%), lowly resistant to chloramphenicol, cotrimoxazole, no resistance to vancomycin, linezolid, rifampicin, pristinamycin found. The resistance percentage of gentamycin, erythromycin are similar to other studies in the world. Although the resistance percentages of chloramphenicol, cotrimoxazole and tetracycline in other studies are higher than ours, studies in Ardabil Hospital in Iran [4] showed consistent results. Tang CS et al., [5] conducted a study evaluating the sensibility of *S. aureus* to antibiotics among the children with atopic dermatitis. Results of antibiogram showed that followed by penicillin, *S. aureus* has the highest resistance to erythromycin and clindamycin. Besides penicillin, gentamycin, erythromycin and clindamycin achieved higher percentages of resistance than the remaining antibiotics.

S. epidermidis was resistant to lots of other antibiotics and was rarely resistant to linezolid. According to the study by Khan MM, Faiz A, Ashshi AM [6] *S. epidermidis* was found to have a high antibiotic resistance. The overall drug resistances were ranged from 1.6% to 99.5% for all test drugs, except vancomycin and linezolid that were 100% sensitive. Thus, there is a similarity in our results when *S. epidermidis* mostly showed the resistance to antibiotics and the high resistance to penicillin. Particularly, vancomycin, linezolid was highly sensitive to *S. epidermidis*.

Our research showed that *Pseudomonas aeruginosa* was not resistant to a variety of antibiotics. It was completely resistant to tetracycline, trimethoprim/sulfamethoxazole (100%). In which only one case is resistant to ceftriaxone (20%). In comparison with other studies, our results are different because *P. aeruginosa* has been reported to be resistant to most antibiotics with different percentage of resistance in regions in the world, but have a high resistance to tetracycline, trimethoprim/sulfamethoxazole, which is consistent with the majority of studies. In our study, the bacterially infected eczema was recurrent, but there was no surgical intervention, no use of invasive devices, most of the patients came for examination in the daytime. Therefore, they were less susceptible to infection and the transmission of the drug-resistant gene of *P. aeruginosa* in the hospital. As a result, the drug resistance of *P. aeruginosa* in our study was not as high as other studies [7], [8], [9], [10].

In conclusion, penicillin is not recommended for the treatment for infected eczema. Linezolid, vancomycin has a high sensitivity to bacteria including multidrug-resistant bacteria like MRSA. Hence, it's prioritized to be used for only patients with eczema infected with multidrug-resistant bacteria. The patient with infected eczema and manifestations of popular infection should be appointed for the antibiogram.

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