Sjournals
Scientific Journals
Scientific Journal of Microbiology (2015) 4(8) 70-74
ISSN 2322-2948
doi: 10.14196/sjm.v4i8.2056

Contents lists available at Sjournals
Scientific Journal of Microbiology
Journal homepage: www.Sjournals.com

Original article

Antibacterial susceptibility patterns of clinical isolates from throat infected patients attending the national ear care centre, Kaduna

M.Y. Aliyu*, A.M. Aliyu, M. Mamoon
Department of Applied Sciences College of Science and Technology, Kaduna Polytechnic, Kaduna, Nigeria.

*Corresponding author; Department of Applied Sciences College of Science and Technology, Kaduna Polytechnic, Kaduna, Nigeria.

ARTICLE INFO

Article history,
Received 24 October 2015
Accepted 23 November 2015
Available online 30 November 2015
iThenticate screening 27 October 2015
English editing 20 November 2015
Quality control 26 November 2015

Keywords,
Streptococcus
Staphylococcus
Klebsiella
Neisseria
Antibacterial susceptibility

ABSTRACT

Throat infection has a tremendous impact on public health. It is one of the reasons for frequent visits to health care facilities. The present study was carried out to assess the antibacterial susceptibility patterns of the clinical isolates collected from throat infected patients attending the National Ear Care Centre, (NECC) Kaduna Nigeria. A total of one hundred (100) clinical isolates were aseptically collected. Out of the one hundred throat isolates obtained, 91(91%) isolates were Gram-positive including Streptococcus species (37%), α-haemolytic Streptococcus species (29%), and Staphylococcus species (25%). The remaining 9(9%) isolates were Gram-negative organisms: Klebsiella species (6%) and Neisseria species (3%).The antibiotic susceptibility test was carried out using disk diffusion method. Results revealed that Ciprofloxacin is the most effective antimicrobial agent against the isolates of Streptococcus species, α-haemolytic Streptococcus species, Staphylococcus species with 30%, 21% and 17% respectively of the isolates displaying high sensitivity, however majority of the isolates display low level of resistant to most commonly used antibiotics. It is therefore necessary to carry out active antibiotic susceptibility testing and surveillance in order to curtail the problems associated with antibiotic resistance.

1. Introduction

Throat infection is another infection occurring among both children and adults. It is also known as sore throat and is often a symptom of another respiratory tract infection. The infection is however more common in winter months and is usually caused by acute coryza (common cold) or influenza. In adults, it is predisposed to vocal over-use, smoking or drinking of spirits. In children, the infection may develop as a result of acute upper respiratory infection which may lead to air way obstruction (Bryce et al., 2005). Sore throats are very common, especially in children and teenagers and most adults will have at least two or three infections every year. The medical name for sore throat is pharyngitis and it can be caused by viruses and bacteria. Most sore throats are not serious and the symptoms usually improve within seven days (Pelucchi et al., 2012).

Infections often fail to respond to the standard treatment, resulting in prolonger or repeated illness. Therefore, infections become resistant to the first-line medicines, more expensive therapies must be used and the longer duration of illness and treatment, often in hospitals, increases the health-care costs and the financial burden to families and societies. This failure of infections to heal or respond to the treatment is caused by the resistant microorganisms that caused the infection (Rice and Bonomo, 2007). An important task of the clinical microbiology laboratory is the performance of antimicrobial susceptibility testing of significant bacterial isolates. The significance of testing is to detect possible drug resistance in common pathogens and to assure susceptibility to drugs of choice for particular infections (Jorgensen and Turnidge, 2007). In many cases, susceptibility of a pathogenic organism to a specific antimicrobial drug is unpredictable. Unfortunately, it has often been the practice to try one drug after another until a favorable response is observed or if the infection is very serious, to give several together. Both approaches are undesirable, with each unnecessary drug given needless risks of toxic or allergic effects arise and the normal flora may be altered, permitting the overgrowth of pathogens resistant to the drug. A better approach is to first determine the susceptibility of the specific pathogen to various antimicrobial drugs and then choose the drug that acts against the offending organism but against as few other bacteria as possible (Nerter et al., 2007).The most widely testing methods used that provide flexibility and possible cost savings include the Disk Diffusion and the gradient diffusion methods. Other methods are broth and agar dilution methods, E-test, automated detection using various commercially available detection kits (Balous, 1999).

The aim of this study was to evaluate the antibiotic susceptibility patterns of clinical isolates from throat infections in national ear, care centre, Kaduna Nigeria in order to facilitate more effective antimicrobial treatment.

2. Materials and methods

2.1. Sample collection

A total of one hundred (100) clinical isolates, from infected throats of patients, were collected from the National Ear Care Centre (NECC), Kaduna, this hospital provides both inpatient and outpatient services for more than one million population surrounding it .

2.2. Preparation of media and sub culturing

Aseptically, plates of nutrient agar were prepared strictly following the manufacturer's instructions. The clinical isolates collected were used to inoculate the freshly prepared nutrient agar plates. The plates were placed inverted position in the incubator set at 370C for 24 hours. Subcultures were performed until pure culture was obtained.

2.3. Antibiotic susceptibility testing

The antimicrobial susceptibility test was carried out using the disk diffusion method (Bauer, 1966). For the Gram positive isolates the antimicrobial agents used were Ampiclox, gentamycin, Septrin, Pefloxacin, Ciprofloxacin, Erythromycin, Amoxacillin, Rocephin, Zinnacef, Streptomycin(S), while for gram negative isolates Septrin, Chloramphenicol, Sparfloxacin, Ciprofloxacin, Amoxacillin, Augmentin, Gentamycin Pefloxacin Tarivid and Streptomycin were used.

The inocula were prepared by growing the various isolates on separate agar plates and colonies from the plate were transferred with inoculating loop into 3 ml of normal saline in a test tube. The density of these suspensions was adjusted to 0.5 McFarland standards as demonstrated by (Murray et al., 2007). The surface of

Muller Hinton agar plates were evenly inoculated with the organisms using a sterile swab. The swab was dipped into the suspension and pressed against the side of the test tube to remove excess fluid. The wet swab was then used to inoculate the Muller Hinton agar by evenly streaking across the surface. The antibiotic discs were then applied to the surface of the inoculated agar and the plates were incubated overnight at 37ºC. The diameter of zone of growth inhibition observed was measured and compared to the chart provided by National Committee for Clinical Laboratory Standards (NCCLS), results were finally recorded.

3. Results and discussion

The result of table 1 revealed that out of one hundred (100) isolates collected from the throat, 91 isolates were Gram positive including *Streptococcus* species with a prevalence of 37%, followed by *α-haemolytic Streptococcus* species (29%), and *Staphylococcus* species (25%). On the other hand, the remaining 9 isolates were Gram negative organisms including *Klebsiella* species (6%) and *Neisseria* species (3%).

Table1
Distribution and percentage occurrence of the clinical isolates from throat infected patients.

Clinical isolates	Type of isolates	Number of isolates	Percentage of occurrence
Streptococcus sp.	Gram-positive	37	37%
α-haemolytic Streptococcus sp.	Gram-positive	29	29%
Staphylococcus sp.	Gram-positive	25	25%
Klebsiella sp.	Gram-negative	6	6%
Neisseria sp.	Gram-negative	3	3%
Total Isolates		100	100%

Table 2 shows the in vitro antimicrobial sensitivity test on the Gram negative isolates of the throat of the infected patients, which reveals that Ciprofloxacin is the most effective antimicrobial agent against the isolates of Streptococcus species, α-haemolytic Streptococcus species, Staphylococcus species with 30%, 21% and 17% respectively of the isolates displaying high sensitivity. The three isolates Streptococcus species, α-haemolytic Streptococcus species and Staphylococcus species respectively however display relatively low level of sensitivity to Zinnacef with 16%, 10% and 3%. Erythromycin and amoxicillin each inhibited growth of (24%), clinical isolates of Streptococcus species, followed by Ampiclox (23%).

Table 2
Antimicrobial susceptibility patterns of the gram-positive isolates among throat infected patients.

Clinical total no isolates	Susceptibility of the isolates to antimicrobial agents (%)									
	PEF	CN	APX	Z	AM	R	CPX	S	SXT	E
Strep spp 37	21	21	23	16	24	22	30	18	18	24
α-haemolytic Strep spp 29	13	14	16	10	14	15	21	18	15	19
Staph spp 25	14	5	7	3	5	6	17	8	6	6

KEY**:** SXT: Septrin**,** E: Erythromycin**,** APX: Ampiclox**,** CPX: Ciprofloxacin**,** AM: Amoxacillin**,** R: Rocephin**,** CN: Gentamycin, PEF: Pefloxacin**,** Z: Zinnacef**,** S: Streptomycin**.**

Table 3 illustrate the frequency of antimicrobial resistance of the Gram-negative isolates against ten (10) antimicrobial agents tested, the susceptibility test reveals that (6%) of Klebsiella species showed low level of resistance to Ciprofloxacin and Amoxicillin. However only (1%) of Neisseria isolate was found to be sensitive to Gentamycin. The result also showed that the Neisseria species indicate low level of sensitivity to Augmentin, Septrin, sparfloxacin and Chloramphenicol with only (2%) each of the isolate showing sensitivity.

Table 3
Antimicrobial susceptibility patterns of gram negative isolates collected from throat infected patients.

Clinical total no isolates	Susceptibility of the isolates to antimicrobial agents (%)									
	SXT	CH	SP	CPX	AM	AU	CN	PEF	OFX	S
Neisseria sp 6	3	2	2	3	3	2	1	3	3	2
Klebsiella sp 3	2	3	4	6	6	3	1	4	2	3

KEY: SXT:Septrin, CH:Chloramphenicol, SP:Sparfloxacin, CPX:Ciprofloxacin, AM:Amoxacillin, AU:Augmentin, CN:Gentamycin, PEF:Pefloxacin OFX:Tarivid S:Streptomycin.

From the results obtained, the organisms isolated from throat infected patients attending the National Ear Care Centre (NECC), Kaduna were *Streptococcus* and *α-haemolytic Streptococcus species, Staphylococccus species*, *Klebsiella species and Neisseria species.*

This study reveals that *Streptococcus species* were predominantly the cause of throat infection among the patients with the highest percentage of occurrence of 37%, followed by *α-haemolytic Streptococcus species* (29%), *Staphylococcus species* (25%), *Klebsiella species* (6%) and *Neisseria species* (3%). This finding is in line with the outcome of the studies carried out in Maiduguri Nigeria by Lamido et al., (2011).

The result of this study also reveals that *Streptococcus and α-haemolytic Streptococcus* were mainly sensitive to Ciprofloxacin and less sensitive to Zinnacef. Lamido et al., (2011), Nakade (2012), and Adamu et al., (2010) also obtained similar result in their findings with Ciprofloxacin having the highest susceptibility pattern.

Our findings also indicate that *Neisseria species* has high level of susceptibility to Ciprofloxacin and Amoxicillin. This is contrary to some previous studies where *Klebsiella species* were found to be resistant to Ciprofloxacin and Amoxicillin (Subha and Ananthan, 2002; Amin et al., 2009; Okonko et al., 2009). The level of susceptibility of *Staphyylococcus species* in this study goes in line with the findings of another study conducted by Nwankwo and Nasiru (2011) in Kano, Northwestern Nigeria. Most of the isolates were found to be sensitive to Ciprofloxacin than any other antibiotic. *Streptococcus species* was found to be totally sensitive to Ciprofloxacin and Erythromycin.

However, in this study, rating the antimicrobials used according to performance, Ciprofloxacin was found to perform best against all the isolates. It has a wider spectrum of activity that includes both Gram positive and Gram negative organisms. This could be seen from the results of the present study and the reports of Ehinmidu (2003); Olayinka et al., (2004) and Adamu et al*.,* (2010) who also observed high sensitivity percentage to Ciprofloxacin.

4. Conclusion

From the results of this study, it was noticed that most of the isolates both Gram-negative and Gram positive showed significant sensitivity to Ciprofloxacin. This makes it therefore to be considered as the best choice of antimicrobials for treating throat infections.

References

Adamu, J.Y., Raufu, A.I., Chimaroke, F.C., Ameh, J.A., 2010. Antimicrobial susceptibility testing of staphylococcus aureus isolated from apparently healthy humans and animals in Maiduguri, Nigeria. Int. J. Biomed. Health. Sci., 6 (4), 191-195.

Amin, A., Alos, J.I., Gomez-Garces, J.L., Ghumro, P.B., Hussain, S., Hameed, A., 2009. Prevalence of antibiotic resistance among clinical isolates of klebsiella pneumonia isolated from a tertiary health care hospital in Pakistan. Malay J. Microbiol., 5(2), 214-223.

Balous, A., 1999. Current techniques for antibiotic susceptibility testing Springfield. 256-264.

Bauer, A.W., Kirby, W.M.M., Sherris, J.C., Turck, M., 1966. Antibiotic susceptibility testing by standard single disc method. Am. J. Clin. Patholol, 45, 493–496.

Bryce, J., Boschi-Pinto, C., Shibuya, K., Black, R.E., 2005. The WHO child health epidemiology reference group. WHO estimates of the causes of death in children. Lancet. 365, 1147-52.

Ehinmidu, J.O., 2003. Antibiotic susceptibility patterns of urine bacterial isolates in Zaria, Nigeria. Trop. J. Pharmaceut. Res., 2, 223-228.

Jorgensen, J.H., Turnidge, J.D., 2007. Antibacterial susceptibility tests: dilution and disk diffusion methods in: Murray, P.R., Baron, E.J., Jorgensen, J.H., Landry, M.L., Pfaller, M.A., Editors. Manual of clinical microbiology.9th ed. Washington, DC: Am. Soci. Microbiol., 1152-72.

Lamido, T.Z., Ibrahim, A.R., Halima, S.M., 2010. Isolation and antibiotic sensitivity of Escherichia coli from pregnant and non-pregnant women attending the university of Maiduguri teaching hospital (UMTH), Maiduguri, Nigeria. Int. J. Biomed. Health. Sci., 6(4), 159-161.

Nakade, D.B., 2012. Antibiotic sensitivity of common bacterial pathogens against selected quinolones. J. Biol. Sci., 1(1), 77-79.

Nerter, E.W., Anderson, D., Robert, E., Martha, T.N., 2007. Upper respiratory infections. Microbiology: A human perspective (5th ed.). McGraw-Hill Publishing Companies Inc. New York. 573.

Nwankwo, E.O., Nasiru, M.S., 2011. Antibiotic sensitivity patterns of staphylococcus aureus from clinical isolates in a tertiary health institution in Kano, Northwestern Nigeria. Panafrican Med. J., 8(4), 11-17.

Okonko, I.O., Donbraye-Emmanuel, O.B., Ijandipe, L.A., Ogun, A.A., Adedeji, A.O., Udeze, A.O., 2009. Antibiotics sensitivity and resistance patterns of uropathogens to nitrofurantoin and nalidixic acid in pregnant women with urinary tract infections in Ibadan, Nigeria. Middle-East J. Sci. Res., 4(2), 105-109.

Olayinka, B.O., Olonitola, O.S., Olayinka, A.T., Raji, B., 2004. Antibiotic susceptibility pattern and multiple resistance index in staphylococcus aureus isolates in Zaria, Nigeria. J. Trop. Biosci., 4, 51-54.

Pelucchi, C., Grigoryan, L., Galeone, C., Esposito, S., Huovinen, P., Little, P., Verheij, T., 2012. ESCMID guideline for the management of acute sore throat. Clin. Microbiol. Infect. 18(1), 1-27.

Rice, L.B., Bonomo, R.A., 2007. Mechanisms of resistance to antibacterial agents. In: Murry, P.R., Baron, E.J., Jorgensen, J.H., Landry, M.L., Pfaller, M.A., Eds. Manual of Clinical Microbiology. 9th ed. Washington DC: Am. Soci. Microbiol., 1114-1145.

Subha, A., Ananthan, S., 2002. Extended spectrum β-lactamaes mediated resistance to third generation cephalosporins among klebsiella pneumonia in chennai. Indian J. Med. Microbiol., 20, 92-95.

How to cite this article: Aliyu, M.Y., Aliyu, A.M., Mamoon, M., 2015. Antibacterial susceptibility patterns of clinical isolates from throat infected patients attending the national ear care centre, Kaduna. Scientific Journal of Microbiology, 4(8), 70-74.