

Secondary Bacterial Infections Complicating Psoriasis

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ABSTRACT

Background: Psoriasis is a chronic lifelong skin disease most commonly causing erythematous popular and scaly plaques depending on lesion type. Secondary bacterial invaders complicate such lesions. Objectives of this study were to detect the types of aerobic and anaerobic bacterial invaders commonly complicate psoriatic lesions.

Patients and Methods: Swabs were taken from different lesions of different sites of patients with psoriasis. Specimens were examined bacteriologically as soon as possible (within one hour) by direct gram stained smears were examined microscopically and indirectly by cultivation aerobically and anaerobic using suitable culture media and cultivation environments. Bacterial isolates were diagnosed and confirmed using suitable diagnostic techniques.

Results: Psoriasis was found higher in individuals of age group (18-40) years old and majority of them (38; 48.7%) were showing distributed psoriatic lesions whole over the body. *Staphylococcus aureus* took the first rank of isolation 23 (29.5%). *Proteus* spp. and *Staphylococcus epidermidis* became next 11 and 9 for each respectively. Other bacterial isolates were showed lower rate of isolation like *Pseudomonas aeruginosa*, *Bacillus* spp. Enteric bacteria were primarily isolated from children. Also, *E. coli* and *Enterococcus fecalis*. Anaerobic bacteria represented by *Propionobacter* spp., *Fusarium* spp. and *Clostridium perfringens* were isolated within few numbers (3, 2, 1) for each respectively.

Conclusion: Secondary bacterial infections of different types complicate psoriatic lesions on different sites of the body, so we recommended the follow up of perfect sanitation and disinfection with suitable antimicrobial regimen to reduce infection hazards.

Keywords: Psoriasis, Bacteria, Infected psoriasis

INTRODUCTION

Psoriasis is a chronic lifelong skin disease most commonly causing erythematous popular and scaly plaques depending on lesion type, Gudionsson, E. J. *et al.* (2003); and Guo-li, *et al.* 2009. Psoriasis is a chronic immunologically based inflammatory disease of the skin and joint, which has been estimated to affect 1-3% of population. The exact cause is unknown, however researches believe heredity, environment and immune system also play a role in psoriasis Gudionsson, E. J. *et al.* (2003). and Hwerta, C. *et al.* (2007).

Several overlapping clinical types of disease have been identified but the chronic

plaque form (*Psoriasis vulgaris*) is the most common Gudionsson, E. J. *et al.* (2003). and Mallbris, L. *et al.* (2005).

Psoriasis is a common T-lymphocyte mediated inflammatory skin disease believed to have an autoimmune basis.

The link between psoriasis and infection is probably explained by the superantigen theory, that superantigens are the products of bacteria, viruses, or fungi, which can bypass normal immunological pathway and cause powerful stimulation to the immune system. Studies imply that a protein called the M protein carried by *S. pyogenes* acts as superantigen in provoking psoriasis, Beaker, B.S. *et al.* (2006).

Secondary infected dermatosis develops when a bacterium invades compromised skin such as psoriasis, Brook, I. *et al.*2002. This study aimed to detect the types of aerobic and anaerobic bacterial invaders commonly complicate psoriatic lesions.

Patients and Methods

Seventy eight (78) patients with different types of psoriasis from both sexes and different residence sites of Ramadi District, West of Iraq, were included in this study. Patients were attending Ramadi General Hospital, Clinic of Skin and Venereal Diseases and Private Clinics of Dermatology in Ramadi City during the period extended from January to July 2009.

Patients were examined by Senior Dermatologist for the diagnosis and follow up of their treatment. Information about each patient was reported using questionnaire for each one. Bacteriological swabs were taken aseptically from different lesions and sites of psoriasis. Specimens were processed as soon as possible for bacteriological investigation through direct Gram stained smears and indirect examination by cultivation on blood agar, chocolate agar and MacConkey agar and incubated at 37 °C for 24-48 hrs aerobically and anaerobically using Gas pack anaerobic Gas sheets (Oxoid).

Special culture media and techniques were employed for the diagnosis of some bacterial isolates on need. Bacterial isolates diagnosis was confirmed using morphological and culture characters following (Washington *et al*⁷).

Data were reported and analyzed using SPSS Program.

RESULTS

Age, sex and residence

Psoriasis was found higher in individuals of age group (18-40) years old (49, 62.8%) and both sexes (28 males and 21 females) (Table1). Significant difference ($P < 0.05$) was found between males and females in group (18-40) and (41-50) years old patients. Urban males and rural females were showing higher rate of psoriasis in age group (1-17) year (45.5%), 36.5%) for each respectively (Table1). All patients within age group > 50 years from both sexes were rural. Regarding site of psoriasis, majority of patients (38, 48.7%) were showing distributed psoriasis lesion whole over the body followed by hands and legs (26, 33.4%) (Table 2).

Table 1: Psoriatic patients regarding age, sex, and residence.

| Age group (Year) | Urban | | Rural | | Total |
|------------------|-------------|------------|-------------|-------------|-------------|
| | Male | Female | Male | Female | |
| 1-17 | 5 45.5% | 1 9.0% | 1 9% | 4 36.5% | 11 14.1% |
| 18-40 | 14 28.6% | 10 20% | 14 28.6% | 11 22.4% | 49 62.8% |
| 41-50 | 2 18.2% | 1 9.1% | 6 54.5% | 2 18.2% | 11 14.1% |
| >50 | 0 0 | 0 0 | 4 57.2% | 3 42.8% | 7 9% |
| Total | 21 27 | 12 15.4 | 25 32% | 20 25.6% | 78 100% |

Table 2: Numbers of patients regarding psoriasis anatomical sites.

| Age group (Year) | Site of the lesion | | | | Total |
|------------------|--------------------|-----------|----------------|-------------------|------------|
| | Head and Neck | Trunk | Hands and Legs | Whole of the Body | |
| 1-17 | 0 | 0 | 2 | 11 | 13 |
| 18-40 | 6 | 5 | 18 | 18 | 47 |
| 41-50 | 1 | 0 | 5 | 4 | 10 |
| >50 | 2 | 0 | 1 | 5 | 8 |
| Total | 9 11.5% | 5 6.4% | 26 33.4% | 38 48.7% | 78 100% |

Bacterial Isolation

All specimens from patients were showing positive bacterial growth. The total number of bacterial isolates was (95), Seventy eight (78) of them were isolated as single bacterial isolates, while the rest (17) were showing mixed bacterial isolation (Tables3 &4).

Staphylococcus aureus took the first rank of isolation (23, 29.5%) and most of isolates were isolated from lesions on hands and legs (Table-3). *Proteus* species. and *Staphylococcus epidermidis* became next (11 and 9) for each respectively. *Pseudomonas aeruginosa*, *Bacillus* species. (non anthrax) and *E.coli* were showing equal rate of isolation, (6) for each.

Other bacterial isolates were showing lower rate of isolation (Table 3).

Anaerobic bacterial types represented by *Propionobacter* spp. *Fusarium* and *Clostridium perfringens* were showing low number of isolation, (3, 2, 1) for each respectively (Table 3).

Regarding mixed bacterial isolation, *Staphylococcus aureus* showed the highest rate of mixed isolation (7,53.8%) followed by *E.coli* and *Staphylococcus epidermidis*, (4) isolates for each (Table 4).

Enteric bacterial types were mostly isolated from hands, legs and whole of the body from children within age group (1-17) years old patients.

Table 3: Single bacterial isolates regarding psoriasis sites.

| Bacterial Isolates | Head and Neck | Trunk | Hands and Legs | Whole of the Body | Total No. (%) |
|---|---------------|-------|----------------|-------------------|---------------|
| <i>Staphylococcus aureus</i> | 6 | 2 | 9 | 6 | 23 (29.5) |
| <i>Staphylococcus epidermidis</i> | 2 | 1 | 4 | 2 | 9 (11.5) |
| <i>Bacillus</i> spp. | 1 | 0 | 3 | 1 | 5 (6.4) |
| <i>Proteus</i> spp. | 2 | 1 | 5 | 2 | 10 (12.7) |
| <i>E. coli</i> | 1 | 0 | 4 | 1 | 6 (7.7) |
| <i>Pseudomonas aeruginosa</i> | 1 | 0 | 3 | 2 | 6 (7.7) |
| <i>Streptococcus pyogenes</i> | 1 | 2 | 3 | 0 | 6 (7.7) |
| <i>Corynebacterium</i> (non diphtheria) | 1 | 0 | 1 | 2 | 4 (5.1) |
| <i>Enterococcus faecalis</i> | 0 | 0 | 2 | 1 | 3 (3.9) |
| <i>Propionobacter</i> spp. | 1 | 0 | 2 | 0 | 3 (3.9) |
| <i>Fusarium</i> spp. | 1 | 0 | 1 | 0 | 2 (2.6) |
| <i>Clostridium perfringens</i> | 0 | 1 | 0 | 0 | 1 (1.3) |
| Total | 17 | 7 | 37 | 17 | 78 (100) |

Table 4: Mixed bacterial isolates regarding anatomical sites of psoriasis.

| Bacterial Isolates | Head and Neck | Trunk | Hands and Legs | Whole of the Body | Total |
|---|---------------|-------|----------------|-------------------|-------|
| <i>Staphylococcus aureus</i> + <i>Bacillus</i> spp. | 1 | 0 | 1 | 0 | 2 |
| <i>E. coli</i> + <i>Staphylococcus aureus</i> | 0 | 1 | 2 | 1 | 4 |
| <i>Pseudomonas aeruginosa</i> + <i>Proteus</i> spp. | 1 | 0 | 1 | 0 | 2 |
| <i>Bacillus</i> spp. + <i>Staphylococcus aureus</i> | 1 | 0 | 1 | 2 | 4 |
| <i>Staphylococcus aureus</i> + <i>Fusarium</i> spp. | 0 | 0 | 1 | 0 | 1 |
| Total | 3 | 1 | 6 | 3 | 13 |

DISCUSSION

Higher psoriasis rate (62.8%) in patients within age group (18-40) years old was in accordance with the findings of, (Hwerta, C. *et al.* 2007 and Zieve, d. *et al.* 2008).

These findings disagree with the findings of ⁽¹⁾ who found that psoriasis particularly psoriasis vulgaris was higher and common in individuals within (40-50) years old.

Discrepancy of results in contrast to other investigators might be due to difference of patient samples and type of psoriasis, (guttate type) mostly mediated early with *S. pyogenes* recurrent tonsillitis which is most common infection in children who showed more guttate psoriasis type, Guo-li *et al.* (2009) and Owen, C., *et al.* (2001). Guttate psoriasis type is mostly mediated by *S. pyogenes* superantigen, Gudionsson, E. J. *et al.* (2003).

Residence (urban and rural) was not affecting psoriasis rate particularly patients of higher rate within age group (18-40) years old, this might be due to the nature of psoriasis, which is primarily autoimmune triggered disease, Gudionsson, E. J. *et al.* 2003; Beaker, B.S. *et al.* 2006 and National Psoriasis Foundation NPF National Psoriasis Foundation NPF (2010). This immune reaction leads to infiltration of inflammatory cells and increased proliferation turnover of keratinocytes, Mallbris, L. *et al.* All patients above 50 years old were rural, this might be due to the small sample size in this study which affects the distribution of patients regarding residence and socioeconomic status. Socioeconomic status of patients affects indirectly on the degree of effectiveness of disease via affecting immune status, sanitation and treatment. Age also affects psoriasis incidence through immune system modulation, aged individuals show decrease in CD8 T-cells and more shift to autoimmunity through break of autotolerance, National

Psoriasis Foundation NPF (2010) and Rosen, S.F. 2007.

In all age groups (18-40), (41-50) and (>50) years old, males were showing more psoriasis rate, this was in accordance with Hwerta *et al.* 2007.

Bacterial Isolation

Regarding bacterial isolation from psoriatic patient lesions of different sites, *Staphylococcus aureus* was predominant isolated bacteria, this was in agreement with previous referees, Gudionsson, E. J. *et al.* 2003; Brook, I. *et al.* 2002 and Abdullah, M. *et al.* 2007. *Staphylococcus aureus* was the commonest organism causing secondary infections of skin lesions, this might be attributed to the antiphagocytic effect of protein A of this organism, as well as the inhibitory effect of serum exuding from denuded skin on linolenic acid an essential fatty acid normally present on the intact skin inhibits *Staphylococcus aureus* colonization, Gudionsson, E. J. *et al.* 2003 and Brook, G.F. *et al.* 2007.

Similarity in most of bacterial infections for psoriatic lesions and other dermatological affections like atopic dermatitis, eczema and scabies, Brook, I. *et al.* 2002; Rosen, S.F. 2007 and Lafi, S.A.; *et al.* 2008. Isolation of opportunistic pathogens from psoriatic lesions like *Bacillus* species. (non anthrax type) (*Anthraxoid* spp.) and *Staphylococcus epidermidis* was due to the reduced local defense factors in the lesion due to local and systemic immunosuppressant drugs like cytotoxic drugs and cortisones used for the treatment of psoriasis, Zieve, d. *et al.* 2008 and National Psoriasis Foundation NPF, 2010.

In addition to that, antiphagocytic activity of certain factors released by actual pathogens previously invade psoriatic lesion like *Staphylococcus aureus* protein A, such *Staphylococcus aureus* predispose invasion by opportunistic pathogens, Gudionsson, E. J. *et al.* 2003 and Lafi, S.A. 2008.

Isolation of anaerobic bacteria was different from that reported by previous researchers, Gudionsson, E. J. *et al.* 2003; Brook, I. 2002 and Abdullah, M. *et al.* 2007, lower rate of isolation of *Fusarium*, *Propionobacter* and *Clostridium* spp. was reported in this study, in addition to that *Bacteroides* and *Prevotella* were not isolated from specimens of this study.

This difference might be attributed to many factors affecting residence and transient skin flora like patient rate and residence, habits, socioeconomic status, as well as other patients personal status and environmental factors, (Proceeding of National Academy of Science 2007).

Enteric bacterial species like *E. coli*, *Enterococcus fecalis*, *Proteus* spp. were isolated primarily from children particularly lesions from hands, legs and whole of the body, this was in accordance with the findings of (Brook, I. *et al.* 2002; Abdulla, M. *et al.* 2007). This was probably ought to the low personal care and sanitation criteria of patients particularly children.

The recovery of multiple organisms from psoriatic lesions of patients illustrated the polymicrobial nature of secondarily infected psoriasis and the potential for bacterial synergy between different microbial isolates, Brook, I. *et al.* 2002; Washington, W. J. *et al.* 2006 and Harry, J. *et al.* 2008.

We concluded that psoriatic lesions of different types and sites of the body undergo contamination and bacterial infections and probably with other organisms like fungi, viruses, etc. So we recommend the follow up of perfect sanitation and disinfection of the lesion with suitable antimicrobial regimen to prevent complications and invader disposal.

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ARABIC SUMMARY

الأخماج الجرثومية الثانوية المعقدة لداء الصدفية

- شهاب أحمد لافي¹ - عبد الله صالح حسن² - منتهى مداح الألوسي¹
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الصدفية هي مرض جلدي مزمن مدى الحياة غالباً يسبب صفيحات قشرية تعتمد على نوع الإصابة البكتريا تغزو مثل هذه الإصابات الجلدية، مما يجعلها أكثر تعقيداً .
 أهداف هذه الدراسة هي كشف أنواع الجراثيم الهوائية واللاهوائية الأكثر شيوعاً بإصابة آفات الصدفية.
المرضى وطرائق العمل
 أخذت مسحات من إصابات مختلفة من مناطق مختلفة على جسم المرضى . فحصت العينات بالسرعة الممكنة (خلال ساعة) باستخدام مسحات مصبوغة بصبغة كرام تفحص تحت المجهر بشكل مباشر وباستنابات المسحات على أوساط زرعيه مناسبة. شخّصت العزلات الجرثومية باستخدام تقانات تشخيصية مناسبة.
النتائج
 لوحظ أعلى نسبة إصابة بداء الصدفية في المرضى ضمن الفئة العمرية (18-40) سنة وكانت نسبة الإصابة 48.7% وكان أغلبهم مصاب بداء الصدفية المنتشر في معظم أماكن الجسم.
 جاءت المكورات العنقودية الذهبية بالمرتبة الأولى وكانت نسبة العزل (29.5%) . جاءت بعدها المتقلبات والمكورات العنقودية البيضاء 11 و 9 لكل منها على التوالي . جاءت عزلات لبكتريا أخرى بنسب أقل مثل الزوائف الزنجارية والعصيات.
 عزلت الجراثيم المعوية مثل الاشريكية القولونية و المكورات المعوية بنسبة أعلى في الأطفال.
 عزلت الجراثيم اللاهوائية بنسب أقل من غيرها وكانت نسبة عزل البروبيونوبكتريا والفيوزيريوم والمطثيات البر فرنجية 3 و 2 و 1 على التوالي.
الخاتمة
 الاخماج البكتيرية الثانوية المختلفة تعقد آفات الصدفية في مختلف الأماكن وعليه نوصي بإتباع وسائل التطهير واستخدام مضادات الجراثيم لتنشيط مخاطر الخمج.