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Bacterial Infections in post-operated wound and burn patients at Sabha medical center in South Libya

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ABSTRACT

Hospital acquired infection is serious health hazard worldwide; wound infection has been regarded as the most common nosocomial infection especially in patients undergoing surgery. Assessing the frequency of keratinophilic fungi, potentially pathogenic fungi from different area at south Libya. Samples of post-operated wound and burn infection were collected and inoculated in on blood agar and MacConkey's agar under aseptic condition. Colonies were identify by gram stain and Standard bacteriological, isolated bacteria were tested for antibiotic sensitivity using disc diffusion method, total of 72 from 180 patients developed bacterial infection, the most predominant bacterial isolate was Staphylococcus. spp [52.8%] followed by Proteus spp [34.7%], E. coli [8.3%], Klebsiella spp [4.1%]. The rate of wound and burn infection was high among our patients, Staphylococcus. spp was the highest gram positive isolate while Proteus spp was the highest among gram negative

Key words: post-operated wound infection, burn infection

INTRODUCTION

Hospital acquired infection one of the major infectious diseases having major side effect of hospital treatment and contribute significantly to the rate of morbidity, mortality and cost of care. Surgical site infections the second most common cause of hospital acquired infections, representing about 24% of all nosocomial infections. [1, 2, 3] Wound infection has been regarded as the most common nosocomial infection in patients undergoing surgery. [4]

Infection of wound one of the major obstacles to the establishment of infections by bacterial pathogens in internal tissues which delays healing and may cause wound breakdown, herniation of the wound and complete wound dehiscence. [5] Infection occurs when one or more of the contaminant evades the clearing effect of the host's defenses', replicates in large numbers and attacks and harms the host's tissues. [6]

Burns are one of the most common and devastating forms of trauma, burn injury may result from an industrial or work-related accident or occur as a result of suicide attempts, assault, and unintentional injury due to alcohol and/or drug use. [7, 8] Infection remains a major cause of morbidity and mortality in patients with burns, patients with

burns had the highest rates of urinary tract infections and the second highest rates of ventilator-associated pneumonia and central venous catheter-associated bloodstream infections [trauma units had the highest rates]. [9]

The occurrence of such infections increases the length of hospital stay, admission to the intensive care unit, incidence of readmission and risk of mortality.4 Patient's health status, physical environment where surgical care is provided and clinical interventions all factors influence the rate of infection

Aerobic and anaerobic of bacterial species may be present either singly or in combination in infections of wounds and others soft tissues, some infection especially mixed infection can cause severe synergic infections calling for prompt antibiotic therapy other infection resolve without specific therapy . [10]

This study was aimed to determine rates of infection in Sabha teaching hospital, to identify the etiologies of burn and surgical wound infection and to evaluate susceptibility pattern of these pathogens to various commonly used antibiotics in Sabha teaching hospital

MATERIALS AND METHODS

Patients and specimen collection
One hundred and eighty post-operated wound and burn samples were collected from patients admitted to Sabha Medical Center [south Libya] during the period from May to November / 2013,

One hundred and fifty two swabs were collected from patients who had developed postoperative wound infection with purulent discharge and clinically diagnosed as postoperative sepsis. Twenty eight swabs were collected from patients admitted to the to the burn treatment unit.

Cultural methods
All samples were inoculated on blood agar and MacConkey's agar under aseptic condition; blood agar plates inoculated were cultivated aerobically an anaeorbically at optimum temperature 37°C for overnight [18-24 h].

Examination of cultures and identification of isolates
All cultures were examined with the naked eye for growth and colonial morphology as well as any changes in the media. Plates, which showed visible growth, were subjected to subsequent bacteriological tests. Those which did not show visible growth were reincubated and examined daily for up to 7 days.

Colonies were identify by gram stain and Standard bacteriological identification for gram positive and gram negative, the isolated bacteria were tested for antibiotic sensitivity using disc diffusion method

Antibiotic susceptibility test
Disc diffusion technique [Kirby-Bauer method] was used to test antimicrobial sensitivity**,** isolated colonies were taken by sterile loop and emulsified in 3-4 ml of sterile physiological saline, and turbidity of suspension was compared to the barium chloride turbidity stander.

Sterile swab was soaked in the test organism suspension and swab was streaked over the surface of the Muller Hinton agar. The Petri-dish allowed 3-5 minutes to dry, by using sterile forceps the antimicrobial disc were placed evenly distribution on the inoculated plate, then incubate the plate aerobically at 37c for 24 hours. The zone of growth inhibition around each disc was measured in millimeters and the result was reported either sensitive or intermediate or resistant.

Commercially prepared antibiotic discs include: Penicillin [10mcg], Amoxicillin [25mcg], Cephalexin [30mcg], Choramphenicol [10mcg], Choramphenicol [30mcg], Naldixic Acid [30mcg], Aztreonam l [30mcg], and

RESULTS

Total number of 180 patients included in this study of these One hundred fifty-two had different surgical operations and developed post-operative wound infection with purulent discharge and Twenty -eight burned patients were admitted with burn injury during the period May to November 2013. [Table.1]

A total of 72 from 180 patients developed bacterial infection male represent 46[63.9%] and female represent 26 [36.1%].

Age group [26 to 46years] represent [50%] of our infected patients [30 wound and 6 burn patients], group of [47 to 67 years] represent [33.3%], with [22 wound and 2 burn patients], while group from [5 age to 25 years] and group of greater than or equal to70 years had [2.8%] with [2 wound and 0 burn patients] and [13.9%] with [8 wound and 2 burn patients] respectively. [Table.2]

Sixty two post operation wound patients had bacterial infection [40 male and 22 females], ten of 28 burn patients developed bacterial infection [6 male and 4 females]. [Table.3]

The most predominant bacterial isolate was *Staphylococcus .spp* 38 [52.8%] followed by *Proteus spp* 25 [34.7%], *E. coli* 6[8.3%], *Klebsiella spp* 3[4.1%]. [Table.4]

Antibiotic susceptibility testing was performed on the isolated bacteria from our patients, [Table.5] show resistant percentage of the isolated bacteria to antibiotics.

Table.1 showing age distribution of patients

Age group [year]	number of wounds	number of burns	total number
[5- 25]	2 [3.2%]	[0 [0%	2[2.8%]
[26- 46]	30 [%48.3]	6[60%]	36[50%]
[67- 47]	22 [35.5%]	2 [2%]	24[33.3%]
[68≥]	8 [12.9%]	2[20%]	10[13.9%]

Table.2 showing number of infected sample among patients

Type of injury	number of Patient with infected samples	total number of patients with the condition
Wounds	62	152
Burns	10	28
Total	72	180

Table.3 showing gender distribution of wounds and burns patients

Type of injury	number of Patient	female	infected males
Wounds	62	22	40
Burns	10	4	6
Total	72	26	46

Table.4 showing type of isolated bacteria

Type of Bacteria	Number
Staph.spp	38
Proteus spp	25
E. coli	6
Klebsiella spp	3
No growth of bacteria	108
Total	180

Table.5 showing resistance percentage of isolated bacteria to antibiotic

Staph. spp **R**	*Proteus spp* **R**	*E. coli* **R**	*Klebsiella* **R**	Antibacterial Drug
90%	96.3%	100%	100%	Penicillin[10mg]
33.34%	81.49%	26.67%	60%	Cephalexin[30 mg]
76.67%	74.08%	76.96%	50%	Amoxicillin[25 mg]
42.67%	25.56%	26.67%	100%	Choramphenicol [30 mg]
60%	38.89%	66.67%	50%	Choramphenicol [10 mg]
90%	97.6%	74%	50%	Naldixic Acid[30 mg]
86.67%	92.6%	26.67%	76.4%	Aztreonam[30mg]

DISCUSSION

Hospital acquired infection remain a significant clinical problem despite improvements of infection control prevention method.

Post-operative wound infections are the second most common cause of hospital acquired infections [11], they increase incidence of readmission and risk of mortality. [12]

Burns are one of the most damaging forms of injury and a major public health issue in the entire world [13]. There is significant improvement in the survival of burn patients; but they are still at high risk of infections because of their skins damaging which is the first barrier against infection and suppression of immune system.

The majority of patients between 26- 46 years of age, suggesting that active age is an important risk factor for this type of hospital-acquired infection.

Our study showed that the rates of post-operative wound and burn infection in Sabha Teaching Hospital were 40%. [Wounds 40.78%, burns 35.71%]

The presented results were relatively higher compeer to Mohamed Issa who investigated HAI among post-operative wound infections in Eastern Sudan and he concluded that, the prevalence rate was 25.2%. [18]

Our founding was higher than the prevalence survey conducted by the WHO in 55 hospitals of 14 countries representing 4 WHO Regions [Europe, Eastern Mediterranean, South-East Asia and Western Pacific]. [14]

Our result also much higher than study done by Lilani *et al* as they reported a rate of 8.95% in such type of surgical interventions, and other result by Abubaker *et al*, Azzam *et al*, they reported that rate of wound infection was 9%, 6.8% respectively. [15, 16, 17]

In similar other founding had lower rate of infection than us conducted by Azzam and Dramaix in Lebanon, they reported HAI prevalence rate was 6.8%. [17]

Wound can be infected by a variety of microorganisms ranging from bacteria to fungus and parasites [19]. The common gram-positive organisms are the _-hemolytic streptococcus – *Streptococcus pyogenes* and *Staphylococcus aureus*. The gram negative aerobic rods are *Pseudomonas aeruginosa*. The facultative anaerobes include *Enterobacter* species, *Escherichia coli*, *klebsiella* species and *Proteus* species. [20]

Staphylococcus aureus represent one of the most common causes of healthcare-associated infections reported to the National Nosocomial Infections Surveillance [NNIS] System, including surgical site infection and ventilator-associated pneumonia. [17]

Moreover our result revealed that *Staphylococcus .spp* isolate were the major causes of HAI from post-operative wound and burn infections 38 [52.8%]. Other isolated bacteria were gram-negative bacteria in particular *Proteus spp* 25 [34.7%], *E. coli* 6[8.3%], *Klebsiella spp* 3[4.1%].

Previous studies in agree with our founding, they reported that although any microorganism can be a potential pathogen in burn patients, but *coagulase-negative staphylococci* and *S. aureus* and *Enterococcus* spp were the most common Gram positive pathogens but disagree *P. aeruginosa*, *Acinetobacter* spp., *K. pneumoniae* and *E. coli*, were the most common our result about gram negative microorganisms that can cause infection in burn patients. [21, 22, 23].

Abadi and his colleague also in line with our results, they reported that *S. aureus* and coagulase-negative *staphylococci* were the most common Gram positive bacteria while the most common Gram negative bacteria were, *P. aeruginosa, Acinetobacter* spp., *Klebsiella* spp. [24]

This presented study clearly showed that *Proteus* species were the most commonly isolated organisms amongst the Gram negative bacilli. This result corroborate by Oguachuba who reported that *Proteus* species were the commonest coli forms isolated from wound infections. [28]

Our result is contrary to the observations of Kehinde and his colleague [25] who claimed that *Klebsiella* species were most predominant in burn wounds at 34.4% followed by *Pseudomonas* species [29%] and *Proteus* species the least prevalent [6.5%]. Also our result disagree by Again Ihanni et al. and Oni et al. [26, 27] working in a tertiary hospital in Ibadan observed different prevalence rates of the gram negative organisms in their work in which *Proteus* species were the least prevalent.

Our study also looked at the susceptibility patterns of aerobic bacteria responsible for post-operative wound and burn infections. Isolated strains considerable variation in term of antibiotic susceptibility

To conclude, post-operative wound and burn patients were most commonly infected with *S. aureus* and *Proteus spp*, they were resistant of most of the antibiotics tested, a problem that seems to be a major cause for concern in south Libya where considerable misuse of antibiotics is prevalent.

Our high rate of HAI mandate further investigation and more surveys to risk factors and possible methods of reducing nosocomial infections among Libyan patients, and for better therapeutic options.

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