Isolation and Identification Bacteria Species and Study Epidemiological Features to Burns Patients in Al- Yarmook Teaching Hospital

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Abstract

The present study was conducted to identify the correlation between some epidemiological and bacterial characteristics of burn patients and their complications for the period from October to March 2018 for patients who were visiting or staying at AL- Yarmook hospital. One hundred patients were randomly selected after being examined and diagnosed by a specialist. The pre-prepared questionnaire for the epidemiological features of each patients, which included sex, age, marital or economic status, location of residence and the nature of the work of the patients was filled. While the bacterial side included the collection of skin swabs from areas exposed to burns (skin) and to all patients under sterile conditions and under the supervisions of the doctor supervisor the treatment of infected cases. Samples were transferred to the laboratory to complete bacterial laboratory test. Samples were planted on the special and general culture, and bacterial growth was observed followed by final diagnosis of isolates. The results showed that the rate of infection was high in females compare males (63% to 37%) respectively. While the incidence of burns was high in patients aged (16-30) 52%. The rate of infections was also high in patients with poor families (54%) while those living in rural areas had high rates of infection (41%).

The results of primary bacterial transplantation gave a high positive result (78%). The total isolates obtained from all initial transplant samples were 92% isolates and a percentage (117.9%), a high and satisfactory rate. Gram negative bacteria isolates showed a higher frequency than gram positive (73.9) and (26.06%) respectively.

It was noted that Pseudomonas spp was very high (48.9%) compared with rest of the positive or negative bacteria isolates, where the frequency presence of Klebsiella spp, Staphylococcus spp , Streptococcus SPP (25%), (18.4%), (7.6%) respectively. The results of the present study include the importance of epidemiological aspects in the cases of burns, whether as factors that assist or are ready to be injured or accelerated in the healing of the infected cases, in addition to the importance of early bacterial diagnosis of infection to control the complications of secondary infection of bacteria in cases of burns and thus easy medical treatment.

Keywords: *bacteria, epidemiological features, burns, patients*

Introduction

The most common burns and damage to body tissue which causes the immune system inhibition of the injured body, making it vulnerable to the various complications that causes various types of pathogens [1]. High mortality was noted in cases of burns and associated bacterial infections [2]. Burns destroy skin tissue responsible for protecting the body from the pathogenic and bacterial pathogens, which become an important and appropriate medium for the growth and reproduction of pathogenic bacteria, leading to various diseases [3]. Burns occur for different reasons as well as different ways and means. Burns in children under the age of eight year are often burns, hot water or boiling water vapor [4]. Burns caused by direct burning fire are the second most common cause of burns after water, liquids or hot steam [5]. Other types of burns occur as a result of exposure to heat centrally and for a very short period such as burns caused by

incendiary gases such as propane, butane, oil purification gases, alcohols and other combustible liquids [6]. Burns also occur as a result of direct contract with hot metals, liquids plastics, hot gases [7]. Chemical burns are known to be burns caused by the exposure of the human body to chemical solution concentrated or containing chemical composition of burning materials such as caustic side, it has been observed that most of these burns are very influential on the tissues of the body of the patient, leading to the formation of thrombocytopenia of the skin and epithelial tissues and muscles lining and very quickly before removal [8]. The burning skin tissue attacks several types of bacterial pathogens due to the severe damage caused by burns to the body tissues or to the self-immunity of the patient with burns, leading localized infections which increase with time, local sepsis, and septicemia cases which complicate burns and delay treatment or recovery which sometimes lead to death of the patient [9]. It was noted that Pseudomonas and Klebsiella are among the most important bacterial pathogens that are contaminated or associated with burns which cause significant damage to the infected cases, some of which may lead to death, while studies indicate that Staphylococcus bacteria and Streptococcus are also Gram positive bacteria responsible for injuries associated with burns which have somewhat lower effect than the factors first mentioned in the severity of the impact or damage$_{(10)}$.

Aims

The present study aims at identifying some of the epidemiological characteristics of cases of burns related to patients such as sex, age, marital or economic status, location or place of residence, as well as the nature of the work of the person suffering from burns. The study also isolates and diagnosis some of the most common pathogenic bacterial pathogens (usually secondary infections or burns) to burn patients at Al- Yarmook teaching hospital and during six months research period only.

Patients and Methods

1- Patients : the study examined 100 randomly selected patients (males and females), between the age of (4-45) years who were visiting or staying at Al-Yarmook teaching hospital (burns division) for the period 10 October to 30 March 2019. where they examined and diagnosis clinically by the specialist doctor as all of them cases of burns due to various causes and the various degree of disease and the quantity and quality of burns (whether flame or burning with warm water) and range or intensity degree burns between 15-75%.

2- Epidemiological aspects: A questionnaire was developed in the research to identify some characteristics or epidemiological profile of burn cases, which include information on patients with burns. It was filled by the researchers and supervised by the treating physician for each case. The questionnaire included sex, age, marital or economic status, place of residence (place, nature of work of the injured person).

The study sample was divided by age into three groups:

First age group	The age of patients with burns range 5-15 years
Second age group	The age of patients with burns range 16-30 years
Third age group	The age of patients with burns range 31-45 years

The study classified the living or economic situation into three categories of agencies:

* Good quality:the families whose average monthly income exceeds above five hundred thousand dinars

** Average class: for families whose average monthly income ranges from two hundred and fifty thousand to five hundred thousand dinars.

*** Poor category : for families whose average monthly income less than two hundred and fifty thousand dinars.

While the studied cases of burns according to the location of housing by distance from the city of Baghdad to :

1- Rural housing: for families living in the countryside surrounding the city of Baghdad which are often cases of the arrival of Baghdad.

2- Civil housing: for the families who living in the city of Baghdad and nearby cities of the civilian nature of housing.

3- Rural housing –civil: for families living in areas

that mix the rural civil character of living.

While the nature of the work of the patients was mainly male, which is often free work irregular in the state departments, in addition to some cases of disease for females, which was explained in the results, which were also due to the work of females outside the home, which is almost limited.

4- Bacterial side: for the purpose of identifying some of the bacterial cases associated with burns, swabs were taken for burns from the patients and they were removed from the burns and administrated by medical staff supervising the treatment in the hospital. The cotton swabs where the placed in sterile test tube containing a buffer solution to maintain intact bacterial pathogens. Test tube were transferred sterilely to the laboratory (11).

in vitro samples were cultured on blood agar, Mac Conkey agar and nutrient agar, and incubated for 24-48 hours at 37 c, (12). The isolates as follows:

1- Macroscopic appearance: the examination included identification of the shape, size, color, nature of the outer edges of the colony as well as its texture.

2- Microscopic appearance: the isolates were examined after staining by gram stain.

3- Biochemical tests: several tests were used to diagnosis or differentiation to arrive at the final diagnosis(13).

Results and Discussion

The present study indicates that the number of cases diagnosis as burns was 37 cases in males while 63 cases were in females. All cases studied (100) were the same percentage of cases as shown in table (1). The number of infection and their percentage in females is 63% compared to 37% in females respectively. The nature of house work and their preoccupation with household maters, especially with regard to cooking or near sources of burns such as direct fire, hot steam during the day (14). The results of this study agree with the findings of, Mayhall, 2003, [15] that the incidence of burns affects females more than males because of the nature of work of females work in cooking and direct contact with the source of fire. Table (1) showed distribution of burns according to age group of (16-30) years had a high incidence of infection at 52% while the age group (5-15) years with a lower accidence of burns, 30%. The infection rate in the age group (31-45) years was the lowest in the infection which reached 18%. The results indicate that the third group had the lowest rate of infection, which may be due to the effect of age in the injury in which the person at this age is more mature and aware and experience to enable it keep away or reduce the chance of burns . The injuries were very high (52%) in the middle age group (16-36) which may be due to this age is working in various household or work matters, wither male or female(16), while the injuries in the first group (5-15) years were 30%, and this percentage reflect the relationship between burn and age. Especially children they are more susceptible to burns for different reasons [12]. The results of the current study indicated in the table (2) that the cases of burns diagnosed clinically were distributed in varying degrees in terms of the living or economic situation where the incidence of burns in the family members of the vulnerable category was 54% while the rate of infection in individuals or families of the middle class 29%, while at a slightly lower rate was 17% in the good category. It is noted from the proportions of the distributions of status that the living conditions associated with the general income families play an important role in the creation of the means of or tools, devices or equipment that may ensure the individual to move away or reduce the sources of exposure to burns and this conclusion is consistent with the findings of many researchers(17).

Table (1); Percentage of distribution of burns cases according to the sex and age group.

Sex	Infected cases
Male	37(37%)
Female	63 (63%)
Total	100(100%)
Age group (5-15)	30(30%)
(16-30)	52(52%)
(31-45)	18(18%)
Total	100(100%)

Table (2); Percentage of distribution of burns status according to the marital or economic situation and location of residence.

Living situation	Infected cases	Location of residence	% for infected cases
Good quality	17(17%)	Rural accommodation	36(36%)
Middle quality	29(29%)	Civil housing	23(23%)
Bad class	54(54%)	Rural housing –civil	41(41%)
Total	100(100%)	Total	100%

Table (3); First bacterial transplantation and distribution of positive and negative cases of cultivation

Total no. of smears	Positive smears	Negative smears	Dingle growth	Mixed growth	Total numbers of isolated
100	78(78%)	22(22%)	14(14%)	53(53%)	92(117.9%)

Table (4); Results of distribution of bacterial isolates

Total no. of isolates	G+ isolates	Staphylococcus	Streptococcus	G_ isolates	Pseudomonas	Klebsiella
92	24(26%)	17(18.4%)	7(7.6%)	68(73.9%)	45(48.9%)	23(25%)

Table (5); Results of laboratory tests for isolation and diagnosis of isolates (92 bacterial isolation)

Bacterial isolates	Catalase	Oxidase	Coagulase	Movement	Gram's stain
Staphylococcus spp.	+	_	+	_	G+cluster
Streptococcus spp.	_	_	_	_	G+long chains
Pseudomonas spp.	+	+	+_	+	G-rod shape
klebsiella	+	_	+	_	G-rod shape

The results of the first implantation of the skin lesions samples from burned skin areas which occurred more than 24 hours and less than ten day ago, showed that the number of cases of bacterial transplantation (containing bacterial growth) was 78 cases out of a total of 100 studied cases (78%) while 22 did not give positive results for the first bacterial transplant. These results are consistent with the (19) incidence of skin lesions of burns with a recurrence rate of 86.5% for the first bacterial transplant, as well as for (20) of the number of skin

lesions that give a negative result of bacterial cultures in his research was 18% (table 3). Bacterial growth rate (78%), which gave 14 single bacterial growth (bacterial isolates of one bacterial species) was 17.9% while the combined bacterial growth (each containing more than one bacterial strain) was positive 53% and 67.9% respectively. The bacterial isolates obtained from all Petri dishes showed 92 bacterial isolation and 177.9% (table 3). After bacterial isolating observed that the primary cultures media and carrying out isolation and identification of bacteria, frequency of gram positive bacteria isolates was 24(26.06%) while the frequency or recurrence of Gram negative bacteria isolates 68 (73.9%) which confirm that we have indicated that Gram negative bacteria is highly susceptible to infection and invasion of tissues exposed to burns, and occupied Pseudomonas spp. The highest incidence was 45(48.9) while the presence of Klebsiella spp. At a lower rate than the previous 23 (25%) table (4), while types of Gram positive bacteria were 17 (18.4%) and 7(7.6%) for Staphylococcus aureus and Streptococcus pyogens. The results of isolation and diagnosis agree with, Muir, 1987, [18]. he was found Gram negative bacteria is more presence or recurrence in cases of burns for their ability to produce large amounts of factors and enzymes in infected tissues in addition to toxins that affect on skin tissues which helps in the poisoning of the body (generalized septicemia). The present study also agreed with its findings, Maitra, 2003 [19]. that pseudomonas spp the most frequent cases of burns because they are opportunistic bacteria which find tissues infected burns a good medium for growth and reproduction, as well as being one of the most important bacterial species that causes nosocomial infection which transmitted easily. Klebsiella spp is one of the Gram negative bacteria which is infected burns and existed 23 (25%) and this percentage agreed with, Bowler, 2001 [20]. The results of isolation and diagnosis showed that the positive bacterial species were found somewhat lower than those of Gram negative bacterial according to nature and requirement of this type of bacteria. Presence of Staphylococcus ssp more than Streptococcus spp (18.4%) and (7.6%) respectively, and these results are agreed with, Emmerson, 1994, [(21)] Staphylococcus aureus is still one of the most of Gram positive bacteria contaminated for hospitals and causes sever skin sores damage. With regard to streptococcus infection is similar to Staphylococcus for nutritional requirement and reproduction, which is often attributed to 20% of septic episodes of skin burns in patients [19].

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Conflict of Interest: None to declare.

Ethical Clearance: All experimental protocols were approved under the Technical medical institutes and all experiments were carried out in accordance with approved guidelines.

References

1- Church D, Elsayed S, Reid O. Burn wound infections. Clinical microbiology Reviews. 2006; 19(2): 403-404.

2- Wibbenmeyer L, Danks R. Prospective analysis of nosocomial infection rates , antibiotic use, an patterns of resistance in a burn population. Burn care Res. 2006; 27(2): 152-160.

3- Vindenes H, Bjerknes R. Microbial colonization of large wounds. Burns. 1995; 21: 575-579.

4- Herendon D, Spies M. Modern burn car. Semin . Pediatr. Surg. 10: 28, 2001.

5- Hettiaratchy, S. and Dziewulski, P. Path physiology and types of burns BMJ. 2004; 328: 1427-1429.

6- Yarbrough DR. Burns due to aerosol can explotions . Burns. 1998; 24: 270.

7- Margulies D, Navarro R, Kahn A. Molten metal burns: early treatment improves outcome. Am Surg. 1998; 64: 947.

8- Wassermann D. Criteria for burn severity. Epidemiology. Prevention, Organization of management. Pathol . Biol. (Paris). 2002; 50(2):65-73.

9- De Macedo J, Rosa S. Sepsis in burned patients. Revista da sociedade Brasileria de Medicina Tropical. 2003; 36(6): 647-652.

10- Gillespie S, Bamford K. Medical microbiology and infection at a plance . Blackwel publishing. 2003.

11- Benson HJ. Microbiological application : Laboratory manual in general microbiology . 17th ed. W.B. McGraw Hill. 1998; 112-130.

12- Collee J, Fraser A. Mackie and McCartney Practical Medical Microbiology 4th ed. Churchill and livingstone, INC.1996.

13- Macfaddin JF. Biochemical tests for identification of medical bacteria . 3rd Williams and Wilkins-baltimor. New York.2000.

14- Maurray P, Baron, E. Mannual of clinical microbiology 8th ed. Washington, D. C. 2003.

15- Mayhall C. The epidemiology of burn wound infections: Health care Epidemiology. CID. 2003; 26.03.19 13:30].

16- Mercier C, Blond M. Epidemiology survey of childhood burn injuries in France . Burns. 1996; 22: 29-34.

17- Bagdonas R, Tamelis A. Analysis of burn patients and the isolated pathogens. Lithuania surgery . 2004; 2(3): 190-193.

18- Muir I, Barclay T. burns and their treatment, 3rd butter –worth London Boston, cited by reference number 1987; (5).

19- Maitra A. Environmental diseases in kumar , V., Contran , R. and Robbins, S. Robins Basic pathology. 7th Saunder an important of Elsevier Science , London, 2003.

20- Bowler P, Duerden B. Wound microbiology and associated approaches to wound management. Clin Microbiol. 1987.

21- Emmerson M. Nosocomial Staphylococcal outbreak. Scandinavian J. of infection diseases. Suppl. 1994; 93: 47-54.