

Pyoderma among Hajj Pilgrims in Makkah

Mohamad I. Fatani, MD, KFUF, Syed Z. Bukhari, MCPS, MPhil, Khalid A. Al-Afif, MD, KFUF,
Talal M. Karima, MD, KFUF, Magdy R. Abdulghani, MD, KFUF, Mohamad I. Al-Kaltham, MD, KFUF.

ABSTRACT

Objective: Bacterial skin infections have been considered as a possible health problem of the Hajj pilgrims. Significant increase in the rate of resistance to commonly used antibiotics against gram positive organisms has been observed. The present study was planned to obtain the microbiological profile of bacterial skin infections and their susceptibility to antimicrobials.

Methods: Pyodermas were investigated clinically and bacteriologically by a prospective study conducted on patients attending the dermatology clinic at the King Faisal Hospital, Makkah, Kingdom of Saudi Arabia during 2 Hajj periods (2000 - 2001).

Results: Of a total of 80 pyoderma patients, 52.5% were primary and 47.5% secondary. The leading cause of primary pyoderma was found to be impetigo in 28.8% cases, and of secondary pyoderma was infected eczema in 18.8% cases. Positive cultures were found in 87.5% cases. The organisms responsible for primary pyoderma were:

Staphylococcus aureus (65.6%), *Streptococcus pyogenes* (28.1%) or both (6.4%) while in secondary pyodermas were: *Staphylococcus aureus* (44.7%), *Streptococcus pyogenes* (15.8%), or both (18.4%), and gram negative bacilli (21.1%). The resistant pattern of antimicrobials against *Staphylococcus aureus* was as follows: penicillin 80.85%, tetracycline 10.6%, gentamicin 6.4%, erythromycin 4.3% and cotrimaxazole 4.3%. Oxacillin and cephalothin were found least resistant (2.1%).

Conclusion: Pyoderma appeared as one of the common health hazard of our Hajj pilgrims. Penicillin and tetracycline are found ineffective in treating skin infections caused by *Staphylococcus aureus* while oxacillin is recommended as first line of treatment.

Keywords: Pyoderma, Hajj, antimicrobials.

Saudi Med J 2002; Vol. 23 (7): 782-785

Makkah is the place which captures the hearts of billions of Muslims from all over the world. It is also the destination of millions of pilgrims and visitors to the holiest spot on earth. The annual pilgrimage to Makkah is considered the most significant manifestation of Islamic unity. It is an obligation for those who are physically and financially able to perform it at least once in a life time. During the previous 2 years (Hajj 2000 and Hajj 2001) more than 4 million pilgrims performed Hajj, of which 2,630,992 were from abroad and the rest were the local residents of the Kingdom of Saudi Arabia (KSA). The maximum temperature during

Hajj season ranged between 35°C to 37°C. Due to huge gathering and hot weather, the bacterial skin infections among the pilgrims are one of the common health problems. The objective of this study was to analyze the etiology of primary and secondary pyoderma as well as to determine the antimicrobial susceptibility pattern of microorganism responsible. Knowledge of the causative pathogens of pyodermas facilitates the planning for provision of health needs.

Methods. This prospective study was carried out at the King Faisal Hospital (KFH), Makkah,

From the Department of Dermatology (Fatani, Al-Afif), King Faisal Hospital, Department of Microbiology (Bukhari), Department of Internal Medicine (Karima), Hera General Hospital, Makkah, Department of Dermatology (Abdulghani), Armed Forces Hospital, Jeddah, and the Department of Dermatology (Al-Kaltham), Dammam Central Hospital, Dammam, Kingdom of Saudi Arabia.

Received 25th November 2001. Accepted for publication in final form 11th March 2002.

Address correspondence and reprint request to: Dr. Mohamad I. Fatani, Consultant Dermatologist, Department of Dermatology and Microbiology, King Faisal Hospital, PO Box 5970, Makkah, Kingdom of Saudi Arabia. Tel. +966 (2) 5566411 Ext. 2221. Fax. +966 (2) 5200333. E-mail: m_fatani@yahoo.com

Kingdom of Saudi Arabia during the 2 Hajj periods of one-month duration each year (between February 2000 and March 2001). All new patients attending the dermatology clinic were included in this study. The patients were examined by Dermatology Specialists and Consultants. The personal and clinical data pertaining to each patient were recorded. Specimens from skin lesions of suspected bacterial infections were collected by sterile swabs and sent to Department of Microbiology for culture and sensitivity. Swabs were inoculated on sheep blood agar and MacConky agar and incubated at 35°C aerobically for 24-48 hours. Identification and confirmation of the organisms were carried out by the standard microbiological methods.¹ Antimicrobial susceptibility was determined by the Kirby-Bauer disc diffusion method on Mueller-Hinton agar using aerobic incubations. Methicillin susceptibility was determined with oxacillin discs. Interpretation of zones of inhibition was determined in accordance with the interpretive standards outlined by the National Committee for Clinical Laboratory Standards.²

Results. The total number of patients attended the outpatient department during the study period was 42,549 patients. Dermatology patients were 1441, which represents 3.4% of the total patients seen. This study includes 80 (5.6%) new patients who came to our clinic for pyodermas. Among them, 51 (63.7%) were male and 29 (36.2%) were female with a ratio of 1.8:1. Age wise: 58 (72.5%) were adults (>13 years) and 22 (27.5%) were children (<13 years). By nationalities, Saudis constitute 46.3%, Asians 26.3%, Arabs 26.2%, and Europeans 1.2%. Twenty eight patients (35%) fall in age group 0-19 and 25 patients (31%) in 40-59 years. Out of total Arabs, 66% were between the age group of 40-59 years and among Asians 43% were between the age group of 0-19 years. Primary pyoderma was seen in 42 (52.5%) cases while secondary in 38 (47.5%) cases. Primary pyoderma was noted in 25 adults (31.2%) and in 17 children (21.2%) and secondary pyoderma in 33 adult (41.2%) and in 5 children (6.2%). Primary and secondary pyodermas cases among Saudis were 22 and 15, in Arabs other than Saudis were, 9 and 12, and in Asians, 11 and 10 respectively. Primary pyoderma was seen more in Asians (26.2%) than in Arabs (21.4%) while secondary pyoderma was seen more in Arabs (31.6%) than Asians (26.3%). Clinical subtypes of primary pyoderma were as follows: impetigo 23 (28.8%), carbuncle 4 (5%), furuncle 12 (15%), folliculitis 3 (3.8%) and secondary pyoderma were: eczema 15 (18.8%), intertrigo 11 (13.8%), *Leishmaniasis* 2 (2.5%), tinea pedis 8 (10%) and skin erosion 2 (2.5%). Out of 80 pyoderma cases, bacterial cultures were positive in 70 (87.5%) and negative in 10 (12.5%). Gram positive cocci were

isolated from 62 cases which includes *Staphylococcus aureus* (*Staph. aureus*) 38, *Streptococcus pyogenes* (*Strep. pyogenes*) 15, and both 9, and gram negative bacilli (GNB) from 8 cases which includes *Pseudomonas aeruginosa* (*Pseu. aeruginosa*) 5, *Escherichia coli* (*E. coli*) one, *Proteus* one, and *Klebsiella* one. The distribution of microorganisms in relation to the clinical diagnosis of primary pyodermas was as follows: impetigo (*Staph. aureus* 15, *Strep. pyogenes* 5, both *Staph. aureus* and *Strep. pyogenes* 2), carbuncle (*Staph. aureus* 3, *Strep. pyogenes* one), furuncle (*Staph. aureus* 2, *Strep. pyogenes* 3), folliculitis (*Staph. aureus* one). While the distribution for secondary pyodermas was as follows: eczema (*Staph. aureus* 8, both *Staph. aureus* and *Strep. pyogenes* 6 and GNB one), intertrigo (*Staph. aureus* 5, *Strep. pyogenes* 5, and GNB one), *Leishmania* (*Staph. aureus* one, and GNB one), tinea pedis (*Staph. aureus* 2, both *Staph. aureus* and *Strep. pyogenes* one, and GNB 5), and skin erosion (*Staph. aureus* one, and *Strep. pyogenes* one). Antimicrobial susceptibility testing was carried out on all isolates but the sensitivity pattern of 3 most common organisms isolated, *Staph. aureus*, *Strep. pyogenes* and *Pseu. aeruginosa* is given below. Of the 47 *Staph. aureus* strains which were tested against 8 antibiotics, the sensitivity (in percentage) was as follows: penicillin 19.1%, erythromycin 95.7%, cephalothin 97.9%, trimethoprim/sulfamethaxazole 95.7%, clindamycin 95.7%, tetracycline 87.2%, gentamicin 93.6% and oxacillin 97.9%. Only one isolate of *Staph. aureus* was resistant to oxacillin which was considered as methicillin resistant *Staph. aureus* (MRSA) and was sensitive to vancomycin. All *Strep. pyogenes* strains (24 isolates) were sensitive to penicillin and oxacillin. *Pseudomonas aeruginosa* (5 isolates) were susceptible to 7 antibiotics tested, gentamicin, tobramycin, amikacin, piperacillin, ciprofloxacin, imipenem and ceftazadime.

Discussion. Knowledge of common skin infections in Makkah, KSA especially during Hajj period may help the clinicians and the dermatologists to diagnose and manage the cases of bacterial infections. A huge gathering of more than 2 million pilgrims and hot weather can influence the pattern of bacterial skin infections. During Hajj period, no referral letter is required for local residents and pilgrims to get medical care from our hospital. As the study was limited to KFH, Makkah, it may not entirely reflect the true percentage of pyoderma among the Hajj pilgrim. On literature review, we could not find the study on pyodermas during Hajj period at Makkah, therefore we compared our results with the studies conducted in other parts of the world including KSA. The magnitude of pyoderma in our study was 5.6% which is more than other studies conducted in KSA (Asir)³ and gulf area (United Arab

Emirates)⁴ and comparable to studies conducted in Bamako, Mali⁵ and Tanzania.⁶ The low incidence of pyoderma in Asir may be due to the cold climate of this area and in Gulf region probably due to high socioeconomic status and better environmental conditions. Primary pyoderma accounted for 52.5% of the cases, while the remaining cases due to secondary pyoderma which is comparable to other studies.^{7,8} A high proportion of secondary pyoderma 56.9% was found in our adult patients while in children primary pyoderma was more than 77.3%. Similar observation was documented in another study.⁹ The leading cause of primary pyoderma was found to be impetigo predominantly noted in children as in other reviews.^{8,9} The most common organism responsible for impetigo was *Staph. aureus* followed by *Strep. pyogenes* similar to other studies.^{10,11} Secondary pyoderma was more common in adults than primary which is comparable to another study.⁸ The reasons for high number of secondary pyoderma in adults during Hajj season may be due to exposure of pilgrims to hot climate, sweating, over crowding, trauma, walking long distances within few days to perform their Hajj. Many reports of association between pyoderma with hot weather and over crowding were found.^{8,12-14} Infected intertrigo occurred in 29% of secondary pyoderma, this may be due to constant friction, sweating and occlusion which lead to bacterial colonization as reported in other studies.^{15,16} Tinea pedis tend to be infected with gram negative organisms particularly *Pseu. aeruginosa*.¹⁷ The predominant organism responsible for secondary pyoderma was *Staph. aureus* followed by *Strep. pyogenes* and GNB. *Pseudomonas aeruginosa* were the most common GNB followed by *E. coli*, *Klebsiella* and *Proteus* similar to other studies.^{7,9} It revealed that GNB is more likely to be isolated from secondary pyodermas. It is interesting to find that secondary pyoderma was more common in Arabs including Saudis as compared to the Asians, this may be due to over weight (authors personal observation) of the former group in which intertrigo and infected tinea pedis were increased. Further study is needed to prove this variable. From our total *Staph. aureus* isolates, penicillin was found the most resistant antibiotic followed by tetracycline comparable to other studies,^{7,8} therefore, these 2 drugs are not useful to treat *staphylococcus* skin infections. According to the results, oxacillin should be the drug of choice, with cephalothin and clindamycin equally effective. Erythromycin is the 2nd alternative due to low price as the majority of pilgrims belong to the low socioeconomic group and secondly it was found most effective against *Strep. pyogenes*. Although the number of MRSA isolates in our study were less as compared to another similar study,⁹ but its emergence in out patient study is more significant and warrants further studies. This emergence is probably due to

indiscriminate and inappropriate prescription of antibiotics in the general population. Penicillin, erythromycin and cephalothin showed excellent activity against *Strep. pyogenes* similar to another study.¹⁸ Aminoglycosides (gentamicin, amikacin, tobramycin), ciprofloxacin and ceftazidime were found highly effective against *Pseu. aeruginosa*. Other GNB, *E. coli* and *Proteus* were sensitive to first and 2nd generation cephalosporin (cephalothin and ceftriaxone) and gentamicin.

In conclusion, antibiotic resistance of bacteria is increasing worldwide and may lead to a significant public health problem. Emergence of community acquired MRSA from skin infections in the outpatient department is an alarm to implement the strict appropriate antibiotic policy. Penicillin and tetracycline are found ineffective in treating skin infections caused by *Staph. aureus* while oxacillin is recommended as first line of treatment. Oxacillin and penicillin are found equally effective for *Strep. pyogenes* infections, cephalosporin is the 2nd alternative as it also covers the gram negative organisms. Local application of gentamicin and oral use of ciprofloxacin is recommended in secondary pyodermas caused by *Pseu. aeruginosa*.

References

- Fallon RJ, Young H. Staphylococcus: cluster-forming Gram positive cocci. In: Collee JG, Fraser AG, Marmion BP, Simmon A, editors. Mackie and McCartney Practical Medical Microbiology. 14th ed. New York (NY): Churchill Livingstone; 1996. p. 245-281.
- National Committee for Clinical Laboratory Standards (NCCLS). Performance standards for antimicrobial disk susceptibility test. 10th Informational Supplement NCCLS document M100-S10. Villanova (PA): NCCLS; 2000. p. 20-38.
- Bahamdan KA, Egere JU, Khare AK, Tallab T, Ibrahim K, Mourad MM. The pattern of skin diseases in Asir region, Saudi Arabia: A 12-month prospective study in a referral hospital. *Annals of Saudi Medicine* 1995; 15: 455-457.
- Shareah AM, Dayem HA. The incidence of skin diseases in Abu Dhabi (United Arab Emirates). *Int J Dermatol* 1991; 30: 121-124.
- Mahe A, Cisse IA, Faye O, Diaye HT, Niamba P. Skin diseases in Bamako (Mali). *Int J Dermatol* 1998; 37: 673-676.
- Gibbs S. Skin diseases and socioeconomic conditions in rural Africa: Tanzania. *Int J Dermatol* 1996; 35: 633-639.
- Tan HH, Goh CL. Bacterial skin infections at a tertiary dermatological center. *Singapore Med J* 1998; 39: 353-356.
- Kakar N, Kumar V, Mehta G, Sharma RC, Koranne RV. Clinico-bacterial study of pyoderms in children. *J Dermatol* 1999; 26: 288-293.
- Sugeng MW, Ang P, Tan HH, Goh CL. Characteristics of bacterial skin infections in children compared to adults at a tertiary dermatologic center. *Int J Dermatol* 1999; 38: 582-586.
- Sadick NS. Current aspects of bacterial infections of the skin. *Dermatol Clin* 1997; 15: 341-350.
- Odom RB, James WD, Berger TG. *Andrews's Diseases of the skin*. 9th ed. Philadelphia (PA): WB Saunders; 2000. p. 307-357.

12. Ahmad S, Aftabuddin AK. Common skin diseases (analysis of 7,636). *Bangladesh Med Res Counc Bull* 1977; 3: 41-45.
13. Kristensen JK. Scabies and pyodermas in Lilongwe, Malawi. Prevalence and seasonal fluctuation. *Int J Dermatol* 1991; 30: 699-702.
14. Brahmadathan KN, Koshi G. Epidemiology of Streptococcus pyoderma in an orphanage community of a tropical country. *J Trop Med Hyg* 1988; 91: 306-314.
15. Smith A, Waterworth PN. The bacteriology of some cases of intertrigo. *Br J Dermatol* 1962; 74: 323-325.
16. Burkhart CG, Mulholland MB, Burnham JC. Scanning electron microscopic evidence of bacterial overgrowth in intertrigo. *Cutan Pathol* 1981; 8: 273-276.
17. Leyden JJ, Klingman AM. Interdigital athlete's foot: new concepts in pathogenesis. *Postgrad Med* 1977; 61: 113-116.
18. Lee CT, Tay L. Pyodermas: an analysis of 127 cases. *Ann Acad Med Singapore* 1990; 19: 347-349.

**Riyadh Armed Forces Hospital
Department of Neurosciences**

Neurology Training Programme at RAFH

The Neurosciences Department at the Riyadh Armed Forces Hospital (RAFH) advertises two (2) **un-sponsored positions** for physicians to join the Neurology Training Programme for the Board of the Saudi Council for Health Specialties. The training programme is for four (4) years. The first year consists of rotations in internal medicine. The following three (3) years consist of rotations in General Adult Neurology, Neurophysiology, Psychiatry, Pediatric Neurology, Neuroradiology, Neuropathology and other related specialties.

Candidates who finish the training are entitled to sit the Final Examination for the Neurology Board of the Saudi Medical Council. During the training period, candidates are encouraged and supported to attend local and international symposia and courses. Candidates who finish the training period in Neurology may join a 3-year subspecialty fellowship programme such as epilepsy, stroke, etc. **Candidates applying for these 2 training posts should be fully sponsored by their sector (for Saudis) and by their government or country (for non-Saudis).**

Interested candidates should forward their application letter with a recent CV and forward it to the Neurosciences Department, Armed Forces Hospital, PO Box 7897, Riyadh 11159, Kingdom of Saudi Arabia. Tel No. +966 (1) 4777714 Ext. 5419/5329, Fax No. +966 (1) 4777194. E-mail: rkhnsksa@zajil.net or byaqub@arab.net.sa