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Predominance of *Staphylococcus* and *Staphylococcus aureus* Susceptibility to Antibiotics in Men with Urethral Discharge in Benin

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Abstract: Antimicrobial resistance became a growing public health problem in the world and sexually transmitted infections (STIs) are one of the five types of pathologies which special care should be given. *Staphylococcus aureus* appear the most prevalent bacteria encountered causing infections in male urethral discharge (MUD) at Cotonou in Benin. It prevalence and it resistance to antibiotics were evaluated. This paper aims to describe the bacterial profile and antimicrobial susceptibility of *S aureus* strains isolated from MUD specimens at the National Laboratory (NL) of Heath Ministry. A retrospective study included 81 men at Cotonou suspected MUD during 1st January 2004 and 31st December 2015. MUD swabs were collected and analyzed to identify the bacteria by standard biochemical reactions, screening of trichomonads and detection of intracellular Gram-negative diplococci within phagocytes. The three main pathogens encountered among 81 MUD were *Staphylococcus aureus* (30/81; 37.04%), Staphylococcus spp (19/81; 23.46%) and Staphylococcus dore (12/81; 14.81%). *S aureus* susceptibility ranged from 60-80% for minocyclin, lincomycin, chloramphenicol and gentamycin. But resistance was observed to ofloxacin, kanamycin, amoxicillin, amoxicillin-clavulanic acid, oxacillin, ceftriaxon, tetracyclin, trimethoprim+Sulfonamides and ampicillin between 59-100%. Conclusion: This study highlights the importance of routine susceptibility tests to antibiotics in the treatment of *S aureus* responsible of MUD in Benin.
Keywords: MUD, *Staphylococcus aureus*, antimicrobial effectiveness, Benin

INTRODUCTION

The squamous epithelium surrounded by mucous glands are the components of paraurethral ducts that appear to be embryological remains [1]. Clinically, inflammation of male manifests itself as erythematous swelling in the external orifice of the urethra that often presents an abscess [2]. This perforated and pressed abscess emerges from the purulent excretion of the ostium. Fan *et al.* reported that gonococci is sexually transmitted infections (STIs) that is often responsible of paraurethral inflammation of glands causing male urethral discharge (MUD) [3, 4]. However, other pathogens are responsible of MUD[5]. According to the world Health Organization (WHO), STIs are one of the five types of pathologies which special care should be given [6]. In study conducted in China, *Fan et al.* reported 26% and 8% of *Staphylococcus aureus* and *Escherichia coli* in MUD respectively [7]. A rate of 47% of *Staphylococcus aureus* have been isolated in MUD in study performed in Gabon [8].

The presence study is designed to identify the isolated bacteria in MUD and susceptibility of *Staphylococcus aureus* towards currently used antibiotics.

METHODOLOGY

Study design

It was retrospective cross sectional study conducted on samples collected during a period of twelve years from men at the National Laboratory (NL) of Benin Health Ministry in Cotonou between 1st January 2004 and 31st December 2015. For each man (n= 81) between 10 and 63 years of age, we extracted from the laboratory records, age, sex, MUD sample culture results, identification of strain responsible of MUD and the correspondent antimicrobial susceptibility test (AST) results.

Ethical committee

This study was approved by the Research Ethics Committee for Applied Biomedical Sciences (CER-ISBA)

Sample collection

MUD swabs samples were obtained from each man as described by Fan *et al* [2].

Processing of samples

After inoculation, the specimens were incubated (with 5% CO2) at 37°C for 48 hours. Bacterial growth and confirmation of S*taphylococcus aureus* were done as described by Kouegnigan *et al* [8]. Screening of trichomonads and detection of intracellular Gram-negative diplococci within phagocytes were performed throughout Gram-stained smears of MUD.

Antibiotics' susceptibility was performed by disk diffusion method in solid middle according to the guidelines of the Antibiogram Committee of the French Society for Microbiology (CA-SFM) [9]. Antibiotic discs were obtained from Bio-Rad, Marne la Coquette, France.

Statistical analysis

The statistical test EpiData 3.1 was used to check-in results and EpiData Analysis V2.2.2.182 for data analysis. The chi-2 test was used to compare proportions.

RESULTS

Distribution of organisms isolated from MUD

Overall 81 MUD cultures were performed during 2004-2015 period. The mean age in this study was 30.59 years [95% Confidence Interval (CI) 28.57-32.51] ranging from 10 to 63 years. The Figure illustrates the types and proportions of microorganisms isolated in 81 men with inflammation of paraurethral glands attending the National Laboratory (NL) of Benin Health Ministry.

Table 1: Antibiotics susceptibility to *S aureus*

	Antibiotics	*Staphylococcus aureus* (n=30)	
		R(%)	S(%)
Penicillin	Ampicillin (30 ug)	100.0	-
	Amoxicillin(25 ug)	75.0	25.0
	Amoxicillin-clavulanic acid (20/10 ug)	75.0	25.0
	Oxacillin (5 ug)	75.0	25.0
2nd G Cephalosporin (2CG)	Cefoxitin (30 ug)	44.4	55.6
3rd G Cephalosporin (3CG)	Cefotaxim (30 ug)	50.0	50.0
	Ceftriaxon (30 ug)	84.6	15.4
Aminoglycosides	Netilmicin (30 ug)	50.0	50.0
	Gentamicin (30 ug)	20.0	80.0
	Kanamycin (30 ug)	80.0	20.0
Tetracyclin	Tetracyclin (30 UI)	86.7	13.3
	Minocyclin (30 UI)	36.4	63.6
Macrolides	Erythromycin (15 UI)	50.0	50.0
	Spiramycin (100 ug)	50.0	50.0
	Lincomycin (15 ug)	31.6	68.4
Phenicoles	Chloramphenicol(30 ug)	36.0	64.0
Quinolones	Ciprofloxacin (10 ug)	55.6	44.4
	Ofloxacin (5 ug)	58.8	41.2
	Pefloxacin (5 ug)	100.0	-
Trmethoprim+sulfonamides	Trimethoprim+Sulfonamides (1.25/23.75 ug)	93.3	6.7

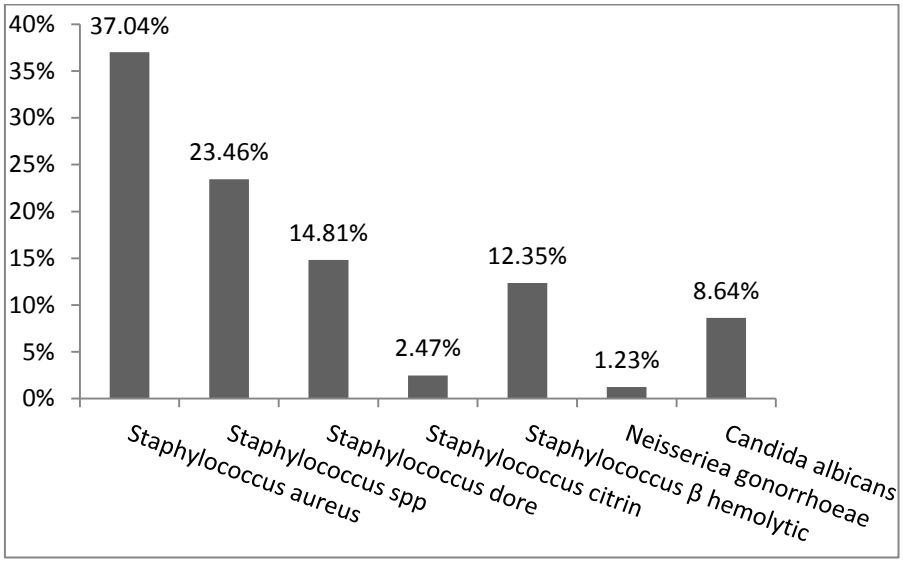

Fig-1: Types and proportions of microorganisms isolated in 81 MUD

The three main pathogens encountered were *Staphylococcus aureus* (30/81; 37.04%), *Staphylococcus spp* (19/81; 23.46%) and *Staphylococcus dore* (12/81; 14.81%).

Percentage of S aureus sensitivity isolated to various antibiotics

The Table summarizes the antibiotic susceptibility to *S aureus.* Among cephalosporin, 2CG (cefoxitin) and 3CG (cefotaxim) were active against *S aureus* (55.6% and 50% respectively) whereas 3CG (ceftriaxon) lost effectiveness with 84.6% resistance rate.

Regarding aminoglycosides (nethilmicin, gentamycin) were most effective (50% and 80% respectively). In tetracyclin group, 63.6% of *S aureus* isolates were susceptible to minocyclin

About Macrolides, lincomycin was effective against *S aureus* with 68.4% rate whereas 64% of *S aureus* isolates were susceptible to chloramphenicol in phenicoles group.

DISCUSSION

To our best knowledge, it is the first study conducted in Benin to determine the distribution of MUD bacterial and *S aureus* susceptibility in patients attending NL of health Ministry of Benin.

In our study, seven microbial species were identified from 81 patients included Gram-negative bacteria (1 case, 1.23%), Gram-positive bacteria (80 cases, 98.8%). *Fan et al* in 2014. have reported Gram-negative bacteria (23 cases, 54.8%) and Gram-positive bacteria (15 cases, 35.7%) [2].

Even if the main causes of MUD is gonococci [2], it is well know that *S aureus* is a dangerous pathogen responsible for various infections [2]. In our study, a rate of 37% has been isolated and is higher (16.7%) (p=0.019) and no significantly different (30.4%) (p= 0. 33) in studies performed by Fan *et al* [2, 7].

In order to interrupt the chain of transmission, sexually transmitted infections must be treated with appropriate antibiotics. But no medical antibiotic use could emergence contribute to resistance. Few antibiotics remain effective against *S aureus* such as cefoxitin (2CG) (55.6%), cefotaxim (3CG)(50%), nethilmicin(50%), gentamycin (80%), minocyclin (63.6%), lincomycin (68.4%) and chloramphenicol (64%), erythromycin (50%) and spiramycin (50%).

S aureus isolates were resistant to penicillin group: ampicillin (100%), amoxicillin (75%), amoxicillin-clavulanic acid (75%), oxacillin (75%). Resistance was also observed with ceftriaxon (84.6%), kanamycin (80%), tetracyclin (86.7%), ofloxacin (58.8%), ciprofloxacin (55.6%), trimethoprim+Sulfonamides (93.3%). These resistances to antibiotics might be attributed to the wide use of antimicrobial drugs. In Benin, people easily take care at Dantokpa market with antibiotics without physician prescription. In fact, Benin is a country neighboring West Africa Nigeria where a lot of counterfeit drugs are circulating as antibiotics and other pharmaceutical products. Few studies have described the susceptibility of *S aureus* in MUD. In Gabon, more than 70% of isolated staphylococci were resistant to tetracyclin and 37% to oxacillin [8] whereas 86.7% and 75% of resistance were respectively observed in this work. Eighty percent of *S aureus* isolates were susceptible to gentamycin in our study. In Gabon, Rerambiah *et al.* reported 32.5% of resistance rate to this antibiotic [8]. Fifty percent and 55.6% of isolated *S aureus* were resistant to both erythromycin and ciprofloxacin which is close to the findings of JZ *et al.* in China [10].

CONCLUSION

This study highlights the importance of routine susceptibility tests to antibiotics in the treatment of *S aureus* responsible of MUD.

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