PREVALENCE AND ANTIMICROBIAL SENSITIVITY OF *S. AUREUS* ISOLATED FROM PATIENT WITH SKIN WOUND INFECTION IN SHAAFI HOSPITAL.

Ahmed Saed Hussein, Fatuma Abdullahi Dirie, **Fartun Mohamed Osman, Hawa Ali Hirsi**
FACULTY OF MEDICINE & HEALTH SCIENCES
Jamhuriya University of Science & Technology, Mogadishu- Somalia
Axmadduwe@gmail.com, 15366032x@gmail.com, fartunmohamed114@gmail.com

ABSTRACT

Staphylococcal infections still remain an important cause of mortality and morbidity worldwide despite the development of antimicrobial agents (Onwubiko, et al 2011). Staphylococcus aureus the most common cause of skin and soft tissue infections, such as boils and abscesses, as well as post-operative wound infections. The objective of this study was identifying the Prevalence and antimicrobial susceptibility of S.aureus isolated from patient with skin wound infection in Shaafi hospital. The method used in this study was Cross sectional descriptive design involving using quantitative method. The swabs were collected from wound from patients attending Shaafi Hospital. Swabs were cultured and identified by using gram staining according to standard conventional methods. The isolated organisms were tested for sensitivity against the antimicrobial agents that are commonly used in hospitals. A total 50 wound swabs were collected from patients with symptoms of wound infection attending to Shaafi Hospital, in Mogadishu Somalia. Different age groups and both sexes were covered. Staphylococcus aureus strains were the predominant organism isolated 13 (26%) of total samples, and other 37 (74%). were no growth. The bacteria that isolated from the patients were resistant to Amoxyclav, Methicillin and penicillin, while 9 of them 69.2% were sensitive to Vancomycin and 4 of them 30.8% were resistant to Vancomycin so the highest frequency of sensitivity with observed with Vancomycin while Amoxyklav, Methcillin and Penicillin were highest resistant.

Bacterial species isolated were all susceptible to Vancomycin which may be selected as the drugs of choice for treatment of wound infection. The development of bacterial resistance against Penicillin among all isolates reflects the abuse of antibiotics in Somalia. We recommended the hospitals and doctors: - Bacterial culture to ensure the appropriate antibiotics, to encourage the patients coming hospital early stages of wound, since the culture is high expensive we recommended the doctor holding seminars that persuade that the culture is the best diagnosis of bacterial infections, we recommend the doctors to give the technicians seminars about swabbing, isolation and identification of bacteria

Keywords: prevalence, antimicrobial sensitivity, s.aureus

1.0 Background

Staphylococcal infections still remain an important cause of mortality and morbidity worldwide despite the development of antimicrobial agents. It has a remarkable capability of evolving different mechanisms of resistance to most antimicrobial agents. The aim of the present study is to establish the incidence of *S.aureus* in clinical specimens and its antibiotic sensitivity pattern to various antibiotics in this locality *(Onwubiko, et al 2011)*.

*Stapylococcus*is a gram-positive organism with aerobic to facultative anaerobic lifestyle and colonizes skin, nares, and axillae of humans. *Staphylococcus aureus* is a catalase-, urease-, and phosphatase-positive organism with most strains secreting coagulase and it also ferments mannitol sugar to lactic acid. Testing for catalase is an important criterion to distinguish Staphylococci from Streptococci and coagulase test for distinguishing *S.aureus* from *S. epidermidis*. It reduces nitrates to nitrites, liquefies gelatin, and is methyl red and Voges-Proskauer test positive. *Staphylococcus aureus* is lipolytic (lecithinase) when grown on media containing egg yolk. *Staphylococcus aureus* reduces tellurite in media containing potassium tellurite and produces shiny black color colonies *(Reddy, P. N et al 2011)*.

They are Grampositive bacteria, with diameters of 0.5 – 1.5 μm and characterized by individual cocci, which divide in more than one plane to form grape-like clusters *(Harris et al., 2002)*.

The specific objectives of this study were
1. To isolate and identify pathogenic bacteria associated with wound infection
2. To determine sensitivity patterns of pathogenic bacteria

2.0 METHODOLOGY

2.1 Research design

2.1.1 Approach design: A quantities approach aiming to investigate patients with microbial wound infections.

2.1.2 Study design: The study design *was* be a hospital-based, experimental study.

2.1.3 Study type: The study type *was* a descriptive, cross-sectional study.

2.2 Study duration: The study *was* carried out during the period from Nov to May, 2018,

3.3 Study area: This study *was* conduct at Shaafi Hospital.

2.4 Study population: Patients with infected wounds *was* recruited for this study covering different age groups and gender.

2.5 Inclusion criteria: All patients with infected wounds who accept for this study.

2.6 Exclusion criteria:
Severely ill patients and dressed wounds *were* excluded from this study.

2.8 sampling: Non- probability, convenience sampling.

Sample strategy: convenience where patients *was* chosen on the basis of   accessibility.

Sample frame: patients with microbial wound infections at Shaafi hospital.

Sample size: the sample size of this study was 50.

2.9 Method of data collection:

The software used for the analysis of data *was* statistical package for social sciences (SPSS) program (version 20). Frequencies, percentages, tables and graphs *was* used for presentation of the data.

2.10 Sample collection:

Demographical data was collected from patients using a direct interviewing questionnaire covering information regarding name, age, gender and clinical symptoms. Collection of specimens from infected wounds *was* done swabbing.
The patient was given a concise explanation of the need for the microbiological investigation. Sterile cotton swabs *were* usually used. If the wound *was* moist a swab can be used straight from the packaging; but if the wound *was* dry, the swab tip *was* moistened with sterile saline to increase the chances of recovering organisms from the site. Then the swabs *were* transport to the microbiology lab within one hour.

2.11 Culture specimen:

All specimens *were* directly cultured on standard media such as blood agar. Plates *were* incubated aerobically at 37° C for 24 hours. The isolated samples *were* identified used gram staining and examined microscopically the used biochemical reactions such as catalase test to differentiate staphylococcus from streptococcus, coagulase test s.aureus forom other coagulase negative.

2.12 Sensitivity testing:

Antimicrobial susceptibility testing *was* performed Kirby-Bour agar disc diffusion method. Isolates *was* swabbed uniformly across a Muller-Hinton agar plate. Inoculum *was* adjusted as per McFarland turbidity standard. Filter-paper disks *was* placed on the surface of the agar and incubated at 37°C overnight. The antimicrobial drugs used *was* penicillin, methicillin, Amoxclavin, vancomycin, Ampicillin, amoxcillin and Cloxacillin on the inoculum and incubate overnight at 37º C and then measure the zone of inhibition to determine the sensitivity pattern.

2.13 Ethical consideration:

First Approval *was* taken from Faculty of Medical Laboratory Science, Jamhuriya University of Science and technology (JUST). Second maintaining confidentiality of information obtained from patients investigated. Third valid consent of the patients under the study. Fourth permission to collect the specimens *was* request Shaafi Hospital.

3.0 Results

Number of respondents in our sample was 50 patients including out patients and inpatients, number of isolated were growth 13 that is 26% of total samples, and other 37 were no growth which is 74% as shown (Table 4.3).

The age and sex distribution of patients with *S.ureus* infection were 53.8% male, while 46.2% was female as shown in (Table and figure 4.1), so males were higher infection rate than females. The most age was over 41 years 46.2%, while the least less than 20 years 15.4% as show in (Table and figure 4.2. So The highest frequency of isolates of *Staphylococcus aureus* occurred in the age group (41 and above) yrs while the least *was* in the (1-20) yrs group. the bacteria that isolated from the patients were resistant to Amoxyclav, Methicillin and penicillin, while 9 of them 69.2% were sensitive to Vancomycin (18-20 mm in zone inhibition) and 4 of them 30.8% were resistant to Vancomycin so the highest frequency of sensitivity with observed with Vancomycin while Amoxyklav, Methcillin and Penicillin were highest resistant as shown (Table 4.4).

Gender	Frequency	Percent
Male	7	53.8
Female	6	46.2
Total	**13**	**100**

Table 4.1: Respondent by gender

Table 4.1:- Respondents by Gender

shows that the total of respondents was 13 persons, 7 of them was male that 53.8%, and 6 of them was female that 46.2%.

Age	Frequency	Percent
1-20 yrs	2	15.4
21-40 yrs	5	38.5
41 and Above	6	46.2
Total	**13**	**100**

Table 4.2 Respondents by age

Table 4.2: shows that the most age of respondent was 41 years and above 46.2%, while the least was 20 year and below 15.4%.

Number of samples	N. o isolates	% of total isolates
50	13	26.0%

Table 4.3:   Bacterial species isolated

No.	Name of antibiotics	Sensitivity pattern			Resistance pattern
		Sensitive (%)	Moderately Sensitive (%)	Total (%)	
01	Amoxyclav	0 (13)	0(13)	13(13)	0 (13)
02	Penicillin G	0(13)	0(13)	13(13)	0 (13)
03	methicilin	0 (13)	0(13)	13(13)	0 (13)
04	vancomycin	9 (13)	0(13)	13(13)	4 (13)

4.4: Sensitivity pattern of isolated organisms

3.0 Discussions

Study done in Nigeria, the age and sex distribution of patients with *Staphylococcus aureus* infection in Kano, Males (62.0%) had higher infection rate than females (38.0%). The highest frequency of isolates of *Staphylococcus aureua*s ccurred in the age group (0-10) yrs while the least *was* in the (51- 60) yrs group.

According to our study the age and sex distribution of patients with *S.aureus* infection in Shaafi Hospital males was 53.8%, while Females was of 46.2% so males were higher infection rate than females. The highest frequency of isolates of *Staphylococcus aureus* occurred in the age group (41 and above) yrs while the least *was* in the (1-2years) yrs group. So our study has agree the infection while disagree the frequency.

Another previous study in Eritrea the antimicrobial susceptibility study of *S.aureus* isolates revealed high resistance to penicillin (77%), and most of them were methicillin resistant. According to our study penicillin was one of the highest resistant 100%, and also was methicillin resistant.

4.0 Conclusions

The antimicrobial susceptibility of S.aureus was different, so the four antibiotics those were used in our study were resistant except Vancomycin that had high sensitive 69%. The zone inhibition to determine s.aureus to be susceptible to vancomycin, using disc diffusion is >= 15mm and susceptibility test was between (18-19 mm). So the drug of choice of our study was Vancomycin since it was the highly sensitive.

Most of the antimicrobial resistance which is now making it difficult to treat some infectious diseases is due to the extensive use and misuse of antimicrobial drugs which have favoured the emergence and survival of resistant strains of micro-organisms. Drug-resistant strains are common among staphylococci.

Bacteria become resistant to antimicrobial agents by a number of mechanisms, the commonest being: production of enzymes which inactivate or modify antibiotics, changes in the bacterial cell membrane, preventing the uptake of an antimicrobial, modification of the target so that it no longer interacts with the antimicrobial. So in our study the cause of antibiotic resistance we think due to extensive use and misuse of antimicrobial drugs and lack of an effective microbiology lab in our country.

REFFERENCE

Archer, G. L. (1998). *Stapylococcus*: a well-armed pathogen. *Reviews of Infectious Diseases*, *26*(5), 1179-1181.

De Kraker, M. E., Davey, P. G., Grundmann, H., & BURDEN Study Group. (2011). Mortality and hospital stay associated with resistant Staphylococcus aureuaand Escherichia coli bacteremia: estimating the burden of antibiotic resistance in Europe. *PLoS medicine*, *8*(10), e1001104.

Harris, L., et al. (2002). "An introduction to *Stapylococcus*, and techniques for identifying and quantifying S. aureus adhesins in relation to adhesion to biomaterials: review." Eur Cell Mate (3).

Kawada-Matsuo, M., & Komatsuzawa, H. (2012). Factors affecting susceptibility of Staphylococcus aureuato antibacterial agents. *Journal of Oral Biosciences*, *54*(2), 86-91.

Kitara, L. D., Anywar, A. D., Acullu, D., Odongo-Aginya, E., Aloyo, J., & Fendu, M. (2011). Antibiotic susceptibility of Staphylococcus aureuain suppurative lesions in Lacor Hospital, Uganda. *African health sciences*, *11*(3), 34-39.

Kong, C., Neoh, H., & Nathan, S. (2016). Targeting *Staphylococcus*Toxins: A Potential form of Anti-Virulence Therapy. *Toxins*, *8*(3), 72.

Kumar, S. (2016). Essentials of microbiology. *Jaypee Brothers Medical Publishers, New Delhi*, 560-561.

Kumar, S. (2016). Essentials of microbiology. *Jaypee Brothers Medical Publishers, New Delhi*, 560-561.

Laupland, K. B., et al. (2003). "Population-based study of the epidemiology of and the risk factors for invasive Staphylococcus aureuainfections." The Journal of infectious diseases 187(9): 1452-1459.

Lowy, F. D. (1998). Staphylococcus aureuainfections. *New England journal of medicine*, *339*(8), 520-532.

Lowy, F. D. (1998). Staphylococcus aureuainfections. *New England journal of medicine*, *339*(8), 520-532.

Lowy, F. D. (1998). Staphylococcus aureuainfections. *New England journal of medicine*, *339*(8), 520-532.

Moellering, R. C. (2006). "The growing menace of community-acquired methicillin-resistant *Stapylococcus*." Annals of Internal Medicine 144(5): 368-370.

Naber, C. K. (2009). Staphylococcus aureuabacteremia: epidemiology, pathophysiology, and management strategies.*Clinical infectious diseases*, *48*(Supplement_4), S231-S237.

Naik, D., & Teclu, A. (2009). A study on antimicrobial susceptibility pattern in clinical isolates of Staphylococcus aureuain Eritrea. *Pan African Medical Journal*, *3*(1).

Noskin, G. A., et al. (2005). "The burden of Staphylococcus aureuainfections on hospitals in the United States: an analysis of the 2000 and 2001 Nationwide Inpatient Sample Database." Archives of internal medicine 165(15): 1756-1761.

Onwubiko, N. E., & Sadiq, N. M. (2011). Antibiotic sensitivity pattern of Staphylococcus aureuafrom clinical isolates in a tertiary health institution in Kano, Northwestern Nigeria. *Pan African Medical Journal*, *8*(1).

Onwubiko, N. E., & Sadiq, N. M. (2011). Antibiotic sensitivity pattern of Staphylococcus aureuafrom clinical isolates in a tertiary health institution in Kano, Northwestern Nigeria. *Pan African Medical Journal*, *8*(1).

Onwubiko, N. E., & Sadiq, N. M. (2011). Antibiotic sensitivity pattern of Staphylococcus aureuafrom clinical isolates in a tertiary health institution in Kano, Northwestern Nigeria. *Pan African Medical Journal*, *8*(1).

Reddy, P. N., Srirama, K., & Dirisala, V. R. (2017). An update on clinical burden, diagnostic tools, and therapeutic options of *Stapylococcus*. *Infectious Diseases: Research and Treatment*, *10*, 1179916117703999.

Reddy, P. N., Srirama, K., & Dirisala, V. R. (2017). An update on clinical burden, diagnostic tools, and therapeutic options of *Staphylococcus*. *Infectious Diseases: Research and Treatment*, *10*, 1179916117703999.

Reddy, P. N., Srirama, K., & Dirisala, V. R. (2017). An update on clinical burden, diagnostic tools, and therapeutic options of *Staphylococcus*. *Infectious Diseases: Research and Treatment*, *10*, 1179916117703999.