

Study of aerobic agents that causes secondary infection associated with Atopic Dermatitis (Eczema) in an affected patients admitted to Ramadi Teaching Hospital and private clinics in Ramadi city-western of Iraq.

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ABSTRACT

Background : Atopic dermatitis or Atopic Eczema(AE) is a chronic, inflammatory skin disease which usually develops in early stage of life (childhood). In spite of the intensive investigations, the causes of Atopic Eczema still unclear, but are more likely to be multifactorial in nature. The interaction between environmental factors and genetic-factor seem to play a key role in the progression of disease. This study aimed to determine the prevalence of secondary bacterial infections associated with Eczema and the antibiograms of the most common bacterial isolates toward available commercial antibiotics.

Patients and Methods: Swabs were taken from the affected patients with Eczema. Specimens were examined microscopically as soon as possible (within one hour) by direct Gram-stained smears and indirectly by cultivation aerobically using suitable culture media. Bacterial isolates were diagnosed and confirmed using suitable diagnostic techniques. The antibiotics susceptibility was determined by the Kirby Bauer Disc diffusion method and the results were interpreted according to the Clinical and Laboratory Standards Institute (CLSI) guidelines 2018.

Results: A total of 44 bacterial isolates were isolated from 55 patients affected with Eczema during a period from August to December 2019. *Staphylococcus epidermidis* took the first rank of isolation 18 (40.9%) followed by *Staphylococcus aureus* (14, 31.8%), *Klebsiella pneumonia* (7, 15.9%), *Pseudomonas aeruginosa* (4, 9.1%) and *Proteus spp* (1, 2.3%).

Conclusion: Gram-positive bacteria including *Staphylococcus epidermidis* and *Staphylococcus aureus* appeared to be the most bacterial agent that caused secondary bacterial infection with Eczema.

Keywords: Eczema, Atopic dermatitis, Atopic Eczema .

الخلاصة :

التهاب الجلد التأتبي أو الأكزيما التأتبية (AE) هو مرض جلدي مزمن يتطور عادة في مرحلة مبكرة من الحياة (الطفولة). على الرغم من التحقيقات المكثفة ، لا تزال أسباب الأكزيما التأتبية غير واضحة، ولكن من المرجح أن تكون متعددة العوامل في طبيعتها. يبدو أن التفاعل بين العوامل البيئية والعامل الوراثي يلعب دوراً رئيسياً في تطور المرض. هدفت هذه الدراسة إلى تحديد مدى انتشار العدوى البكتيرية الثانوية المصاحبة للإكزيما والمضادات الحيوية للعزلات البكتيرية الأكثر شيوعاً تجاه المضادات الحيوية التجارية المتاحة.

Introduction

Atopic dermatitis (AE atopic eczema) is a chronic, relapsing, pruritic, inflammatory eczematous eruption that usually begin in early stage of life. The factors responsible of disease remain unclear, but may be due to multifactorial reasons in nature including genetic, socioeconomic, and environmental factors(1). In the last years, the prevalence of Atopic dermatitis is increased and the reason for this is still not clear(2). Some studies were suggest that environmental factors influence the increase in the prevalence of AE. Small family size, increased income, education, migration from rural to urban environments, and increased use of antibiotics may all be associated with the rise in AE(3). Recent reports demonstrated that indoor air pollution, outdoor exposure to allergens and environmental tobacco smoke are considered to be some of the environmental factors(4) (5) . However, the association between serum vitamin D levels or obesity and AE has still been controversial(5). AE is a major global public health problem, affecting 1%-20% of people worldwide. The prevalence of AE in adults is about 1%-3%, and 10%-20%, in children(6)(7). AE is the most common form of eczema in childhood. Since 1960s, the prevalence of AE has increased more than 3-fold(8). The reasons for the rising prevalence are as yet unclear. We suggest that the basis for this increase in prevalence, as well as the causes of AE, involve an interaction between genetic and environmental factors(9). The prevalence of AE is steadily increasing, currently ranging 1%-20% of the general population. AE may be caused by genetic factors and may be influenced by environmental factors. Most AE patients have a chronic, relapsing disease course

characterized by remission and intermittent flares. Therefore, controlling symptoms of chronic AE is still challenging (9).

Materials and Methods

Samples collection, Isolation, and Identification

Sixty skin swabs were collected from patients affected with Eczema from both sexes. Patients were attending to Ramadi Teaching Hospital and Private Clinics of Dermatology in Ramadi City , west of Iraq during the period extended from August to December 2019. Initial identification of the bacterial isolates was done on blood agar, MacConkey agar, mannitol salt agar and cetrimide agar (Oxoid, Himedia). Biochemical identification of isolates was carried out by different biochemical test include catalase and oxidase test, IMVC test, KIA test. The diagnosis was confirmed by using VITEK 2 system.

Antimicrobial susceptibility test

12 commercial common antibiotics including β -Lactam group, aminoglycoside group, monobactam group, and quinolones group had been tested to determine the sensitivity of the two most common bacterial *isolates* by Kirby Bauer disc diffusion method. Suspensions of the isolates (0.5 McFarland turbidity standard) were prepared and inoculated on Mueller Hinton Agar (MHA) plates. Antibiotic discs were applied on the plates. The incubation was done at the temperature 37°C in aerobic conditions for 18-24 hours(10). The results were interpreted according to the Clinical and Laboratory Standards Institute (CLSI) guidelines 2018. The inhibition zones were controlled with the reference *Escherichia coli* ATCC10536 and *Pseudomonas aeruginosa* ATCC154427.

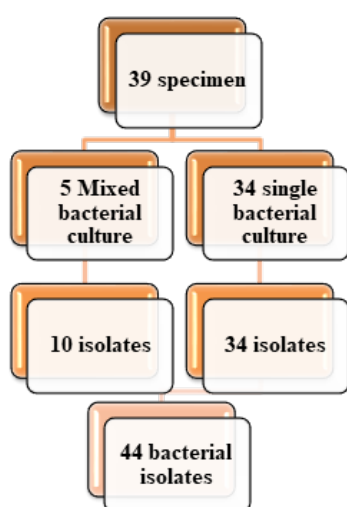
Results

Sex and age

Fifty five skin swabs were collected from patient admitted to Consulting Clinic in Ramadi Teaching Hospital and Dermatology private clinics in Ramadi city. The specimen were randomly collected and examined for diagnosing of the secondary bacterial infection companion to Eczema. A total (n=23, 41.8 %) represented skin swabs from males and (n=32 , 58.2%) skin swabs from females.

Isolation and Identification of bacterial isolates

The preliminary cultural diagnosis was done on blood agar, MacConkey agar, mannitol salt agar and cetrimide agar. The diagnosis was confirmed by using the VITEK 2 system. From a total 55 swabs, thirty nine 39 swab were showing positive bacterial growth and 16 swab showed negative bacterial culture. The total number of bacterial isolates was (44), thirty four (34) of them were isolated as single bacterial isolates, while the rest (5) were showing mixed bacterial isolation (figure 1).



Figure(1): Schematic diagram shows the number of the bacterial isolates obtained from 39 skin swab gave positive bacterial culture.

Table 1 :
pattern of infection in mixed culture.

Isolates	Number of cases	Percentage
S.epidermidis + S.aureus	2	40%
S.epidermidis + Proteus	1	20%
S.epidermidis + K.pneumonia	1	20%
S.epidermidis + P.aeruginosa	1	20%

In this study, gram-positive bacteria were the predominant agents companion to Eczema with rate 72.7%, while gram-negative bacteria caused secondary infection associated with Eczema with low rate 27.3% (figure2). *Staphylococcus epidermidis* took the first rank of isolation (18, 40.9%) followed by *staphylococcus aureus* (14, 31.8%), *Klebsiella pneumonia* (7, 15.9%), *Pseudomonas aeruginosa* (4, 9.1%) and *Proteus* spp (1, 2.3%). Most of isolates were isolated from lesions on hands and legs.

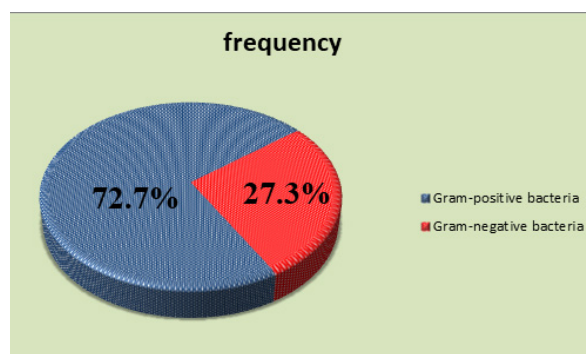


Figure (2):
Rate of Gram-positive & Gram-negative bacteria obtained from the skin swabs.

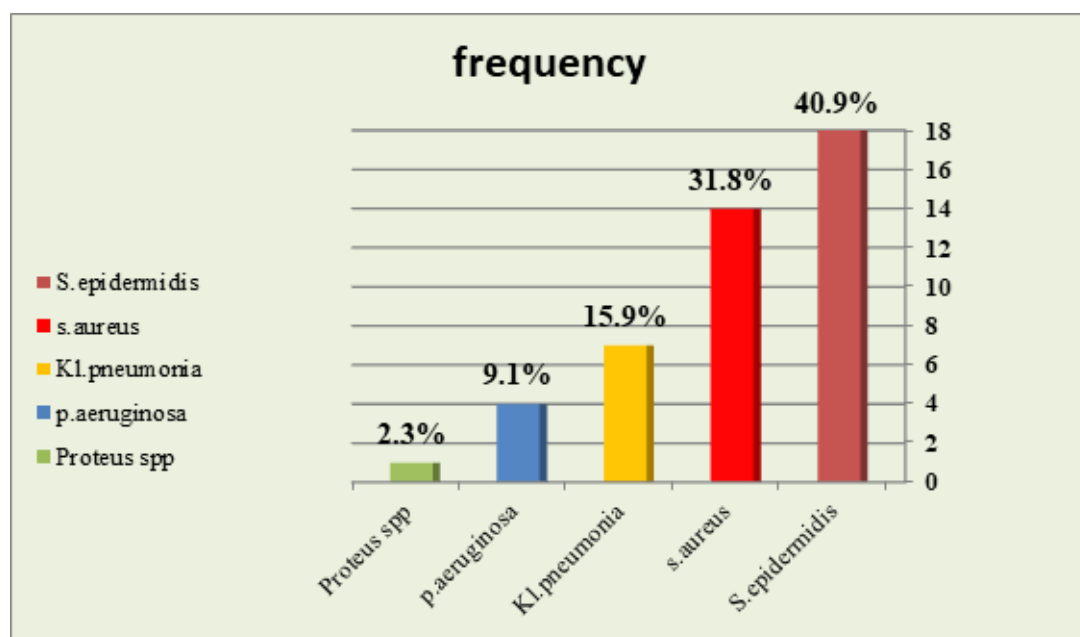


Figure 3: Rate of bacterial species isolated from the skin swabs.

Antibiotic sensitivity :

Staphylococcus epidermidis :

Eighteen isolates of *s.epidermidis* tested to determine their sensitivity to 12 commercial common antibiotics. Imepenem , Amikacin, Amoxicillin/clav, Ciprofloxacin, Gentamicin and Amoxicillin were very effective against *S.epidermidis*. Penicillin and Cefixime showed very low activity against *S.epidermidis* (figure 4).

Staphylococcus aureus:

Fourteen isolates of *Staph. aureus* tested to determine their sensitivity toward 12 antibiotic. The majority of isolates were sensitive to Amikacin, Imepenem, Ciprofloxacin and Gentamicin. On the other hand, Azteronam, Ceftriaxone, Amoxicillin, Amoxicillin/clav, Penicillin, Cefixime, Ceftazidime and Metronidazole (Figure 5).

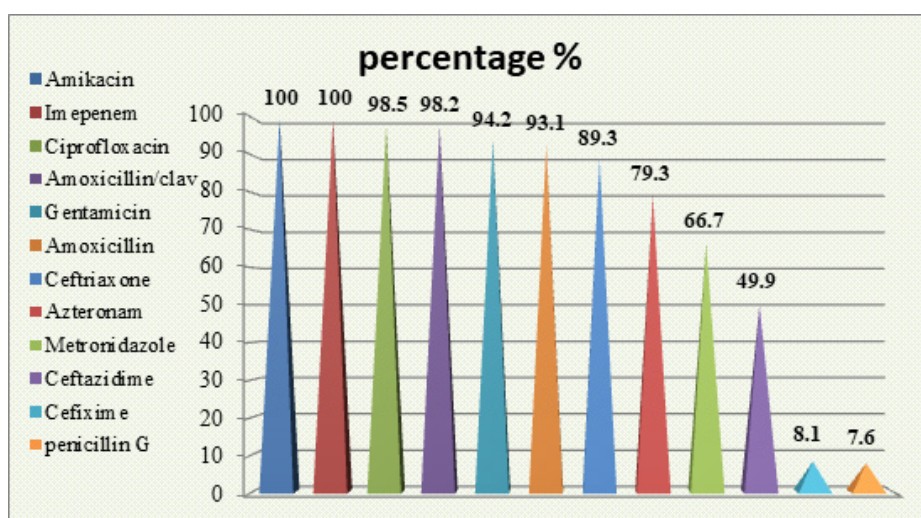


Figure 4: Antibiogram of *S. epidermidis* against 12 antibiotics.

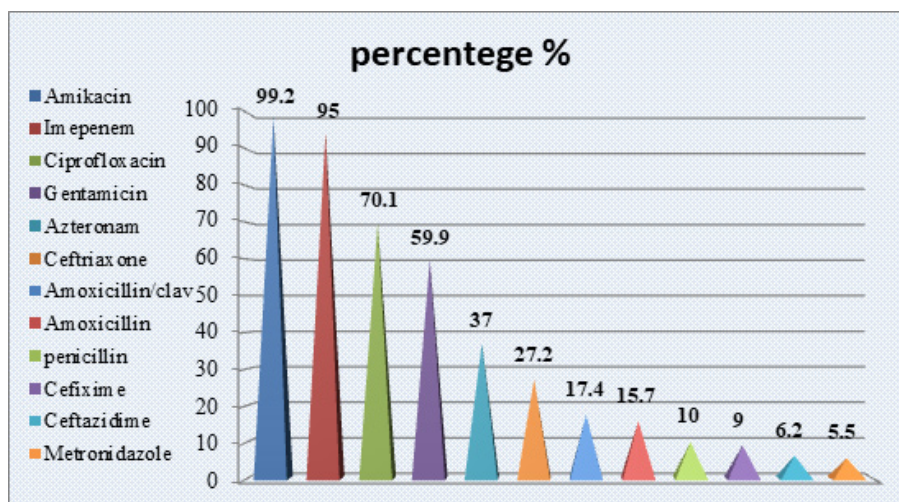


Figure-5 Antibiogram of *S. aureus* against 12 antibiotics.

Discussion :

Clinicians have long since been aware that bacteria and other microorganisms that play a role in the etiology of atopic dermatitis. The result showed high rate of colonization with *S.aureus* and *S.epidermidis* which considered as skin micro biota. The immunological profile of atopy considered as very important factor that favor the colonization by *Staphylococcus aureus* and the other bacteria which are found in most patients with atopic dermatitis, even in the absence of skin lesions. Clinical symptom of impetiginization such as crusting, weeping, periauricular fissuration or small superficial pustules are a clinical indicator of secondary infected dermatitis that the numbers of *S. aureus* may be increased (11). The high rate of cutaneous colonization with Gram positive bacteria especially *S.aureus* and *S.epidermidis* may be due to the defects in innate and an adaptive immunity(12). However, recent research that has focused on the role of *S. aureus* in atopic dermatitis, offers a reversed perspective, by presenting evidence that the underlying pathology of atopic dermatitis, i.e. an

alteration of the skin barrier and inflammation of the upper dermis, depends itself on the presence of an infectious process(11).

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