MICROBIOLOGICAL SCREENING OF OTORRHOEA FROM PEOPLE COMING TO HOSPITAL IN MAHAJANGA

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ABSTRACT

Background: Otorrhoea commonly hits young people. Ciprofloxacin and rifampicin are the two ear drop antibiotics commonly used for the probabilistic treatment of otitis in Madagascar. This study aimed to determine the potentially dangerous bacteria involved in otitis and to identify their resistance to fluoroquinolone or rifampicin. **Method**: A prospective study was conducted with the collaboration of the Ear Nose and Throat unit (ENT) at the laboratory of UHC PZaGa in Mahajanga. In whole, 56 patients were included. Samplings of otorrhoea were performed by aspirating the auditory canal using 2ml sterile syringe and then were headed to the laboratory in less than 30 minutes for analysis. **Results:** Amidst identified microorganisms were fungus (4,7%) and bacteria (95,3%) to which Gram-negative bacilli represented 72.1% (n=44), Gram-positive cocci 6.4% (n=10), Gram-positive bacilli 8.2% (n=5) and Gram-negative cocci 3.3% (n=2). Among these bacterias, *Pseudomonas aeruginosa* and *Proteus sp* were predominant, with respectively 41% (n=25), 23% (n=14). However, three cases of *S. aureus* reported six with *negative coagulase Staphylococcus,* one with *Escherichia coli,* one with *Klebsiella sp*, one with *Haemophilus sp,* two cases with *Neisseria sp* and four cases with *Corynebacterium sp*. Two types of cultures were noticed, one of them monomorphic (91.1%, n=51) and the other polymorphic (8.9%, n=5) to which three associations of *P. aeruginosa-Proteus sp*, 1 association of *P. aeruginosa- coagulase-negative Staphylococcus* and one association of *P. aeruginosa- E. coli*. No resistance to ciprofloxacin was observed with *Pseudomonas*, *Neisseria sp, Haemophilus*, and enterobacteria except for *E. coli*. No resistance to rifampicin was observed with *S. aureus*. However, the sensitivity of *S. aureus* to ciprofloxacin decreased (one bacterium out of three). **Conclusion:** The use of rifampicin or fluoroquinolones should be based on the type of ear infections. Rifampicin is suggested only if *S. aureus* was responsible for otitis. Ciprofloxacin use is still yet sensible to Gram-negative bacilli.

Keywords: Otitis; Bacteria; Rifampicin; Ciprofloxacin.

INTRODUCTION

Otorrhoea commonly hits young people. Risk factors of otitis occurrence as described by literature, are the presence of smokers among patients [1,2], chronic otorrhoea over twelve months and the number of children living on the same roof [3]. Ciprofloxacin and rifampicin are the two ear drop antibiotics commonly used for the probabilistic treatment of otitis in Madagascar. Discharge in the ear known as otorrhoea is a common reason for medical consultation. Otitis media is an infectious disease widely found around the world. In the United States, it represented 42% of antibiotic treatment prescribed in ambulatory [4].

The change of behaviour of these pathogens because of antibiotics should lead to new reflexions on how therapy must be conducted [5]. Identifying bacteria involved in otitis media is a prerequisite for possible drugs to be tested to deal with otitis media and later, to do an effective probabilistic antibiotic therapy. This study aimed to determine the potentially dangerous bacteria involved in otitis and to identify their resistance to fluoroquinolone or rifampicin.

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MATERIAL AND METHODOLOGY

Study design: Prospective descriptive study

Ethics approval and informed consent: Informed consent was obtained from participants

Time frame: May 2016 to February 2017

Study location: at the laboratory of UHC PZaGa in Mahajanga (Madagascar) with the collaboration of the Ear Nose and Throat unit (ENT)

Inclusion criteria: Including all patients with otorrhoea who accepted to undergo consultation at the ENT unit.

Exclusion criteria: Who are on or past same antibiotic therapy

Sample size: Fifty-six

Sample collection: Samplings were performed by aspirating the auditory canal using 2ml sterile syringe;

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samples were then headed to the laboratory in less than 30 minutes and immediately tested.

Method: A questionnaire was established and completed for each patient at the ENT unit for demographic data. The samples of otorrhoea were collected and sent for following examination at the laboratory where culture media were used: chocolate agar plate, Hektoen agar which is a selective media for Gram-negative rods, Uriselect chromogenic agar to identify bacteria using colour, Mueller Hinton for the antibiogram. Sensitivity test drugs used were Ciprofloxacin (5µg charge disc, Oxoid, Grande Bretagne) and Rifampicin disc (5µg charge disc, Oxoid, Grande Bretagne).

Day 1: Direct examination, sample inoculation on culture media and incubating at 37°C for 24h;

Day 2: Identification and antibiogram, re-isolation if needed;

Day 3-4: Reading of the antibiogram and results.

RESULTS

In whole, 56 patients were included with a sex ratio of 0,93 (p>0,05). The mean age was 14.74 years old, age range from 2 to 10 years old was predominant (37,5%), followed by individuals aged between 11 to 20 years (21.4%) then 21 to 30 years (21.4%) (p>0,05). Smokers represented 46.4% (n=26 ; p>0,05). Patients from urban area were 53.6% (n=30 ; p>0,05). In descending order, the number of children living on the same roof from 1 to 2 years old was 37,5%, those of 3 to 4 (35,7%), and of 5 or above (26,8%). As for the level of education of parents, 44,6% with primary education, 25% with secondary education, 16,2% university and 7,1% illiterates (p>0,05). Chronic otitis media (COM) were the predominant (82,2%, n=46), then AOM (acute otitis media) (8,9%, n=5) and otitis externa (8,9%, n=5). Amidst identified microorganisms were fungus (4,7%) and bacteria (95,3%) to which Gram-negative rods 72,1% (n=44), Gram-positive cocci 6,4% (n=10), Gram-positive bacilli 8,2% (n=5) and Gram négative cocci 3,3% (n=2). Among these bacteria, *Pseudomonas aeruginosa* and *Proteus sp* were predominant, with respectively 41% (n=25), 23% (n=14). However, three cases of otorrhoea with *S. aureus* were reported, six with *negative coagulase Staphylococcus,* one with *Escherichia coli,* one with *Klebsiella sp*, one with *Haemophilus sp,* two cases with *Neisseria sp* and four cases with *Corynebacterium sp*. Two cultures were noticed, one of them monomorphic (91,1%, n=51) and the other polymorphic (8,9%, n=5) to which three associations of *P. aeruginosa-Proteus sp*, one association of *P. aeruginosa- coagulase-negative Staphylococcus* and 1 association of *P. aeruginosa- E. coli*. No resistance to ciprofloxacin was observed with *Pseudomonas*, *Neisseria sp, Haemophilus sp*, and *Enterobacter sp* except for *E. coli*. No resistance to rifampicin was observed with *S. aureus*. However, the sensitivity of *S. aureus* to ciprofloxacin decreased (one case of three).

Table 1: Bacteria identified

Germe	N
Pseudomonas aeruginosa	25 (41)
Haemophilus sp	1 (1.6)
Escherichia coli	1 (1.6)
Proteus sp	14 (23)
Corynebacterium sp	4 (6.7)
Staphylococcus aureus	3 (4.9)
Negative coagulase Stapylococcus	6 (9.8)
Enterobacter sp.	2 (3.3)
Streptococcus sp.	1 (1.6)
Nesseria sp	2 (3.3)
Klebsiella sp	1 (1.6)
Positive Gram Bacillis unidentifiables	1 (1.6)

Table 2: Ciprofloxacin sensitivity

Bacteria	Ciprofloxacin test	
	Sensible	Résistant
	N (%)	N (%)
Pseudomonas aeruginosa	25 (100)	0
Proteus sp	14 (100)	0
Staphylococcus aureus	1 (33)	2 (67)
Escherichia coli	0	1 (100)
Enterobacter sp	2 (100)	0
Klebsiella sp	1 (100)	0
Nesseria sp	2 (100)	0
Haemophilus sp	1 (100)	0

Table 3: Rifampicin sensitivity

Bacteria	Rifampicin test	
	Sensible N (%)	Résistant N (%)
Staphylococcus aureus	3 (100)	0

Table 4 : Otorrhoea origin

Otitis	N (%)
Otitis externa	5 (8.9)
Acute otiti media	5 (8.9)
Chronic otitis media	46 (82.2)
Total	56 (100)

DISCUSSION

Otorrhoea is a medical condition with a common reason for ENT consultation. Results showed that there is no significant association between gender and the occurrence of otorrhoea. Authors, in Italia, reported a similar result in which female gender represented 55,6% [6]. The bacteria involvement is predominant with a monomorphic culture; the association of most pathogenic bacteria is also reported by other authors [7,8]. *Pseudomonas aeruginosa* that colonise the ears is predominant (Table I). It is the case found by other authors in Niger [9] but in South Africa, it comes in the second position after *Proteus sp* [10].

As for otitis externa**,** the common bacteria were *Pseudomonas aeruginosa, enterobacteria,*

Staphylococcus aureus and *Streptococcus pyogenes*. The pool of bacteria reported in the study is similar to the results, but as noted, the predominance of *Pseudomonas aeruginosa* as causative organisms of otitis externa varies according to studies [11]. In the US, authors reported 37,7% of *Pseudomonas aeruginosa* [12].

For acute otitis media, we found 60% of *Pseudomonas aeruginosa.* Which is not the case in France, where Husson reported 4,7% [13]. In France, *Haemophilus influenza* is the first causative agent of acute otitis media, followed by *Streptococcus pneumoniae*. AOM is very common, and at least 75 % of children have contracted it before starting school [14].

For the chronic otitis media, a predominance of *Pseudomonas aeruginosa* and *Proteus sp.* was found with respectively 40% and 26%. In India, Tanmoy D. and Debabrata R., reported in 2012, 37% of *Pseudomonas aeruginosa* and 17% of *Proteus* [15]. But in Mali, the prevalence of proteus (34,79%) is much higher than that of Pseudomonas (4,35%) as reported by a study in 2014[16]. Fluoroquinolone represents the topical treatment of this condition because of its broad antimicrobial spectrum, a well-suited action against more colonising strains and due to its lack of otitis related toxicity [17].

The fungal organisms of otitis are not to be excluded. Causative agents of otitis mycosis belong exclusively to the genus *Aspergillus* and *Candida*. The frequently encountered germ in Europe is *Candida albicans*, followed by *Aspergillus niger* and *Aspergillus flavus*. Regarding the use of ciprofloxacin, all bacteria of *Pseudomonas aeruginosa* were sensitive to the antibiotic. It is also the case in South Africa [9]. But in other countries like Pakistan, sensitivity is reduced, 70,8% in 2012 [18] and of 37,7% in Nigeria in 2010 [19]. The sensitivity of *S. aureus* to ciprofloxacin decreased. This phenomenon is due to the gene mutation of the bacteria. The use of a sole therapy of ciprofloxacin enhances the gene mutation favourably. In 2015, the sensitivity of otitis *S. aureus* found in India was 29,41% [20]. On the opposite, rifampicin remained the topical drug to treat otitis in the case of *S. aureus* for Madagascar. No resistance was found during the study. As for enterobacteria or pseudomonas, rifampicin is naturally resistant to but ciprofloxacin remains the effective antibiotic for Gram-negative bacillus in case of otitis in Madagascar. Throughout the study, the identification of the otitis associated bacteria is used to guide the anti biotherapy even if the antibiogram fails to come.

CONCLUSION

In Mahajanga, the most pathogenic bacteria of otorrhoea were primarily *Pseudomonas aeruginosa* and *Proteus sp,* but fungal involvement is not to be excluded. Indeed, the use of rifampicin or fluoroquinolone must follow indication depending on the type and origin of otitis, knowing that the bacteria mutation and the resistance rate of these bacteria to these antibiotics. Rifampicin ear drop in ambulatory treatment is not advised until *S. aureus* is being identified.

Clinical use of study: Though the size of the sample is limited, these results reflect the benefit of microbiological screening of otorrhoea.

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