

ORIGINAL ARTICLE

Antibiotic Susceptibility Pattern and Associated Factors of Methicillin-Resistant *Staphylococcus aureus* among Dermatological Patients at the University of Gondar Comprehensive Specialized Hospital, Northwest Ethiopia: a Prospective Cross-Sectional Study

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SUMMARY

Background: Determination of the distribution pattern and associated factors of skin and soft tissue infections caused by methicillin-resistant *Staphylococcus aureus* (MRSA) is a fundamental step to set up an effective control program to improve the health status. The purpose of this study was to assess the antibiotic susceptibility pattern and associated factors of MRSA among dermatological patients.

Methods: In this hospital-based, prospective, cross-sectional study, 189 pus and skin swabs were collected from dermatological patients through a convenient sampling method in 2019. A structured questionnaire was employed for data collection of associated factors. Pus and skin swabs were collected using a sterile cotton swab and needle aspiration, then inoculated on mannitol salt agar. We followed a standard bacteriological procedure for identification of MRSA. Logistic regression models at a 95% confidence interval and p-value < 0.05 was considered for significance.

Results: A total of 127/189 (67.2%) of *Staphylococcus aureus* isolates were recovered and 80/127 (63.0%) were MRSA. Over 97% of *Staphylococcus aureus* isolates showed resistance to penicillin. MRSA was sensitive to gentamicin (78.75%), ciprofloxacin (83.75%), and clindamycin (86.25%). Frequency of washing body, method of hand washing, and recent hospitalization had a significant association with MRSA skin infection.

Conclusions: The study revealed a high prevalence of MRSA among dermatological patients. *Staphylococcus aureus* showed a very high degree of resistance to different antimicrobials and most of *Staphylococcus aureus* isolates also showed multidrug-resistance patterns.

(Clin. Lab. 2020;66:xx-xx. DOI: 10.7754/Clin.Lab.2020.200236)

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Manuscript accepted May 6, 2020

Supplemental Tables and Figures

Study Participant Information and parental consent form

The University of Gondar, College of Medicine and Health Science, questionnaire on the intention to know the prevalence of *S. aureus* with emphasis to MRSA & associated risk factors among hospital & non-hospital MRSA skin infection at the University of Gondar, referral teaching hospital.

Questionnaire ID: ----- Kebele No.-----

1. Information sheet

Greeting: Good morning/ afternoon

My name is-----I am working on behalf of the research team (project), which is supervised by the University of Gondar. I would like to ask few questions, which will take 15 minutes, about the general social-demographic characteristics and variables related to the prevalence *S. aureus* with emphasis to MRSA among hospital and non-hospital MRSA skin infection at the University of Gondar. You are going to give very important information to identify problems related to the prevalence *S. aureus* with emphasis to MRSA among hospital and non-hospital MRSA skin infection at the University of Gondar, Gondar town. You have been selected randomly to be a participant of this study if you give me consent after you have understood the following information sheet:

Study Title: Prevalence and antibiotic susceptibility pattern of Methicillin-resistant *Staphylococcus aureus* and associated factors among dermatology patients at the University of Gondar Comprehensive Specialized Hospital, North West Ethiopia.

Name of the Organization: Department of Medical Microbiology, School of Biomedical and Laboratory Sciences, Gondar College of Medicine and Health Sciences, University of Gondar.

Purpose of the Research Project: The aim of this study is to assess the prevalence of MRSA and antimicrobial susceptibility patterns of *S. aureus* among dermatology patients in Gondar, North West Ethiopia. In line with this, the findings will also provide baseline information for health sector administrators, concerned bodies, and the study participants themselves in planning and managing of prevalence of MRSA that further reduce the morbidity and mortality associated with the disease.

Procedure: In order to perform the above-mentioned study at the dermatology department in Gondar Hospital, children and adult patients will be invited to take part in this project. If you are willing to participate, you need to understand the purpose of the study and give your assent. The required sample will be collected by a trained nurse or laboratory technologist. Then, you will be requested to give your assent to the sample collector. Socio-demographic, associated factors, and clinical information will be collected from the study participants using structured questionnaires via interview technique; for your child also fulfill the criteria you are kindly requested to give the required skin swab sample and honest answers to the prepared questionnaire.

The risk associated with the study: You will not be in any physical or psychological risk, and no damage will result from the research procedures.

Benefits of the study: This study will have a great value on preventive measures in hospitals and in the community. The results of this study have importance to treat the patients and to give as additional information for effective treatment in the absences of laboratory investigation in addition to the previously existing data.

Compensation for participation: You will not receive any payment for your participation in this research study.

Confidentiality of your information: All information gathered from the study participant will remain confidential. Your participation in this study is strictly anonymous. Personal information will be treated confidentially and under no circumstances will it be transmitted to any person or organization. The results of this study will be evaluated and summarized, and feedback of the results to the study participants will be given by the principal investigator.

Right to Refuse or Withdraw: Your/Your child's participation in the study is absolutely voluntary; you have full right to refuse to participate in this research. You can refuse to give a sample and not respond to any or all the questionnaires and this will not affect you on using any kind of services from these institutions.

Person to Contacts: This research project will be reviewed and approved by an Ethical clearance committee of the School of Biomedical and Laboratory Sciences, College of Medicine and Health Sciences, University of Gondar. If you want to know more information, you can contact the following individuals and you may ask at any time.

1. Mikias Desalegn, Mobile 0923250122 e-mail: mikydesalegn@gmail.com
2. Mr. Birhanemeskel Tegene, Mobile: 0911910816, e-mail: meskelbirehane@gmail.com
3. Dr. Anisa Befekadu, Mobile: 0918350579, e-mail: annisabefekadu@gmail.com
4. Mr. Yihnew Million (Co-advisor), Mobile: 0988522141, e-mail: millionbeza@gmail.com
5. School of Biomedical and Laboratory Sciences, UOG P. Box-196, Gondar, Ethiopia

I have read this form or it has been read to me in the language I comprehend and understand all the conditions stated above. Therefore, I am/My child is willing to participate in this study.

Signature of child parents/study participant _____ date _____

Name of Principal investigator: signature _____ date _____

Address: Tel.:-----; Email:-----

Signature of the interviewer certifying that the informed consent has been accepted by the participant-----
date-----

The date of the interview in Ethiopian Calendar -----/-----/-----

The result of the interview: 1. Completed 2. Respondent not available 3. Refused 4. Partially completed
Checked by Supervisor, name ----- signature ----- date -----

English Version Questionnaire

Gondar University, College of Medicine and Health Sciences, School of Biomedical and Laboratory Sciences department
 Medical microbiology questionnaire format prepared to identify risk factors associated with *S. aureus* infection personal
 identification.

Instruction for data collection

I. Please greet the client and ask for the consent of the respondents

II. Circle the correct answer

Questionnaire code #.....

Date of data collection.....

Name of institution.....

A person who collected the data.....

II. Socio demographic characteristics of the respondent

1. Code of the respondents _____

Department/ward of the respondent: _____

2. Gender: 1 = male 2 = female

3. Age (year).....

4. Religion

A. orthodox 2. muslim 3. protestant 4. catholic 5. other, specify _____

5. Marital status; 1 = married 2 = single 3 = divorced 4 = widowed

5 = other specify _____

6. Educational status: 1 = illiterate 2 = junior and elementary (1-8) 3 = secondary (9-12)

4 = college, university 5 others specify _____

7. Occupation: 1 = farmer 2 = merchant 3 = day laborer 4 = government employed 5 = housewife

6 = other specify _____

8. Average monthly income (in birr) 1 = 200 - 500 2 = 500 - 1,000 3 = 1,000 - 1,500 4 = > 1,500

9. Residence: 1 = urban 2 = rural

10. Visit to health institution: 1 = new 2 = repeat

III. Risk factors and Clinical data of study participants.

S. No.	Questions	Coding category
1.	Did you apply a topical skin ointment (steroid) in the previous 3 months?	1 = yes 2 = no
2.	Did you use any herbal medication in the previous 3 months?	1 = yes 2 = no
3.	Have you taken antibacterial drugs in the last 3 months?	1 = yes 2 = no

Antibiotic Susceptibility Pattern of *S. Aureus*

4.	How many rooms do you have in the house?	1 = 1 - 3 2 = 3 - 5 4 = >5
5.	Do you live with a family member?	1 = yes 2 = no
6.	If yes, how many people live in your household in one room?	1 = 1 - 3 2 = 3 - 5 4 = >5
7.	Do you share a bed with a family?	1 = yes 2 = no
8.	How frequently did you wash your body?	1. every day 2. as needed 3. sometimes 4. non
9.	How frequently did you wash your clothes?	1. every day 2. as needed 3. sometimes 4. non
10.	Water utilization	1 = private tap 2 = communal 3 = spring 4 = other
11.	When did you wash your hand?	1 = before 2 = after eating 3 = after toilet 4 = as needed 5. others, specify
12.	What is your method of hand washing?	1 = water only 2 = using a soap
13.	Do you have awareness about skin infection?	1 = yes 2 = no
14.	Has your family member gotten sick & hospitalized/ treated ever?	1 = yes 2 = no
15.	Have you been hospitalized within the past 3 months?	1 = yes 2 = no
16.	A hospital visit in the past 3 months?	1 = yes 2 = no
17.	Living with household members' with recent hospitalization?	1 = yes 2 = no
18.	Did you have household members with a recent hospital visit?	1 = yes 2 = no
19.	Did you have a respiratory tract infection?	1 = yes 2 = no
20.	Did you ever have a surgical site infection?	1 = yes 2 = no
21.	Did You have leg ulcer?	1 = yes 2 = no
22.	Have you ever had the allergic disease?	1 = yes 2 = no
23.	Do you have a family member had skin infection right now?	1 = yes 2 = no
24.	Is there any family member serving in medical setup?	1 = yes 2 = no
25.	The incidence of inflammatory skin condition?	1. frequently 2. sometimes 3. only once
26.	Exposure to clinical wastes and fluids?	1 = yes 2 = no
27.	Do you have either of the following chronic co- infection?	1 = HIV 2 = DM 3 = peripheral vascular disease 4 = others
28.	Do you have any of the following sign or symptoms of SSTI today?	1. continual pain 2. redness of skin/swells 3. discharging of pus/fluids 4. fever and malaise 5. warm to touch 6. no

Thank You!!!