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A Systematic Review on the Prevalence of Antibiotic Resistant *Staphylococcus aureus* in Human Source in Bangladesh

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Background

- Antibiotic resistance (ABR) is one of the most concerning public health problems in the world, especially in developing countries, like Bangladesh.
- The leading terrains of ABR due to the lack of precise surveillance, poor healthcare standards and misuse or overuse of antibiotics.
- ABR strains significantly increased the death toll like multidrug-resistant tuberculosis (MDR-TB) (10% higher in 2019 than 2018) **[1]**
- ABR strains also causes blood infections in newborns and resulted about 214,000 death **[2]** .
- Staphylococcus aureus (SA) **(Figure 1)** is one of the dominant resistant strains which has a natural ability to become resistant to any antibiotics.
- Healthy adults carry this bacteria inside the nose (30%, usually temporarily), on the skin (20%); however, the percentages are higher for people who are patients in a hospital or who work there **[3]**.
- SA spread by having direct contact with an infected person, by using a contaminated object, or by inhaling infected droplets dispersed by sneezing or coughing.
- Humans are the major carrier of this bacteria and studding SA resistance patterns is crucial to understand the severity or vulnerability of a country's health status.

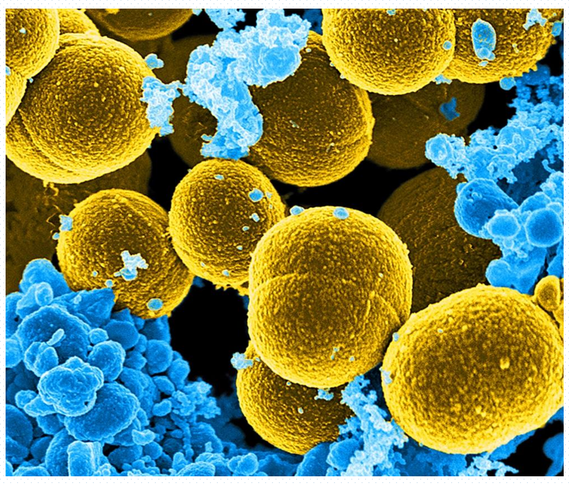

Figure 1. *Staphylococcus aureus* (photo credit: Frank DeLeo, NIAID, CDC)

Objective

This study was designed to determine the prevalence of antibiotic resistant *Staphylococcus aureus* in human samples in Bangladesh.

Methodology

This study was conducted according to PRISMA guidelines. The following databases were used for literature search using the relevant keywords (Antibiotic (also Antimicrobial) AND Resistance (also Susceptibility) AND Staphylococcus aureus AND Bangladesh). Inclusion or exclusion was based on a predefined set of criteria. SA resistance (%) against a given drug was calculated as the mean and median resistance. Interquartile range (IQR) was also calculated to determine whether the data have a mild or strong outlier. Because IQR's based on values that come from the middle half of the distribution.

The search databases were:

► **Scopus** ► **PubMed** ► **Google Scholar** ► **Bangladesh Journal Online** ► **EBSCO databases**

Results

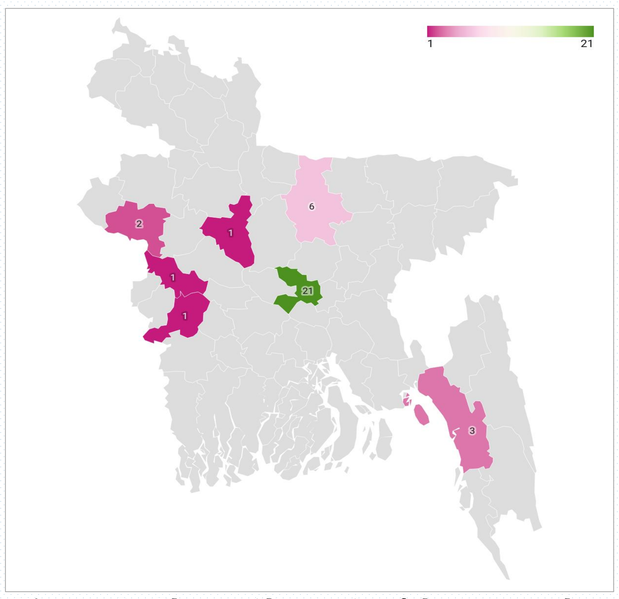

Figure 2. Places (districts) of human studies conducted in Bangladesh.

Finally, 33 articles were selected for this study. The study subjects covered only 7 districts (out of 64) of Bangladesh, of which 64.52% of studies were conducted in the Dhaka district only (**Figure 2**). Disk Diffusion method was used in 87.87% studies for evaluation of antibiotic susceptibility. Unfortunately, the rest of the studies did not mention bacterial susceptibility test method. Study periods and patients age were not mentioned in all studies. ABR SA prevalence (top ten resistant antibiotics) of human samples in Bangladesh: Penicillin (84.75%, interquartile range, IQR, 44.75), Ampicillin (83.75%, IQR 14.475), Oxacillin (77.5%, IQR 44.675), Cefoxitin (72%, IQR 24.55), Tetracycline (68%, IQR 34.3), Amoxicillin (67.375%, IQR 40.95), Ceftazidime (67%, IQR 16.125), Netilmicin (60.625%, IQR 20.625), Cefixime (60%, IQR 13.725), Cefuroxime (60%, IQR 9) were alarming **(Figure 3)**.

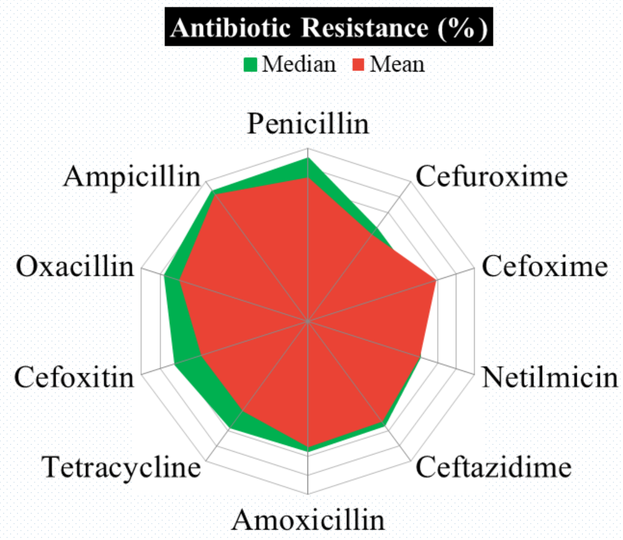

Figure 3. Antibiotic resistance (%) of *S. aureus* of human sample in Bangladesh. Data has shown in 0-100% (center to circumference).

Discussion

The purpose of this study was determining ABR patterns of SA in Bangladesh. Ineffective drugs that was tested against SA, most of them were first line .SA resistant studies were conducted only few places in Bangladesh; therefore, the presented data does not represent whole country and predicting overall scenario of ABR in Bangladesh from human sample is still undetermined. However, trend of data support the global ABR pattern facing currently **[4]**. All the samples collcted from human signifies an alarming rate of resistance (**Figure 3**). It is known that resistant strains are rarely confined to a specific place. It can transmit from one region to whole world within a short time through human, animal or any materials. In our previous study **[5]**, we have observed a significant prevalence of ABR pattern of SA in animal sources, which indicated that a large number of antibiotics are used in agricultural sectors in Bangladesh. The present data showed, β-lactam antibiotics were more resistant to SA. So, it is suggested that SA grows resistance against antibiotics by synthesizing β-lactamase. Adding inhibitors of β-lactamase like clavulanic acid to the β-lactam antibiotics might reduce the ABR of SA.

Conclusions

This study demonstrated the evidence of the high prevalence of ABR SA in patients in Bangladesh. Even though this is limited data, this study's findings might help the policymakers developing the policy to contain the spread of ABR in Bangladesh to support the world One Health goal. Further studies to be warranted to determine actual SA resistance pattern.

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References

1. Hossain, S.; Urbi, Z.; Karuniawati, H.; Mohiuddin, R.B.; Moh Qrimida, A.; Allzrag, A.M.; Ming, L.C.; Pagano, E.; Capasso, R. *Andrographis paniculata* (Burm. f.) Wall. ex Nees: An Updated Review of Phytochemistry, Antimicrobial Pharmacology, and Clinical Safety and Efficacy. *Life* **2021**, *11*, doi:10.3390/life11040348.
2. O'Neill, J. Review on antimicrobial resistance. Available online: https://amr-review.org (accessed on 10 Jan 2021).
3. Bush, L.M. *Staphylococcus aureus* Infections. Available online: https://shorturl.at/fmnpJ (accessed on 10 March 2021).
4. Foster, T.J. Antibiotic resistance in *Staphylococcus aureus:* Current status and future prospects. *FEMS microbiology reviews* **2017**, *41*, 430-449, doi:10.1093/femsre/fux007.
5. Hossain, M.S.; Ahammed, M.M.; Mashhur, N.; Afrin, S.; Ming, L.C.; Sarker, M.M.R.; Urbi, Z.; Siti Hanna Muharram. Antibiotic Resistance Prevalence in *Staphylococcus aureus* from Animal Sources in Bangladesh: A Systematic Review. *The 1st International Electronic Conference on Antibiotics—The Equal Power of Antibiotics And Antimicrobial Resistance* **2021**, doi:10.3390/ECA2021-09633.