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Antibiotic susceptibility profile of Streptococcus species isolated at the China-Guinea Friendship Hospital (HASIGUI) of Kipé in Conakry

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Abstract

Aim: *Streptococcus* infections remain among the most clinically significant bacterial diseases worldwide. This study aimed to determine the frequency and antibiotic-susceptibility profile of *Streptococcus* species isolated at the China-Guinea Friendship Hospital (HASIGUI) of Kipé in Conakry, Guinea.

Methodology: A retrospective descriptive study was conducted at the Sino-Guinean Friendship Hospital (HASIGUI) on Streptococcus samples isolated at the Biomedical Laboratory from July 1, 2012, to December 31, 2019. A total of 120 Streptococcus isolates were analyzed. Bacterial identification was performed using API galleries (bioMérieux, France) and the VITEK-2 Compact system (bioMérieux, France). Antibiotic susceptibility testing was carried out using antibiotic discs via the Muller-Hinton agar diffusion method (Kirby-Bauer) and the VITEK-2 Compact automated system. **Results**: Of 120 patients, women predominated (55.8 %; sex ratio F/M = 1.26). The most represented age group was 4 5-
59 years (26.7 %); mean age = 45.5 ± 21 years (range 184). Fifteen species were identified: Enterococcus faecalis (28.3 %), Streptococcus sp. (19.2 %), Enterococcus faecium (11.7 %), Enterococcus sp. (8.3 %) and others of lower frequenc y. Most isolates were resistant to oxacillin (92.3 %), trimethoprim/sulfamethoxazole (88 %), amoxicillin (78.8 %), eryt hromycin (77.3 %) and tetracycline (76.7 %). High sensitivity was observed to tigecycline (92.9 %), cefotaxime (91.4 %), nitrofurantoin (87.4 %) and linezolid (79.2 %).

Conclusion: High levels of resistance to common antibiotics were observed among *Streptococcus* isolates. Regular antibiotic susceptibility testing remains crucial to guide therapy and prevent therapeutic failures in streptococ cal infections

Keywords: S*treptococcus Species*; Antibiotic Resistance; Enterococcus; Hasigui; Guinea

1. Introduction

The *Streptococcus* genus comprises a diverse group of Gram-positive cocci defined by their carbohydrate cell-wall antigens [1].

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Many bacterial species belonging to the genus Streptococcus, which are part of the normal flora of the mouth and upper respiratory tract, as well as the genitourinary system, are commensal bacteria. However, these bacteria sometimes become pathogenic and can cause illnesses ranging from mild pharyngitis to septicemia and meningitis [2,3]. The emergence of antibiotic-resistant strains of bacteria could be an obstacle to the treatment of streptococcal infections [4].

In Europe, resistance to β-lactams among group B, C and G streptococci has reached 56 %, and to macrolides over 40 % in some species [5]. Although *Streptococcus pyogenes* (grou p A) generally remains sensitive to penicillin and amoxicillin [6], rising macrolide and tetracycline resistance has been reported. In intensive care units, *S. pneumoniae* is a frequent blood culture pathogen (≈ 6 %), while *Enterococcus* species, traditionally low-pathogenic commensals, have emerged as nosocomial agents with multidrug resistance [7, 8].

Considering the frequency and clinical impact of streptococcal infections and their increasing resistance rates, this study was undertaken to determine the prevalence of different *Streptococcus* species isolated at HASIGUI and to assess their antibiotic susceptibility profiles.

2. Materials and Methods

2.1. **Study site:** The study was conducted at the Biomedical Laboratory at the China-Guinea Friendship Hospital in Kipé, located in the Ratoma district of Conakry, Guinea.

2.2. Study design

A retrospective descriptive study was performed between 1 July 2012 and 31 December 2019 at the Bacteriology Unit of the Biomedical Laboratory of HASIGUI. Data were collected from routine records.

2.3. Study population

All laboratory specimens yielding *Streptococcus* isolates during the study period were included (n = 120). Specimens without *Streptococcus* growth were excluded.

2.4. Bacteriological methods

Samples (blood, urine, pus, vaginal fluid, rectal swabs, etc.) were cultured on Blood agar, CLED, and nutrient agar media (Liofilchem Italy and bioMérieux France), incubated at 37 °C for 24 h. Identification was done with API Strep (bioMérieux) and VITEK-2 Compact. Antibiotic susceptibility testing was carried out using the disc diffusion (Kirby-Bauer) method and VITEK-2 Compact.

3. Results

3.1. Socio-demographic characteristics

Table 1 Distribution of patients by sex and age

Characteristic	Frequency	Percentage (%)
Sex		
Female	67	55.83
Male	53	44.17
Total	120	100
Age (years)		
0–14	9	7.5
15–29	20	16.7
30–44	24	20.0
45–59	32	26.7

60–74	26	21.7
≥ 75	9	7.5
Total	120	100

Mean age = 45.5 ± 21 years (range 1–84); sex ratio F/M = 1.26.

3.2. Origin of samples

Table 2 Distribution of *Streptococcus* isolates by hospital department

Department	**n**	**%**
External consultation	46	38.3
Cardiology	36	30.0
Visceral surgery	13	10.8
Emergency	9	7.5
Neurology	8	6.7
Neurosurgery	4	3.3
Traumatology	3	2.5
Intensive care	1	0.8
Total	120	100

3.3. Clinical sample type

Table 3 Distribution of *Streptococcus* isolates by sample source

Type of specimen	**n**	**%**
Urine	88	73.3
Pus	11	9.2
Vaginal secretions	10	8.3
Stool	6	5.0
Blood	1	0.9
Semen	1	0.9
Knee aspirate	1	0.9
Rectal swab	1	0.9
Total	120	100

Urine was by far the most common specimen (73.3 %), followed by pus and vaginal secretions.

3.4. Occupational distribution

Table 4 Distribution of patients by occupation

Occupation	**n**	**%**
Housewives	26	21.7
Students	14	11.7
Traders	11	9.1
Teachers	6	5.0

Workers	5	4.2
Drivers	4	3.3
Others	54	45.0
Total	120	100

3.5. Distribution by species

Table 5 Identified *Streptococcus* species (n = 120)

Species	**n**	**%**
Enterococcus faecalis	34	28.33
Streptococcus sp.	23	19.16
Enterococcus faecium	14	11.66
Enterococcus sp.	10	8.33
S. agalactiae	8	6.66
S. thoraltensis	7	5.83
S. epidermidis	6	5.00
S. uberis	5	4.16
E. gallinarum	4	3.33
S. dysgalactiae ssp. equisimilis	2	1.66
E. avium	2	1.66
S. pneumoniae	2	1.66
S. porcinus	1	0.83
S. pyogenes	1	0.83
E. agalactiae	1	0.83
Total	120	100

3.6. Global antibiotic susceptibility

Table 6 Overall sensitivity and resistance rates of *Streptococcus* isolates

Antibiotic	**Sensitive (%)**	**Resistant (%)**	**Comments**
Oxacillin	7.7	92.3	Very high resistance
Trimethoprim/Sulfamethoxazole	8.0	88.0	Broad resistance
Amoxicillin	15.2	78.8	Common resistance
Erythromycin	16.0	77.3	Macrolide resistance
Tetracycline	16.7	76.7	High resistance
Ciprofloxacin	61.3	33.8	Moderate activity
Nitrofurantoin	87.4	10.5	Highly effective
Cefotaxime	91.4	8.6	Well preserved activity
Tigecycline	92.9	7.1	Excellent efficacy
Linezolid	79.2	18.8	Good activity

Vancomycin	66.7	15.6	Still active on most isolates
Amikacin	100	0	Fully sensitive where tested

4. Discussion

A total of 120 streptococcal strains were isolated from patients, with a female predominance of 55.8% and a female-to-male ratio of 1.26. These results are similar to those reported in 2020 in Mali by Doumbia, who found a female predominance of 54% of patients and a female-to-male ratio of 1.26. The age distribution showed that the mean age of the patients was 45.5 ± 21 years (ranging from 1 to 84 years), with the 45-59 age group being the largest (26.7%), followed by the 60-74 age group (21.7%), and then the 30-34 age group (20.0%), thus indicating that these patients were predominantly older adults.

The majority of samples originated from Cardiology (30 %) and out-patient departments (38 %), where bacteriological testing is frequently requested [9]. Urine was the main specimen (73 %), which aligns with data from Nasaj et al. (2016) [10].

Fifteen species were identified, indicating remarkable diversity at HASIGUI. *E. faecalis* (28 %) was predominant, simila r to studies in Iran (62.5 %) and Cameroon [11]. These differences may reflect specimen variety and hospital ecology.

High levels of resistance to β-lactams, trimethoprim/sulfamethoxazole, macrolides, and tetracyclines were noted. Com parable patterns were reported by Abdel et al. and Ritchnel Goufack et al. (2025) for E. faecalis and E. faecium. Convers ely, marked susceptibility to tigecycline, cefotaxime, and nitrofurantoin suggests their potential as first-line drugs agai nst multi-resistant streptococci.

Other authors also observed excellent activity of linezolid and tigecycline against enterococci [12]. No linezolid resista nce was detected in our study, confirming its continued reliability. Resistance variation across species indicates differe nt mechanisms—including efflux pumps and changes in target sites.

Overall, these results underline the importance of routine antibiograms to guide effective therapy and to track emergin g resistance patterns at the hospital and national levels.

5. Conclusion

This retrospective study (2012–2019) identified 15 species of *Streptococcus* at HASIGUI, with *Enterococcus faecalis* as the most frequent. Patients aged 45–59 years were most affected. Antibiogram results showed high resistance to amoxicillin, trimethoprim/sulfamethoxazo le, oxacillin and tetracycline, contrasted by good sensitivity to cefotaxime, nitrofurantoin, tigecycline, and linezolid.

Antibiotic susceptibility testing must be performed before prescribing any empirical therapy to reduce treatment failur es and limit the spread of resistant strains.

Compliance with ethical standards

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Disclosure of conflict of interest

No conflict of interest has been declared by the authors.

Ethics

The confidentiality of all patients included in the study was respected.

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